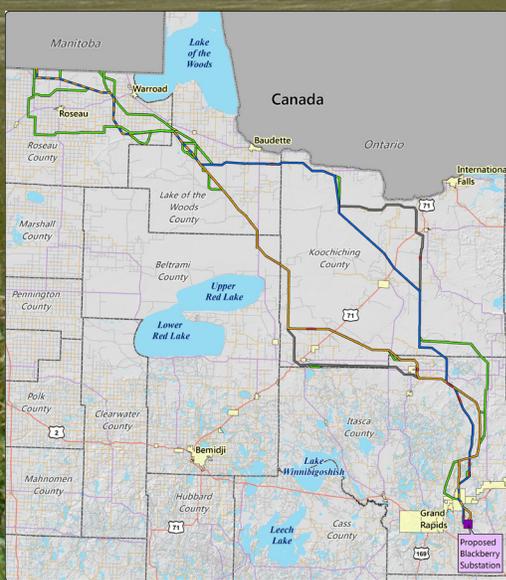


Great Northern Transmission Line Project

Draft Environmental Impact Statement
Volume I: Impact Analyses



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Draft

Great Northern
Transmission Line Project
Environmental Impact Statement

Volume I: Impact Analyses

U.S. Department of Energy
Office of Electricity Delivery
and Energy Reliability



Minnesota
Department of Commerce



Cooperating Agencies

U.S. Environmental Protection Agency
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service

June 2015

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COVER SHEET - ABSTRACT

DOE/EIS-0499

RESPONSIBLE FEDERAL AGENCY: U.S. Department of Energy (DOE), Office of Electricity Delivery and Energy Reliability

RESPONSIBLE STATE GOVERNMENTAL UNIT: Minnesota Department of Commerce (MN DOC)

COOPERATING AGENCIES: U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (EPA)

TITLE: Great Northern Transmission Line Project Draft Environmental Impact Statement (DOE/EIS-0499)

LOCATION: Roseau, Lake of the Woods, Koochiching, Beltrami, and Itasca counties in Minnesota

The DOE and the Minnesota Department of Commerce—Energy Environmental Review and Analysis (DOC-EERA) are jointly preparing an EIS for the proposed Project.

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DOE and DOC-EERA invite comments on this Draft EIS during the 45-day comment period that begins with the EPA publication of the Notice of Availability (NOA) in the Federal Register. The federal and state EIS Web sites provide information on public hearings and information meetings on the Draft EIS to be held at several locations in Minnesota during the comment period. Comments on the Draft EIS may be made verbally or in writing at a public hearing, or may be sent to Julie Smith at the address or email above or by fax to (202) 586-8008, or to William Storm at the address or email.

Written and oral comments will be given equal weight, and any comments received after the comment period ends will be considered to the extent practicable.

Abstract

On April 15, 2014, Minnesota Power (the Applicant) applied to the U.S. Department of Energy (DOE) for a Presidential permit to construct, operate, maintain, and connect an approximately 220-mile long, 500-kilovolt (kV) overhead, single-circuit, alternating current (AC) electric transmission system that would cross the international border between the Canadian Province of Manitoba and Roseau County, Minnesota (Minnesota Power 2014, reference (1)). On the same date, the Applicant also applied to the Minnesota Public Utilities Commission (MN PUC) for a Route Permit under the Minnesota Power Plant Siting Act (PPSA) (Minnesota Power 2014, reference (1)).

On October 29, 2014, the Applicant submitted an amendment to their Presidential permit and Route Permit applications to both DOE and the MN PUC, respectively, as a result of new information. The amended Presidential permit application changed the location of the proposed international border crossing under DOE's consideration.

The Great Northern Transmission Line Project, as amended (proposed Project), would run from the Applicant's proposed international border crossing in Roseau County, Minnesota to the existing Blackberry Substation near Grand Rapids, Minnesota. It would be located on all new 200-foot wide right-of-way with a wider area required for certain spans at angle and corner structures, for guyed structures, or where special design requirements are dictated by topography. The transmission towers would be steel lattice structures for the majority of the route, with the exact type of structure in any given location dependent on land type, land use, and potential effect on the surrounding landscape. Tower heights would range from approximately 100 feet to about 170 feet. In some instances, such as where the proposed Project crosses an existing transmission line, taller structures would be required. The Applicant is also proposing to expand the existing Blackberry Substation to accommodate the required 500 kV interconnection and to construct a new 500 kV series compensation station, regeneration stations, permanent access roads, temporary access roads, laydown areas, and fly-in sites.

COVER SHEET - ABSTRACT

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S.1 Background

Minnesota Power, a regulated utility division of ALLETE, Inc. (Applicant), proposes to construct and operate the Great Northern Transmission Line, which is an approximately 220-mile long, 500 kilovolt (kV) overhead, single-circuit, alternating current (AC) transmission line. The proposed Great Northern Transmission Line would cross the international border from Canada into the United States in Roseau County, Minnesota, and it would connect into a new 500 kV substation adjacent to the existing Blackberry Substation near Grand Rapids, Minnesota (Map S-1).

On April 15, 2014, the Applicant applied to the U.S. Department of Energy (DOE) for a Presidential permit to cross the U.S. / Canadian border in Roseau County, Minnesota.¹⁻² On the same date, the Applicant also applied to the Minnesota Public Utilities Commission (MN PUC) for a Route Permit under the Minnesota Power Plant Siting Act (PPSA).¹⁻³

On October 29, 2014, the Applicant submitted an amendment to their Presidential permit and Route Permit applications to both DOE and the MN PUC, respectively. The amended Presidential permit application changed the location of the proposed international border crossing under DOE's consideration to cross the U.S. / Canadian border at latitude 49 00 00.00 N and longitude 95 54 50.49 W, which is approximately 2.9 miles east of Highway 89 in Roseau County.

The Great Northern Transmission Line Project, as amended (proposed Project), would be located on all new 200-foot wide right-of-way (ROW) with a wider area required for certain spans at angle and corner structures, for guyed structures, or for areas where special design requirements are dictated by topography. The transmission towers would be steel lattice structures for the majority of the route, with the exact type of structure in any given location dependent on land type, land use, and potential effect on the surrounding landscape. Tower heights would range from approximately 100 feet to about 170 feet. In some instances, such as where the proposed Project crosses an existing transmission line, taller structures would be required. As a part of its proposal, the Applicant would expand the existing Blackberry Substation to accommodate the required 500 kV interconnection and construct a new 500 kV series compensation station, regeneration stations,

permanent access roads, temporary access roads, laydown areas, and fly-in sites.

Transmission lines that cross an international border with the United States require a Presidential permit from the DOE.¹⁻⁴ DOE's National Electricity Delivery Division, in the Office of Electricity Delivery and Energy Reliability, is responsible for issuing Presidential permits for such cross-border electric transmission facilities. If issued, a Presidential permit would allow for the construction, operation, maintenance, and connection of the U.S. portion of the proposed Project at the international border.

DOE has determined that the potential issuance of a Presidential permit for the proposed Project would constitute a major Federal action and that an Environmental Impact Statement (EIS) is the appropriate level of review under the National Environment Policy Act of 1969 (NEPA). DOE issued its Notice of Intent (NOI) to prepare an EIS and to conduct public scoping for the proposed Federal Action in June 2014 (79 FR 36493). This EIS is prepared in compliance with the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations (CFR) Parts 1500-1508) and DOE's NEPA regulations (10 CFR Part 1021), and other applicable federal laws.

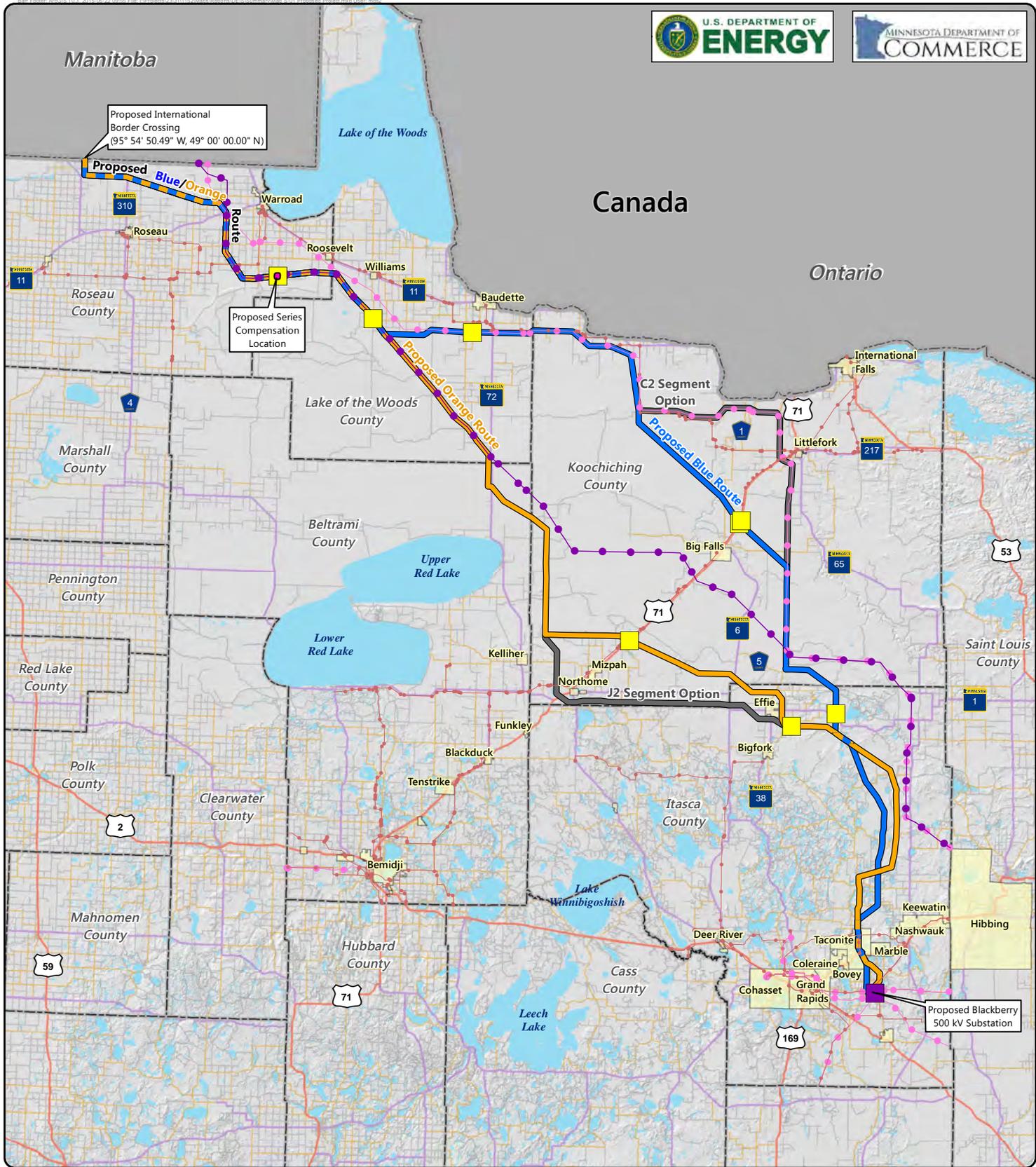
Other federal environmental actions being implemented in coordination with the NEPA process include: floodplain and wetlands assessments, in accordance with Executive Orders 11988 and 11990, respectively, and DOE floodplain and wetland review requirements at 10 CFR Part 1022; Clean Air Act conformity requirements; Clean Water Act (CWA) permit requirements; threatened and endangered species consultation under the Endangered Species Act (ESA); and consultation under the National Historic Preservation Act (NHPA).

The Minnesota PPSA provides that no person may construct a high voltage transmission line without a Route Permit from the MN PUC. Under the PPSA¹⁻⁵, a high voltage transmission line includes a transmission line of 100 kV or more and greater than 1,500 feet in length, with associated facilities.¹⁻⁶ As part of the Route Permit, the MN PUC would also list any conditions it will require for constructing, operating, and maintaining the proposed Project.

Applications for transmission line route permits are subject to environmental review conducted by the Minnesota Department of Commerce – Energy

2 The Presidential permit application and application amendment are available at: <http://www.greatnortherneis.org/Home/documents>
 3 Available at: <http://mn.gov/commerce/energyfacilities/resource.html?id=33849> (The Route Permit Application is nearly identical to the Presidential permit application)

4 Pursuant to Executive Order (EO) 10485 of 1953, as amended by Executive Order 12038, and 10 Code of Federal Regulations (CFR) Section 205.320
 5 Minnesota Statute, Section 216E.03, subdivision 2
 6 Minnesota Statute, Section 216E.01; subdivision 4



- Proposed Regeneration Site
 - Proposed Series Compensation Station
 - Proposed Blackberry 500 kV Substation
- Proposed Routes**
- Blue/Orange Route
 - Blue Route
 - Orange Route
 - Segment Option

- Existing Transmission Lines**
- 69 or 115 kV
 - 230 kV
 - 500 kV
- Boundaries**
- Municipal Boundary
 - County Boundary
 - International Boundary

Map S-1

PROPOSED PROJECT
Great Northern Transmission Line
Draft Environmental Impact Statement



Environmental Review and Analysis (DOC-EERA) staff (Minnesota Rules, part 7850.2500). Projects proceeding under the full state permitting process, such as this one, require the preparation of a state EIS. A state EIS is a document which describes the potential human and environmental impacts of the project and possible mitigation measures, including route, alignment, and site alternatives.

In order to avoid duplication in environmental review procedures, DOE and DOC-EERA prepared a single EIS to comply with environmental review requirements under NEPA and the Minnesota PPSA. DOE is acting as federal joint lead agency with the DOC-EERA acting as state joint lead agency per 40 CFR 1501.5(b).

DOE and DOC-EERA will jointly implement public involvement and the public comment process on the Draft EIS by holding joint federal and state public hearings and informational meetings on the Draft EIS in various locations in the project area in northern Minnesota.

S.2 Regulatory Framework

S.2.1 DOE's Purpose and Need for Agency Action

The purpose of and need for DOE action is to decide whether to or not to grant the Applicant a Presidential permit. If granted, the Presidential permit for the U.S. portion of the proposed Project (Office of Electricity Delivery and Energy Reliability (OE) Docket Number PP-398) would authorize the Applicant to construct, operate, maintain, and connect the U.S. portion of the proposed Project that would cross the international border between the U.S. and Canada.

S.2.2 Minnesota Public Utilities Commission Actions

The MN PUC is charged with selecting routes that minimize adverse human and environmental impacts while ensuring continuing electric power system reliability and integrity. Route Permits issued by the MN PUC include a permitted final route and anticipated alignment, as well as conditions specifying construction and operation standards. Under Minnesota law, the Route Permit process does not determine whether the proposed Project is needed. That decision is made as part of a separate process: the certificate of need.

The MN PUC must also determine whether there is a need for a transmission line, and establish the

size, type, and required end points of the proposed Project. The Applicant filed its certificate of need application for the proposed Project with the MN PUC on October 22, 2013. Following a formal contested case hearing, the Administrative Law Judge (ALJ) issued a report on March 31, 2015, which concluded that the Applicant satisfied the certificate of need requirements and recommended the MN PUC grant a certificate of need to the Applicant for the construction of the proposed Project and associated facilities. In May 2015, the MN PUC granted a certificate of need to the Applicant for the proposed Project.¹⁻⁷

S.3 Applicant's Objectives

The Applicant's proposal is primarily driven by three factors: 1) the opportunity to access new hydroelectric generating capacity in Manitoba, 2) projected electricity shortages in their service territory and across the region by 2020, and 3) the potential to use hydroelectric power to complement the Applicant's wind energy investments in North Dakota.

The Applicant has a 250 MW power purchase agreement with Manitoba Hydro. The proposed Project would permit Manitoba Hydro, which has been supplying power to the regional grid since 1970, to transmit approximately 883 megawatt (MW) of additional power to Minnesota.

S.4 Proposed Project Overview

The Applicant proposes to construct, operate, maintain, and connect a 220-mile, overhead, single-circuit 500 kV AC transmission line between the Minnesota-Manitoba border crossing northwest of Roseau, Minnesota, and the existing Blackberry 230/115 kV Substation near Grand Rapids, Minnesota. The Applicant's proposal also includes associated substation facilities and transmission system modifications at the Blackberry Substation site, construction of a new 500 kV series compensation station series compensation station (a structure which will house the 500 kV series capacitor banks necessary for reliable operation and performance of the proposed transmission line), and necessary access roads, construction lay-down areas and fly-in sites. A new Blackberry 500 kV Substation would be required for the proposed Project and would be constructed adjacent to and east of the existing Blackberry 230/115 kV Substation. The

⁷ MN PUC Docket No. E015/CN-12 1163, "Certificate of Need Application" is available at: <https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={65F60020-4419-41F0-AB43-E4D7F22A6E28}&documentTitle=20153-108775-01>

proposed Project would carry hydropower generated by facilities operated by Manitoba Hydro, a Canadian electric utility, and would support the regional electric grid.

S.4.1 Route Selection

The Applicant underwent a lengthy process to identify route alternatives for analysis in their permit applications, and in response to public comment, they identified two route alternatives – the Blue Route and the Orange Route to be submitted as part of their permit applications to both DOE and MN PUC. These two proposed routes are described in detail in Sections 2.4.1 and 2.4.2 of the EIS. In response to comments from agencies and the public, the Applicant also identified four segment options, as described in Section 2.4.3.

S.4.2 Supporting Structures and Right of Way

The proposed GNTL Project would be located on all new ROW that would be approximately 200 feet wide. A wider ROW (250 to 300 feet) would be required for certain spans of the proposed Project, at angle and corner structures, for guyed structures, or where special design requirements are dictated by topography. The Applicant is evaluating several steel structure types and configurations, including a self-supporting lattice structure, a lattice guyed-V structure, and a lattice guyed-delta structure. The Applicant estimates that four to five structures would be needed per mile of transmission line.

The structures would typically range in height from 100 to 170 feet, depending on the structure type and the terrain. In some instances, such as where the proposed Project crosses an existing transmission line, taller structures may be required. Structures are not anticipated to be taller than 200 feet so they would not be required to meet Federal Aviation Administration (FAA) lighting standards. The structures would be placed approximately 1,000 to 1,700 feet apart, with a maximum span of 1,700 feet.

The Applicant has requested a ROW width of 200 feet and a route width that varies from 650 to 3,000 feet in order to provide flexibility during detailed design, and in part to try to accommodate landowner's preferences along the selected route.

S.4.3 Interference and Contingencies

The proposed Project would be designed to minimize interference with radio and television signals and two-way mobile radios. The Applicant would also take into account the possibility that

extreme weather events could cause simultaneous outages of both the proposed 500 kV transmission line and the existing 500 kV transmission line. They would also install protective devices such as circuit breakers and relays.

S.4.4 Land Acquisition

The Applicant would have to obtain easement rights for any private property that the 200-foot ROW would cross. An ROW representative would contact the owners who would analyze the property and point out to the landowner where the facilities would be located on their property. The representative would value the property and make an offer for the easement rights. If they cannot agree, the utility can initiate a condemnation proceeding, and a three-person condemnation commission would hold a valuation hearing and finally make an award.

The landowner may then file an appeal, and a jury would decide the outcome. At any point in this process, the case can be dismissed if the parties reach a settlement. Additional land for the proposed Blackberry Substation has already been secured.

S.4.5 Construction

Once the Applicant has obtained all the necessary permits, they would coordinate with landowners to prepare the ROW and temporary use areas for construction. They would also coordinate with local utilities and transportation authorities, and would then clear the ROW of woody plants, while taking measures to avoid impacts to birds, rare species, and rare ecological communities.

They would mitigate any possible damage to soils, follow best management practices to avoid introduction of invasive species, and take preventive measure to keep from damaging wetlands. They can also prevent potentially damaging spills by carefully maintaining their vehicles. Any spills that do occur would be treated according to the Applicant's previously determined Spill Prevention Control and Countermeasure plans.

Construction materials would be hauled either directly to structure sites from the local highway or railroad network, or brought first to material staging areas and then to the structure sites. They can be moved by flatbed trucks, or in the case of reinforced concrete foundations, by large rubber-tired vehicles. The Applicant and its contractors would remove construction waste and scrap on a regular schedule or at the end of each construction phase to minimize short-term visual impacts.

The Applicant would mitigate impacts on watercourses and waterbodies during construction by spanning these resources, placing structures above the normal high water level, restricting vehicular activity within riparian corridors, and minimizing the use of heavy equipment when clearing riparian corridors. Once all construction has been completed, the Applicant would fully restore any areas that have not been permanently altered.

For a summary of Applicant proposed measures to minimize environmental impacts, see Table 2-2 in the EIS.

S.4.6 Cost and Schedule

Based on current information, the estimated cost of the total proposed Project is between \$495.5 and \$647.7 million. The cost for routine operation and maintenance typically ranges from \$1,100 to \$1,600 per mile, so the annual costs would range from \$242,000 to \$352,000 for the 220-mile transmission line. Construction is projected to begin in October 2016, and the projected in-service date is June 2020.

S.5 Agency Coordination and Public Involvement

Public participation and interagency coordination are integral elements of the NEPA and state environmental review process under the PPSA and are intended to promote open communication between DOE, DOC-EERA, federal and state regulatory agencies, local governments, American Indian tribes, potential stakeholder organizations, and the public. All individuals and organizations with a potential interest in the proposed Project are encouraged to participate in the public involvement process.

S.5.1 Cooperating Agencies

DOE invited other federal agencies to participate in the preparation of the EIS as cooperating agencies because of their special expertise or jurisdiction by law (40 CFR Part 1501.6). The cooperating agencies are U.S. Army Corps of Engineers – St. Paul District (USACE), U.S. Fish and Wildlife Service – Twin Cities Ecological Field Office (USFWS), and Region 5 of the U.S. Environmental Protection Agency (EPA). DOE also invited the Red Lake Nation of Chippewa Indians to participate as a cooperating agency in the preparation of the EIS and is working with the tribe in order to coordinate this relationship moving forward. See Section 1.2.4.1 and Appendix A for more information about previous and planned tribal consultation.

S.5.2 Public Involvement

DOE and DOC-EERA have implemented a joint planning and scoping process to encourage agency and public involvement in reviewing the proposed Project, and to identify the range of reasonable alternatives. On June 20, 2014, MN PUC issued a Notice of Public Information and EIS Scoping Meeting. The notice described the proposed Project and provided an overview of the MN PUC process and opportunities for public comment.

On June 27, 2014, DOE published its NOI to Prepare an EIS and to Conduct Public Scoping Meetings; Notice of Floodplains and Wetlands Involvement for the Great Northern Transmission Line (79 Federal Register (FR) 36493). The NOI explained that DOE would be assessing potential environmental impacts and issues associated with the proposed Project and the No Action alternative.

During the public scoping period, DOE and DOC-EERA conducted eight joint scoping meetings, and scoping comments were accepted by DOE and DOC-EERA through August 15, 2014. DOE prepared a Scoping Summary Report which is available in Appendix C of this EIS as well as on the EIS Website (<http://www.greatnortherneis.org>). Comments received during the scoping period were used to identify matters to be addressed in this EIS including resources potentially impacted by the project and alternative route segment and alignment modifications.

In addition, DOC-EERA conducted two citizen Workgroup meetings and consultation with local units of government within the project area in an effort to provide an additional opportunity for local representatives to discuss their concerns, develop potential alternative route segments, and review potential zoning conflicts. Based on the scoping comments, feedback provided by the Workgroup, and discussions with DOE and the cooperating agencies, the DOC-EERA issued a scoping decision for the EIS on January 8, 2015. The scoping decision identified the issues to be addressed by DOE and DOC-EERA in the EIS. A description of how public involvement was incorporated into additional alternatives is provided on pages S-12 and S-20 of this Summary.

DOE and DOC-EERA are providing a 45-day public review period and will hold joint public hearings/informational meetings for the Draft EIS. The public review period is initiated through the publication of a Notice of Availability (NOA) in the *Federal Register* by the EPA. State regulations also require mailed notices and publication of the notice of Draft EIS availability

and the opportunity for the public to comment in the Environmental Quarterly Bulletin (EQB) Monitor.

Under Minnesota law, an ALJ will hold state public hearings and an evidentiary contested case hearing on the Route Permit application following release of the Draft EIS, during which interested persons can submit evidence supporting or challenging the proposed Project. Evidence submitted as part of the MN PUC Route Permit process, as well as the comments received on the draft EIS by DOE and DOC-EERA, will ultimately inform the development of the final EIS.

S.6 Alternatives Analyzed

The EIS addresses the No Action alternative, DOE's Proposed Action, the Applicant's preferred alternative (proposed Project), four alternative border crossings, 22 route segment alternatives, and nine alignment modifications.

S.6.1 No Action Alternative

CEQ and DOE regulations require consideration of a No Action alternative. The No Action alternative serves as a baseline against which the potential environmental impacts of a proposed action can be evaluated. Under the No Action alternative, DOE would not issue a Presidential permit for the proposed Project, the transmission line would not be constructed as proposed, and none of the potential environmental impacts associated with the project would occur. However, there would also be a number of negative consequences.

First, the Applicant would not be able to take delivery from Manitoba Hydro under the MN PUC-approved 250 MW power purchase agreement and a pending 133 MW Renewable Optimization Agreement. This, in turn, could prevent the Applicant from filling its customers' future energy needs in a way that would minimize both costs and environmental impacts.

Second, the proposed line would not be available during a contingency on the existing 500 kV transmission line to reduce loading and improve performance. System reliability would be adversely impacted.

Third, future North Dakota wind generation options would be adversely impacted. According to the *Midcontinent Independent System Operator (MISO)*

*Manitoba Hydro Wind Synergy Study*¹⁻⁸, a new 500 kV interconnection with Manitoba would provide benefits to the entire MISO footprint, including substantial reductions in wind curtailments and better use of both wind and hydro resources, resulting in increased efficiency for the energy supply system as a whole.

S.6.2 DOE's Proposed Federal Action and Preferred Alternative

DOE's proposed federal action is the granting of the Presidential permit to authorize the construction, operation, and maintenance of the proposed Project at the Applicant's proposed international border crossing. DOE's Presidential permit decision is solely for the international border crossing, while the proposed construction, operation, maintenance, and connection of the portion of the transmission line within the United States is a connected action to DOE's proposed action.

DOE's preferred alternative is to grant a Presidential permit for the Applicant's proposed international border crossing at latitude 49 00 00.00 N and longitude 95 54 50.49 W, approximately 2.9 miles east of Highway 89 in Roseau County, Minnesota.

S.6.3 Applicant's Preferred Alternative

The Applicant's preferred alternative is referred to as the Blue Route in the EIS Map S-1 and would originate at the Minnesota-Manitoba border roughly 2.9 miles east of Highway 89 in Roseau County, Minnesota. It would proceed southeast 0.5 miles to 410th Street, approximately 0.16 of a mile from the intersection of 410th Street and County Road 3. The proposed Project would travel south 2 miles to 390th Street and turn east following 390th Street for 10.5 miles (where 390th street then turns into County Road 118). At 0.25 miles from Highway 310 the proposed transmission line would turn southeast and continue for another 12 miles. At 0.5 miles from 510th Avenue the proposed transmission line would again turn and travel 2.3 miles east to join the existing Minnkota Power 230 kV transmission line. The proposed Project would parallel the existing Minnkota Power 230 kV transmission line southeast for 1.8 miles and then turn south where it would meet the existing Xcel 500 kV transmission line. Beginning at a tenth of mile north of US Highway 11, the proposed transmission line would parallel the existing Xcel 500 kV transmission line route for 36

8 Available at: https://www.google.com/search?sourceid=navlient&aq=&oq=Miso+Manitoba+Hydro+wind+energy+study&ie=UTF-8&rlz=1T4NDKB_enUS570US570&q=Miso+Manitoba+Hydro+wind+energy+study&gs_l=hp...0.0.0.13675.....0.oBT5HzE-xNA

miles after which it would turn east, leaving the Xcel 500 kV transmission line 2 miles southeast of the intersection of Faunce Forest Road and 19th Street Southwest in Lake of the Woods County (the Blue Route enters the Central Section in this location).

This alternative would proceed east for 5.8 miles and then turn northeast to rejoin the existing Minnkota Power 230 kV transmission line at its intersection with Pitt Grade Trail. The proposed transmission line would then parallel this existing 230 kV transmission line in an easterly direction for 31 miles to a point 1.5 miles west of the County Road 86 in Koochiching County where it would then proceed southeast for 8.3 miles and then south for 1.8 miles. At this point, the proposed Project would be roughly 1.5 miles south from the intersection of County Road 32 and County Road 36 in Koochiching County. The transmission line would then continue southeast for 21.3 miles and intersect Highway 71 roughly 4.5 miles northeast of Big Falls, where it would continue an additional 9.6 miles to the southeast where it would rejoin the existing Minnkota Power 230 kV transmission line, following the existing transmission line in a southerly direction for 12.3 miles.

The proposed Project would continue south for 3 miles following Deer River Line Road (also called County Road 62). The transmission line would turn east for 3.5 miles and then turn southeast again and travel 5 miles to Itasca County near the intersection of County Road 523 and South Lofgrin Forest Road (the Blue Route enters the East Section

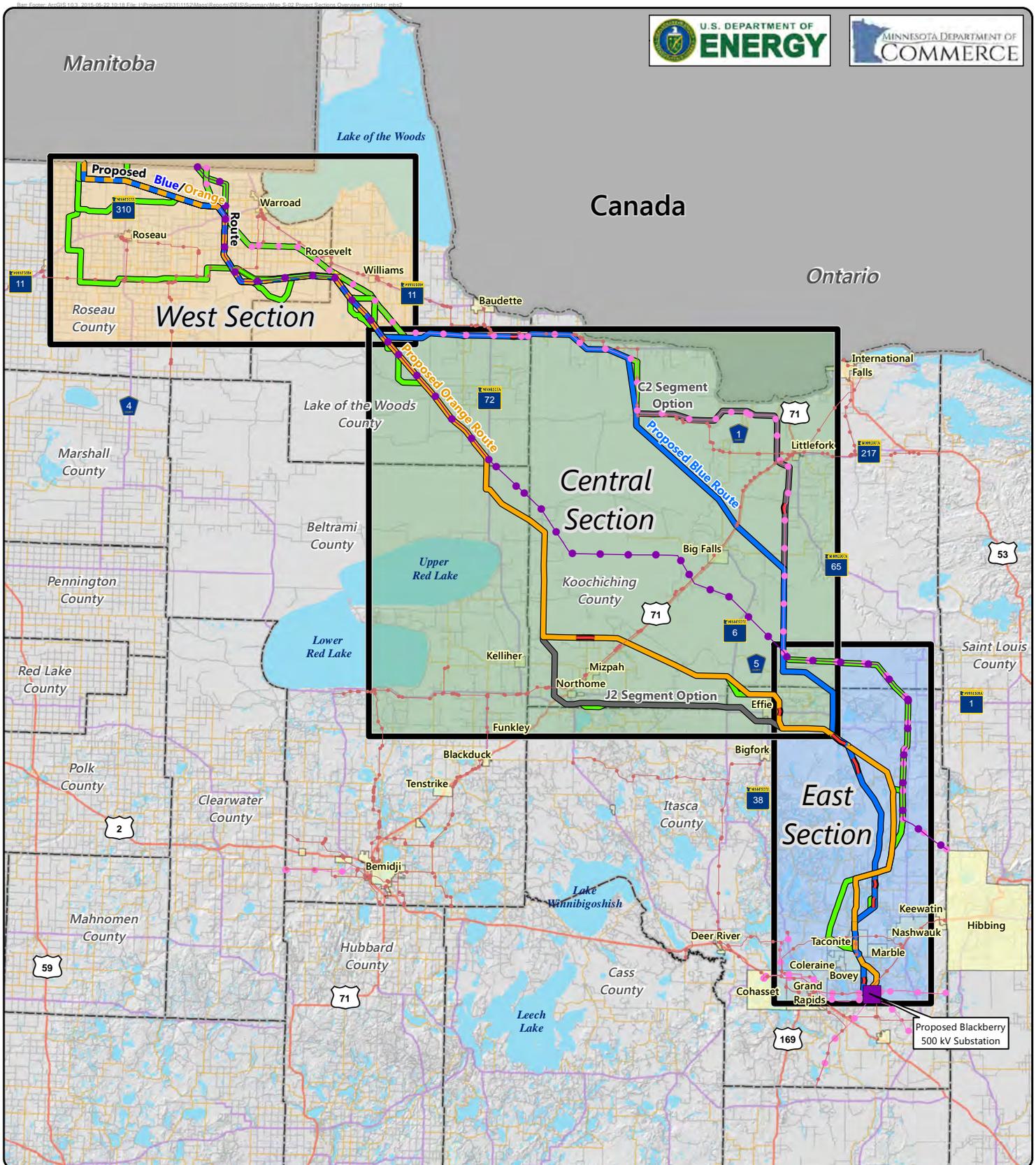
in this location). The proposed transmission line would extend south for 6.4 miles, turning slightly southeast for another 2.8 miles, and then head south for 11.5 miles. At 2.8 miles north of Scooty Lake, the proposed Project would continue to travel 7.5 miles south to County Road 530, where it would cross the West Fork Prairie River. At County Road 530, the proposed transmission line would again turn south and continue 6.5 miles to County Road 57. The transmission line would turn southwest for 3.7 miles, and then head south for 3.8 miles to Diamond Lake Road. The route then heads south, southeast for 2.7 miles. At the Swan River, the proposed Project heads south for 4.4 miles where it would meet the existing Minnesota Power 230-kV transmission line, paralleling it for 1 mile to the Blackberry 500 kV Substation near Grand Rapids, Minnesota. The Blue Route is 220 miles in length.

S.6.4 Border Crossing, Route, and Alignment Alternatives

For the purposes of understanding the environmental settings associated with the proposed Great Northern Transmission Line Project, and to facilitate the analysis in the EIS, the transmission line route was divided into three geographical sections: West, Central, and East (Map S-2). These sections are shown on Map S-3, Map S-4, and Map S-5, respectively. Within each section, multiple variation areas were developed by DOE and DOC-EERA to address local issues (Table S-1).

Table S-1 Sections and Corresponding Variation Areas

Sections	Variation Areas
West Section	Border Crossing Variation Area
	Roseau Lake WMA Variation Area
	Cedar Bend WMA Variation Area
	Beltrami North Variation Area
	Beltrami North Central Variation Area
Central Section	Pine Island Variation Area
	Beltrami South Central Variation Area
	Beltrami South Variation Area
	North Black River Variation Area
	C2 Segment Option Variation Area
	J2 Segment Option Variation Area
	Northome Variation Area
	Cutfoot Variation Area
East Section	Effie Variation Area
	East Bear Lake Variation Area
	Balsam Variation Area
	Dead Man’s Pond Variation Area
	Blackberry Variation Area



- Proposed Blackberry 500 kV Substation
- Project Section
- Proposed Routes**
- Blue/Orange Route
- Blue Route
- Orange Route
- Segment Option

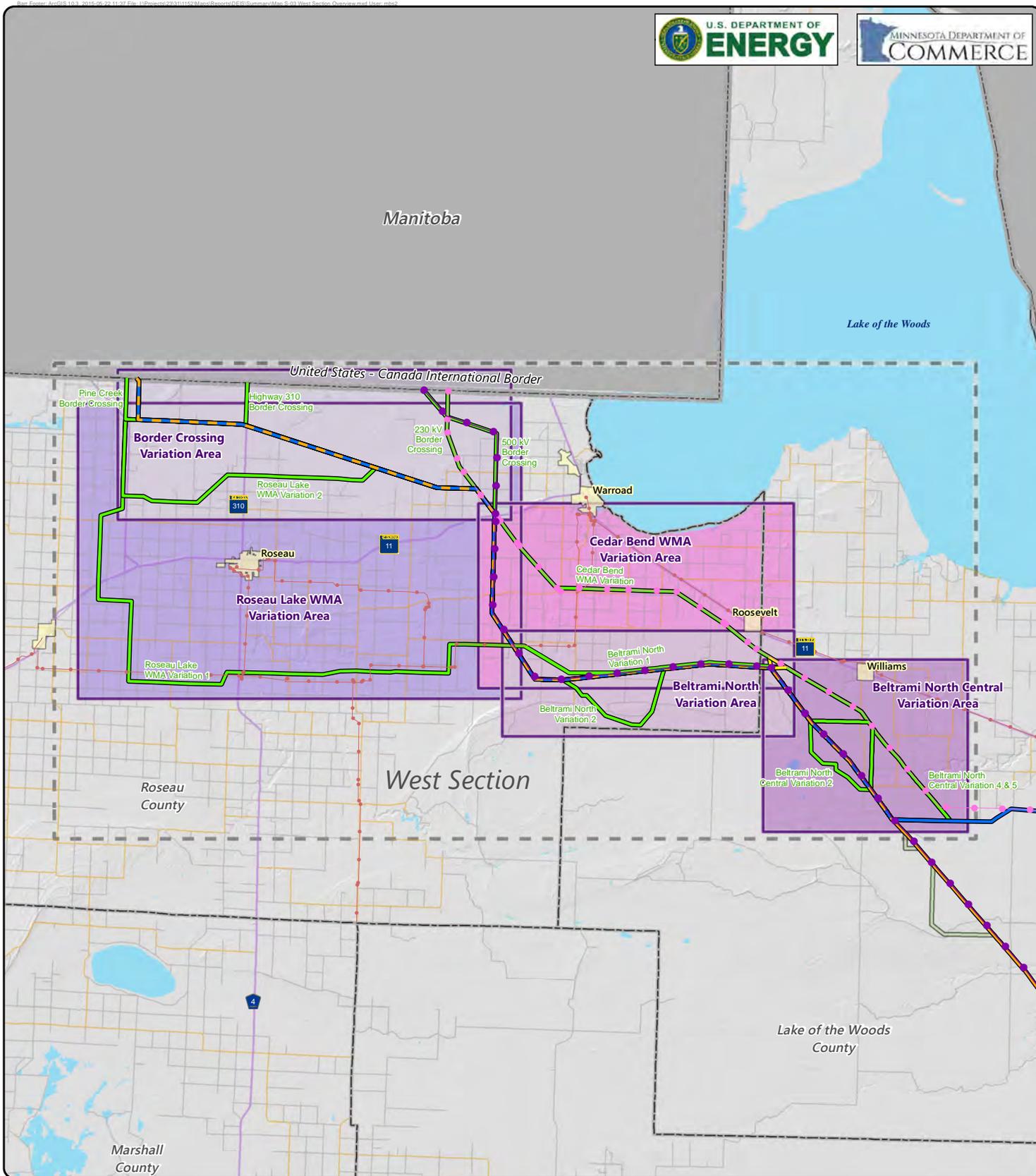
- Alternatives**
- Route Variation
- Route Variation Hop
- Alignment Modification
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV

- Municipal Boundary
- County Boundary
- International Boundary

Map S-2

PROJECT SECTIONS OVERVIEW
Great Northern Transmission Line
Draft Environmental Impact Statement





Proposed Routes

- Blue/Orange Route
- Blue Route
- Orange Route

Alternatives

- Route Variation
- Route Variation Hop

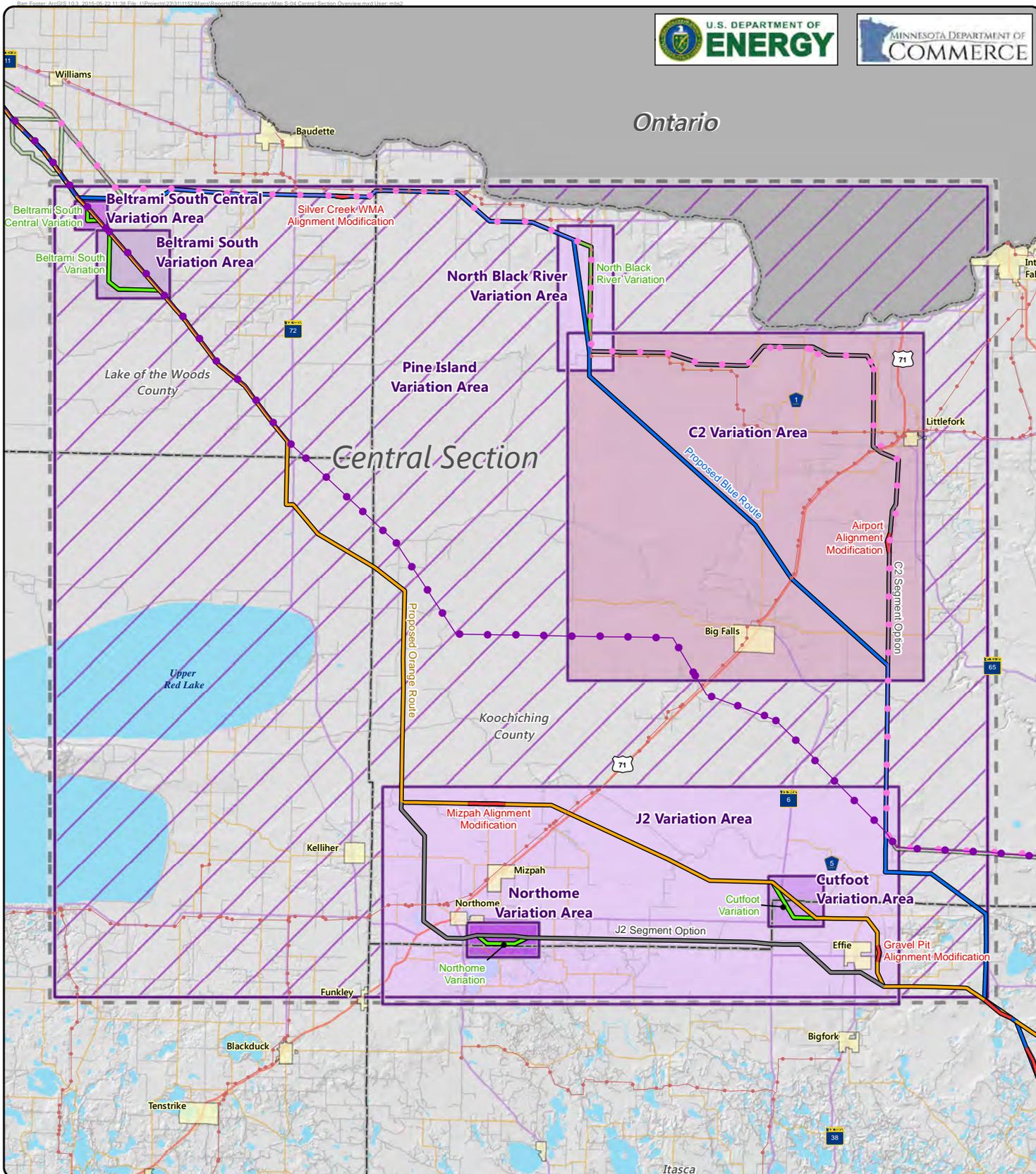
Existing Transmission Lines

- 69 or 115 kV
- 230 kV
- 500 kV
- Municipal Boundary
- County Boundary
- International Boundary

Map S-3

WEST SECTION OVERVIEW
Great Northern Transmission Line
Draft Environmental Impact Statement





Proposed Routes

- Blue/Orange Route
- Blue Route
- Orange Route
- Segment Option

Alternatives

- Route Variation
- Alignment Modification

Variation Area

Existing Transmission Lines

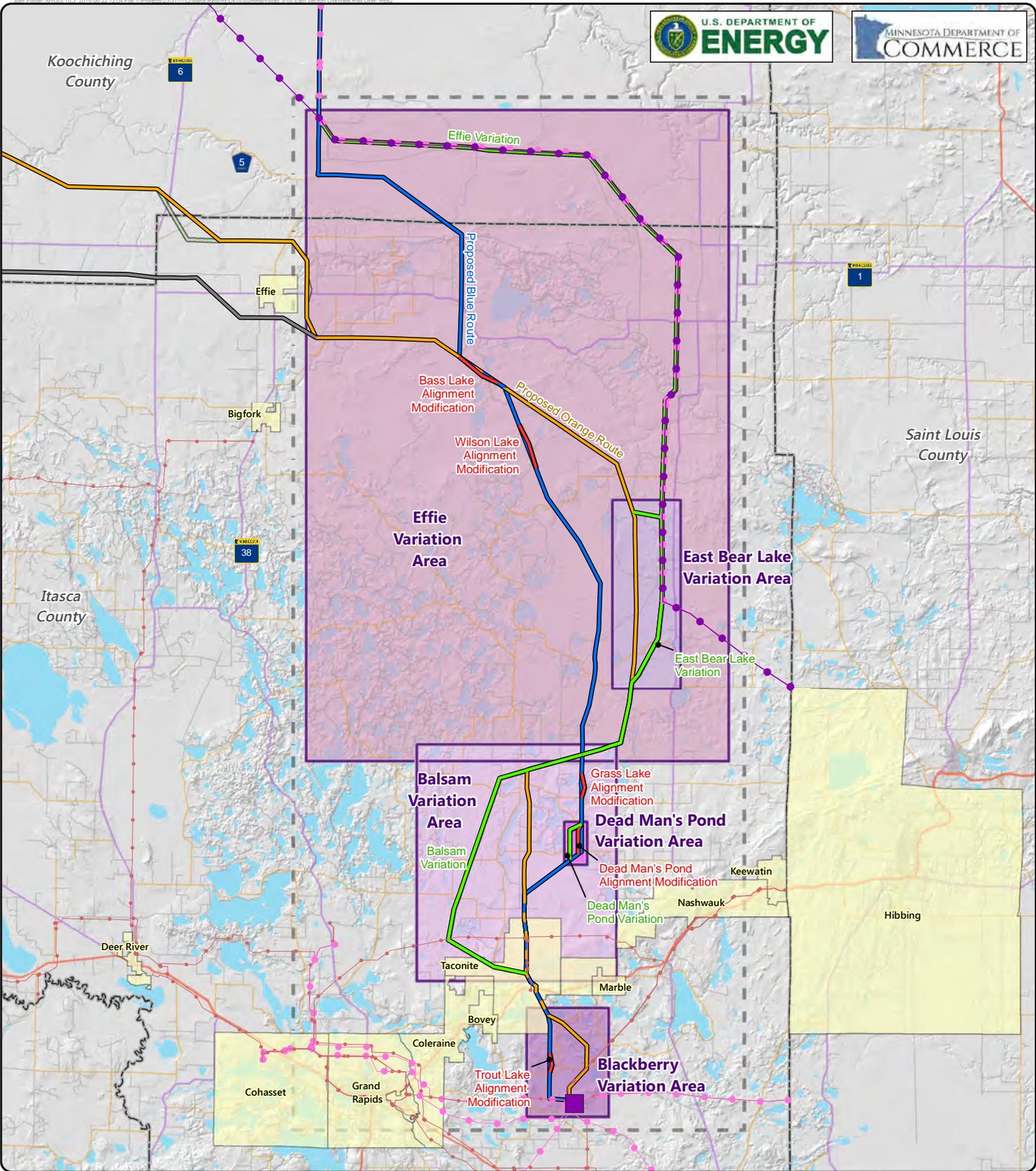
- 69 or 115 kV
- 230 kV
- 500 kV

- Municipal Boundary
- County Boundary
- International Boundary

Map S-4

CENTRAL SECTION OVERVIEW
Great Northern Transmission Line
Draft Environmental Impact Statement





- Alternatives**
- Route Variation
 - Alignment Modification

- Proposed Blackberry Substation Location
- Variation Area

- Existing Transmission Lines**
- 69 or 115 kV
 - 230 kV
 - 500 kV
 - Municipal Boundary
 - County Boundary

Map S-5

EAST SECTION OVERVIEW
Great Northern Transmission Line
Draft Environmental Impact Statement



“Variation areas” are smaller geographic areas that allow evaluation and comparison of local issues, such as wildlife management areas or colocation of transmission lines, across alternatives. Each variation area includes the Applicant’s proposed routes and local route alternatives or “variations.” The EIS evaluates the local issues within each variation area, progressing from west to east across each section.

The “variations” analyzed are specific combinations of segments within a variation area designed to avoid specific local issues. These variations were developed from alternative route segments identified during the scoping process, as described in Chapter 1. The EIS evaluates the potential environmental impacts and presents the results for the variation(s) and the proposed route(s) within each variation area.

The connector segments, or “hops”, connect the end of one variation to the beginning of another variation. These hops generally connect variations from west to east from one variation area to a different variation area. The exception is one hop that connects the end of a variation from east to west in order to allow additional flexibility for a complete route alternative. The EIS uses the hops to develop complete route alternatives.

“Alignment modifications” are minor adjustments of the transmission line alignment (centerline and

associated ROW) within the proposed routes that are analyzed in the EIS. During the scoping process, commenters developed and proposed these alignment modifications. The purpose for each alignment modification is to provide a potential alternative for analysis that avoids a specific issue raised by commenters (e.g., sensitive lands, residences, airstrips, etc.). The EIS evaluates issues identified during the scoping process and presents the results for the alignment modification and the comparable segment of the Applicant’s proposed route alternative.

There are five variation areas within the West Section: Border Crossing, Roseau Lake WMA, Cedar Bend WMA, Beltrami North, and Beltrami North Central. In addition, there are five connector segments, or hops, that connect variations between the Cedar Bend WMA, Beltrami North, and Beltrami North Central variation areas (Table S-2).

In addition, there are five proposed international border crossings within the Border Crossing Variation Area of the West Section as identified in Table S-3. These alternatives include the Border Crossing Pine Creek Variation, Border Crossing Hwy 310 Variation, Border Crossing 230kV Variation, and the Border Crossing 500kV Variation alternatives.

Table S-2 Proposed Route and Variations in the West Section

Variation Area	Name in the EIS	Name(s) in the Scoping Decision Document	Length (mi)
Border Crossing	Proposed Border Crossing-Blue/Orange Route	Blue/Orange Shared	25.0
	Border Crossing Pine Creek Variation	Pine Creek Border Crossing Alternative Route Segment	25.7
	Border Crossing Hwy 310 Variation	Hwy 310 Border Crossing Alternative Route Segment	18.6
	Border Crossing 500kV Variation	500kV Border Crossing Alternative Route Segment	10.1
	Border Crossing 230kV Variation	230kV Border Crossing Alternative Route Segment	8.2
Roseau Lake WMA	Proposed Blue/Orange Route	Blue/Orange Shared Route	30.7
	Roseau Lake WMA Variation 1	Roseau Lake WMA Alternative Route Segment 1	44.1
	Roseau Lake WMA Variation 2	Roseau Lake WMA Alternative Route Segment 2	37.5
Cedar Bend WMA	Proposed Blue/Orange Route	Blue/Orange Route	24.7
	Cedar Bend WMA Variation	Cedar Bend WMA Alternative Route Segment	19.6
Beltrami North	Proposed Blue/Orange Route	Blue/Orange Route	16.5
	Beltrami North Variation 1	Beltrami WMA Alternative Route Segment 1 North	15.8
	Beltrami North Variation 2	Beltrami WMA Alternative Route Segment 2	19.7
Beltrami North Central	Proposed Blue/Orange Route	Blue/Orange Route	11.6
	Beltrami North Central Variation 1	Beltrami WMA Alternative Route Segment 4 & 5	13.7
	Beltrami North Central Variation 2	Beltrami WMA Alternative Route Segment 3	12.6
	Beltrami North Central Variation 3	Beltrami WMA Alternative Route Segment 1 South & 5	12.2
	Beltrami North Central Variation 4	Beltrami WMA Alternative Route Segment 1 South	13.5
	Beltrami North Central Variation 5	Beltrami WMA Alternative Route Segment 4 & 1 South	15.0

Table S-3 Proposed International Border Crossing in the West Section

Variation Area	Name in the EIS	Location of International Border Crossing	
		Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)
Border Crossing	Proposed Border Crossing-Blue/Orange Route	49° 00' 00.00" N	95° 55' 35.79" W
	Border Crossing Pine Creek Variation	49° 00' 00.00" N	95° 54' 50.49" W
	Border Crossing Hwy 310 Variation	49° 00' 00.00" N	95° 46' 8.82" W
	Border Crossing 500kV Variation	49° 00' 00.00" N	95° 32' 23.96" W
	Border Crossing 230kV Variation	49° 00' 00.00" N	95° 30' 26.18" W

Table S-4 Proposed Route Alternatives, Variations, and Alignment Modifications in the Central Section

Variation Area	Name in the EIS	Name(s) in the Scoping Decision Document	Length (mi)
Pine Island	Proposed Blue Route	Blue Route	109.8
	Proposed Orange Route	Orange Route	105.4
	Silver Creek WMA Alignment Modification	Silver Creek WMA Alignment Modification	1.0
	Proposed Blue Route	Blue Route	1.0
Beltrami South Central	Proposed Orange Route	Orange Route	1.2
	Beltrami South Central Variation	Beltrami WMA Alternative Route Segment 7	1.7
Beltrami South	Proposed Orange Route	Orange Route	5.6
	Beltrami South Variation	Beltrami WMA Alternative Route Segment 8	7.5
North Black River	Proposed Blue Route	Blue Route	8.4
	North Black River Variation	North Black River Alternative Route Segment	9.2
C2 Segment Option	Proposed Blue Route	Blue Route	32.8
	C2 Segment Option Variation	C2 Proposed Alternative	46.0
	Airstrip Alignment Modification	Airstrip Alignment Modification	1.5
	C2 Segment Option Variation	C2 Proposed Alternative	1.5
J2 Segment Option	Proposed Orange Route	Orange Route	42.2
	J2 Segment Option Variation	J2 Proposed Alternative	45.2
	Mizpah Alignment Modification	Mizpah Alignment Modification	2.8
	Proposed Orange Route	Orange Route	2.8
	Gravel Pit Alignment Modification	Gravel Pit Alignment Modification	1.2
	Proposed Orange Route	Orange Route	1.2
Northome	J2 Segment Option Variation	J2 Proposed Alternative	3.7
	Northome Variation	Northome Alternative Route Segment	4.0
Cutfoot	Proposed Orange Route	Orange Route	4.2
	Cutfoot Variation	Cutfoot Alternative Route Segment	4.8

There are eight variation areas within the Central Section: Pine Island, Beltrami South Central, Beltrami South, North Black River, C2, J2, Northome, and Cutfoot identified in Table S-4. In addition, there are four alignment modifications within the proposed routes, Section 4.2): Silver Creek WMA, Airstrip, Mizpah, and Gravel Pit.

There are five variation areas within the East Section: Effie, East Bear Lake, Balsam, Dead Man's Pond, and

Blackberry. In addition, there are five alignment modifications: Bass Lake, Wilson Lake, Grass Lake, Dead Man's Pond, and Trout Lake (Table S-5).

S.7 Alternatives Considered but Eliminated from Detailed Analysis

A few scoping comments focused on the potential effects of the proposed Project on Canadian resources and First Nations. Consistent with

Table S-5 Proposed Routes, Variations, and Alignment Modifications in the East Section

Variation Area	Name in the EIS	Name(s) in the Scoping Decision Document	Length (mi)
Effie	Proposed Blue Route	Blue & Blue/Orange Routes	41.1
	Proposed Orange Route	Blue, Blue/Orange, & Orange Routes	44.6
	Effie Variation	Effie Alternative Route Segment	49.8
	Bass Lake Alignment Modification	Bass Lake Alignment Modification	2.5
	Proposed Blue/Orange Route	Blue/Orange Route	2.4
	Wilson Lake Alignment Modification	Wilson Lake Alignment Modification	2.4
	Proposed Blue Route	Blue Route	2.4
East Bear Lake	Proposed Orange Route	Orange Route	8.9
	East Bear Lake Variation	East Bear Lake Alternative Route Segment	10.5
Balsam	Proposed Blue Route	Blue & Blue/Orange Routes	12.9
	Proposed Orange Route	Orange & Blue/Orange	13.7
	Balsam Variation	Balsam Alternative Route Segment 1	17.8
	Grass Lake Alignment Modification	Grass Lake Alignment Modification	1.3
	Proposed Blue Route	Blue Route	1.3
Dead Man's Pond	Proposed Blue Route	Blue Route	2.2
	Dead Man's Pond Variation	Dead Man's Pond Alternative Route Segment	2.3
	Dead Man's Pond Alignment Modification	Dead Man's Pond Alignment Modification	1.6
	Proposed Blue Route	Blue Route	1.6
Blackberry	Proposed Blue Route	Blue Route	5.4
	Proposed Orange Route	Orange Route	6.1
	Trout Lake Alignment Modification	Trout Lake Alignment Modification	1.0
	Proposed Orange Route	Orange Route	1.0

Executive Order 12114, Environmental Effects Abroad of Major Federal Actions (January 4, 1979), this issue was determined by DOE and DOC-EERA to be outside of the scope of the EIS. Implementation of the proposed Project would require construction of a transmission line and other infrastructure in Canada. An environmental review of potential impacts from the portion of the proposed transmission line project in Manitoba will be developed and submitted as part of Canada's authorization process associated with the facilities to be constructed in the province. NEPA does not require an analysis of environmental impacts that occur within another sovereign nation that result from actions approved by that sovereign nation. For that reason, potential environmental impacts in Canada are not addressed in this EIS.

During the public scoping period, five (5) border crossing alternatives, forty (40) new alternative route segments and nine (9) alignment modifications were suggested by the public and agencies for detailed study in the EIS. Four of these border crossing alternatives were determined by DOE as potentially reasonable alternatives and are included in the scope of the EIS. The fifth border crossing alternative was

not included because it was proposed to cross a restricted MN Department of Natural Resources Scientific and Natural Area and was thereby determined by DOE to be infeasible.

With respect to the new route alternatives, the DOC-EERA is charged with including alternatives which will "assist in the [Commission's] decision on the permit application." When route alternatives are proposed during the scoping process, the DOC-EERA analyzes them using a set of criteria, which include considerations related to timing, justification for inclusion in the EIS (i.e., does it mitigate a potential impact from the proposed Project?), jurisdictional restrictions, and feasibility. The DOC-EERA Scoping Decision, determined in coordination with DOE, specifies that the EIS will evaluate 22 new alternative route segments and all nine new alignment modifications. The DOC-EERA Scoping Decision document articulates in detail the agencies' rationale for eliminating each of the 11 alternative route segments from analysis in this EIS.

S.8 Summary of General Impacts Common to All Alternatives

General impacts that are common to all alternatives are provided in Chapter 5 and are discussed below.

S.8.1 Human Settlement

The proposed Project could potentially result in displacement, noise, air quality, property value, electronic interference, and transportation and public service impacts.

Displacement. There are no residences, churches, schools, daycare centers, or nursing homes within the 200-foot ROW or within 1,500 feet of the proposed Project's anticipated alignment. Therefore, none of these structures would be displaced during construction, operation, or maintenance of the proposed Project. A limited number of non-residential structures (e.g., farm structures and animal sheds) are located within the ROW, however as the proposed routes and variations cross relatively sparsely populated areas, adequate space is generally available to allow the alignment of the transmission line to be adjusted so that no buildings would ultimately be located within the ROW. Minor structures, such as farm structures and animal sheds may be displaced. Owners will be consulted and made a land acquisition offer as described in Section S.4.4.

Noise. Potential noise associated with the proposed Project could result from machinery used for constructing and operating the transmission line and the new Blackberry Substation, 500 kV series compensation station, or regeneration stations.

Since noise impacts are a function of the transmission line and equipment, predicted noise levels would not vary by proposed route or variation. The proposed routes and variations cross relatively sparsely populated areas and only a few sensitive receptors (schools, daycares, and nursing homes) could be impacted and those noise levels would be expected to be below Minnesota noise standards for any proposed route or variation. Construction noise at any proposed Project location would occur on a temporary, intermittent, and localized basis during daytime hours. In addition, noise from operating, maintaining, and making emergency repairs to the transmission line would be expected to be limited.

Air Quality. Air quality conditions relative to National Ambient Air Quality Standards (NAAQS) in the State of Minnesota are assessed at the county level. EPA designates Roseau, Lake of the Woods, Beltrami, Koochiching, and Itasca Counties as being

in attainment or unclassifiable (to be considered in attainment) for all NAAQS (EPA 2015, reference (2)). Therefore, DOE's proposed action is exempt from the General Conformity Rule requirements of the Clean Air Act.

Constructing and operating the proposed Project would result in direct and indirect emissions of criteria air pollutants and greenhouse gases (GHGs). These emissions would be short-term and localized. In addition, the proposed Project would reduce indirect criteria pollutants and GHGs because it would reduce the need for coal-fired generation in Minnesota by replacing it with wind and hydroelectric generation (for detailed information on air quality, see Section 5.2.1.3).

Property Values. The precise relationship between property values and proximity to high voltage transmission lines is difficult to quantify, since numerous interrelated factors impact property values. Based on the trends identified in numerous property value studies (Weber and Jensen 1978, reference (3); Jensen and Weber 1982, reference (4); Jackson and Pitts 2010, reference (5)), the impacts from the proposed Project would be expected to be minimal.

Electronic Interference. Potential electronic interference impacts would be expected to be minimal for the proposed Project and would be similar for all proposed routes and variations. No communication towers have been identified within the ROW, and electromagnetic noise from the proposed Project would not be expected to interfere with television, radio, or cell phone transmissions.

Transportation and Public Services. Due to relatively low existing traffic volumes, impacts on local roadways would be short-term and localized. Use of oversized or heavy vehicles would be approved in advance by the Minnesota Department of Transportation (MnDOT), and the Applicant would repair any damage.

Similarly, the proposed Project would not be expected to impact either public airports or private airstrips. All airports are located more than a mile from the proposed Project, and the Applicant would abide by all Federal Aviation Administration (FAA) guidelines. The Applicant has already developed alignment modifications to eliminate potential impacts on unregulated private airstrips.

The proposed Project would not be expected to impact public electric, gas or water utilities, although it could impact existing electric transmission and distribution lines when it passes over them. Design

of the proposed Project would minimize such potential interference.

Emergency Services. The proposed Project would not be expected to impact police, fire, or emergency medical services, and impacts would not be expected to vary by proposed route or variation. The Applicant would coordinate temporary road closures with local authorities and would provide safe access for emergency vehicles. During construction and operation of the proposed Project, some emergency services might also be required. However, existing emergency services are equipped to handle such situations.

Environmental Justice. Analysis indicates that no minority or low-income groups would be exposed to disproportionate impacts from the proposed Project. In addition, many of the impacts would be short-term and localized and would not be expected to differ between the proposed routes and variations considered.

Socioeconomics. During construction, an average of 120 construction workers would be employed annually, with a peak as high as 213 workers. Jobs would also be created in service sectors that support construction and workers. No full- or part-time workers would be expected to be hired during operation and maintenance of the proposed Project.

The proposed Project would also have positive tax benefits. The estimated tax and revenue impacts of the proposed Project would not differ by proposed route or variation considered. Taxes would be collected at the local, county, and state levels and tax rates would be set independently in each jurisdiction.

During the pre-development and construction phases, the proposed Project would generate approximately \$28 million in state and local taxes through compensation, business, household, and corporate taxes. Direct and indirect expenditures during construction would total approximately \$839 million.

Housing demand would also not differ by proposed route or variation considered. Given the available temporary housing supply in each geographic section of the proposed Project, the short-term construction period, and the movement of workers along the route, impacts to temporary housing would be expected to be limited. The proposed Project would also bring economic benefits to proprietors of the hotels, motels, and RV campgrounds rented by temporary workers.

Recreation and Tourism. Recreational resources within 1,500 feet of the proposed centerline include

state forests, state parks, scenic byways, state trails, and snowmobile and water trails. Further, state trails, forests, scenic byways, and snowmobile and water trails all cross the ROW for the proposed routes and variations.

State forests, for example, offer opportunities for camping, hunting, bird watching, hiking, canoeing/kayaking, picnicking, horseback riding, snowmobiling, boating, and fishing. State parks offer opportunities for wildlife and bird watching, hiking, mountain biking, cross country skiing, snowmobiling, camping, fishing, and swimming.

Impacts to recreation and tourism during construction would be expected to be short-term and local, lasting only for the duration of construction. Once constructed, project components, such as the overhead transmission line, could have long-term indirect aesthetic impacts that could detract from the setting of nearby recreational activities. Coordination with relevant state agencies will continue to minimize these impacts.

The proposed Project could result in long-term indirect impacts to recreation and tourism. While potential impacts to recreation and tourism could occur, they would not be expected to vary by proposed route or variation considered, as the proposed Project would cross state forests and have a similar impact wherever it is visible.

S.8.2 Public Health and Safety

Public health and safety concerns from the proposed Project include electric and magnetic fields (EMFs), implantable medical devices, stray voltage, induced voltage, intentional destructive acts, and environmental contamination.

Electric and Magnetic Fields. Human-made EMFs are caused by electrical devices and are characterized by their wavelength, amplitude (strength), and the frequencies at which they alternate. Electric fields are produced by voltage and increase in strength as the voltage increases.

Electric field strength is measured in kilovolts per meter (kV/m), and the strength of an electric field decreases rapidly as the distance from the source increases. Electric fields are easily shielded or weakened by most objects and materials, such as trees or buildings.

Magnetic fields result from the flow of electrical current (measured in amps) moving through wires or electrical devices. The strength of a magnetic field is proportional to the electrical current, and

it is typically measured in milliGauss (mG). As with electric fields, the strength of a magnetic field decreases rapidly as the distance from the source increases. Unlike electric fields, however, magnetic fields are not easily shielded or weakened by objects or materials.

A concern related to EMF is the potential for adverse health effects due to EMF exposure. Laboratory, animal, and cellular studies fail to show a cause and effect relationship between disease and EMF exposure at common EMF levels and a biological mechanism for how EMF might cause disease has not been established. Epidemiological studies, however, indicate that there is an association between childhood leukemia and EMF exposure, but there is no consistent association between EMF exposure and other diseases in children or adults.

The Applicant modeled and calculated EMF with two transmission line structure configurations (stand-alone 500 kV transmission line and 500 kV transmission line paralleling existing transmission lines). The extensive modeling and analysis showed that potential public-health effects of EMFs are not expected from the proposed Project. EMF levels are predicted based on the proposed Project components rather than the surrounding environment. Therefore, EMF levels within the ROW would remain below the Minnesota standard regardless of the proposed route or variation considered.

Implantable Medical Devices. Implantable medical devices, such as pacemakers, implantable cardioverter defibrillators (ICDs), neurostimulators, and insulin pumps may be subject to interference from EMFs, which could mistakenly trigger a device or inhibit it from responding appropriately.

A 2005 theoretical study evaluated the risk for a patient with a unipolar cardiac pacemaker under worst-case and real-life conditions under a high voltage overhead transmission line (Scholten 2005, reference (6)). This study concluded that beneath high voltage overhead transmission lines a life-threatening situation for cardiac pacemaker patients is unlikely because if a cardiac device is affected, it is typically a temporary asynchronous pacing (i.e., fixed rate pacing), and the device returns to its normal operation when the person moves away from the source of EMFs. An interference between the implant and the electromagnetic fields, however, cannot be excluded.

There are no residences, businesses, or sensitive receptors such as hospitals or nursing homes located nearby, so the regular presence of implantable

medical devices within the ROW would not be expected.

Electric field strength levels decrease with distance, and maximum levels at the edge of the ROW are anticipated to be less than 2 kV/m, and, in most instances, less than 1 kV/m; manufacturers indicate that electric fields below 6.0 kV/m are unlikely to affect most implantable medical devices (Electric Power Research Institute 2004, reference (7)). In the event that a cardiac device is affected, the effect is typically a temporary asynchronous pacing, and the device returns to its normal operation when the person moves away from the source of EMFs

Accordingly, potential impacts to implantable medical devices and their users would be expected to be minimal, regardless of the proposed route or variation considered.

Stray Voltage. Stray voltage can arise from neutral currents flowing through the earth via ground rods, pipes, or other conducting objects, or from faulty wiring or faulty grounding of conducting objects in a facility. Therefore, stray voltage could exist at any business, residence, or farm which uses electricity, independent of whether there is a transmission line nearby. Factors that could influence the intensity of stray voltage include wire size and length, the quality of connections, the number and resistance of ground rods and the current being grounded.

The proposed 500 kV transmission line would not directly connect to businesses, residences, or farms in the area, so impacts from stray voltage would not be expected from operating the transmission line. All proposed routes and variations, however, would at some point parallel existing distribution lines, so in those locations additional currents could occur on the distribution line. These currents would not be expected to result in stray voltage in the proposed Project area. If there is not proper grounding or wiring on the distribution system or at a nearby residence, business, or farm, however, these currents could result in a small amount of current flowing through people or livestock, resulting in involuntary muscle contractions and/or pain.

Induced Voltage. The electric field from a transmission line can couple with any object, like a vehicle or metal fence, capable of conducting electrical energy.

If the objects upon which a voltage is induced 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. For metallic objects where effective grounding is more difficult to achieve, impacts such as mild shock could occur.

The primary means of minimizing this potential impact would be to avoid exiting and entering machinery directly under a transmission line and adhering to MN PUC and National Electric Safety Code (NESC) standards on electric field-limit and line-to-ground clearances. That being the case, induced voltage resulting from the proposed Project would be expected to be minimal and would not vary by proposed route or variation.

Intentional Destructive Acts. While the likelihood for intentional destructive acts to the proposed Project is difficult to predict, it is unlikely that such acts would occur, based on past experience along the thousands of miles of electrical transmission lines in the U.S.

Far more likely would be mischievous or criminal acts of theft or vandalism, which would generally pose lower safety risks. Although the possibility of some theft or vandalism is considered likely, related health and safety effects on workers or the public from the proposed Project would be expected to be minimal and do not vary by proposed route or variation.

Environmental Contamination. During construction, spills may occur or excavation may uncover existing contamination, which could pose a safety or health risk to construction workers, the public, wildlife, botanical habitats, soil and sediment, and water resources.

The Applicant is currently developing a Spill Prevention, Control, and Countermeasures Plan (SPCC), which is required to prevent discharge of oil into navigable waters of the U.S., if the aboveground storage capacity for the substance is greater than 1,320 gallons and there is a reasonable expectation of a discharge.

Constructing and maintaining any transmission line involves using hazardous materials and generating waste. If handled improperly, the public or the surrounding environment could be adversely impacted. For all the proposed routes and variations, soil would be disturbed and, as a result, any existing contaminated soil or groundwater could be mobilized.

Four active investigation and cleanup sites and three active hazardous waste sites are located within approximately 2,000 feet of the proposed routes and variations. If contamination is identified during construction activities, the construction would be

discontinued in that location until further evaluation of the conditions is performed.

One contaminated site has been identified within a proposed ROW (J2 Segment Option Variation in the J2 Segment Option Variation Area (see Appendix M). Potential impacts to public health and safety from environmental contamination would be expected to be minimal. Potential impacts from the proposed Project would not be expected to vary by proposed route or variation.

Worker Health and Safety. Constructing transmission lines and related structures is relatively dangerous. Accidents that could occur at construction sites would include heavy equipment and commuting vehicle accidents, electrocution, personal accidents (e.g., slips, trips, and falls), hazardous materials spills, construction-induced fires, and accidents from using watercraft, aircraft, or driving equipment on the ice in winter.

The Applicant and its contractors would comply with Occupational Safety and Health Administration regulations and with other federal, state, and local regulatory requirements and would implement best management practices to safeguard workers and the public from construction and operational hazards. Construction activities would also be similar at all locations and would not vary by route or variation.

To minimize dangers from lightning strikes, the Applicant would also incorporate safety measures, including the use of shield wires, circuit breakers, and relays, into design plans.

S.9 Summary of Route-Specific Impacts Associated with the Project

Impacts that are unique to a specific alternative within the West, Central, and East sections are described below. Impacts are presented geographically (rather than by resource) to assist readers of this EIS in finding information specific to particular areas or locations of interest to them along the length of the proposed Project. The Applicant's proposed route, the Applicant's alternative routes, the 22 alternative route segments, and nine alignment modifications that were proposed by agencies and the public during scoping were analyzed by DOE in coordination with the DOC-EERA, and were jointly determined to be within the scope of this EIS, and therefore studied in detail.

S.9.1 Route-Specific Impacts to West Section

Impacts that are unique to a specific alternative within the West Section are described below.

Human Settlement. Aesthetic, or visual resources, are generally defined as the natural and built features of a landscape that may be viewed by the public and contribute to the visual quality and character of an area.

Much of the West Section is characterized by forest, woodland, brushland, and peatland, with lakes, ponds, streams, and wetlands. Agricultural land is also present within this section.

No county parks, state parks, state forest campgrounds, national parks, or water access points are present within the 200-foot ROW or within 1,500 feet of the anticipated alignment of the proposed routes and variations in the West Section; however residences, historic architectural sites, state forests, national forests, scenic byways, state trails, snowmobile trails, and state water trails are present within 1,500 feet. No residences, state trails, historic architectural sites, national forests, nor state water trails are located within the 200-foot ROW, State forests, scenic byways, snowmobile trails are crossed by the ROW in the West Section.

Constructing and operating the proposed Project could impact views of the landscape, and short-term impacts could be caused by everything from ROW clearing and building access roads to dust from vehicle traffic, the presence of large delivery vehicles, or worker parking. Long-term impacts could include transmission line forms, textures, or colors that conflict with natural forms.

Land-Use Compatibility. The predominant land uses in the West Section, crossed by the proposed routes and alternatives, include state forest land, state fee lands, USFWS interest lands, and agriculture. In addition, a large number of Red Lake Reservation parcels are located throughout the West Section but these parcels are not crossed by the ROW. State forests offer a variety of recreational opportunities.

County and state ordinances and land management plans generally permit, or at least do not prohibit, the construction of transmission lines.

Constructing the transmission line and associated facilities would result in temporary disturbances to land uses within the ROW and surrounding area. Such disturbances would include limiting property access due the presence of construction work areas and equipment.

Operating and maintaining the transmission line would have long-term impacts on land use within the ROW and surrounding area. It would require that all woody vegetation and brush within the ROW be cleared, resulting in long-term change in land cover for forest or shrub land. The conversion from forest land in state fee areas where timber can no longer be harvested would result in a reduction of revenues to the School Trust Land program.

Agricultural land uses would still be allowed in the ROW, but the presence of transmission structures could prevent some farm equipment from accessing land. Transmission towers could also impact private aircraft.

Cultural Values. Cultural values are shared beliefs or attitudes that define what is acceptable or unacceptable and provide a framework for unity and sense of identity for a community, region, or people. The major values within the region include pragmatism, appreciation, and use of natural resources, individualism, political and social conservatism, community pride, and economic well-being. The values of individualism and community pride are tied to the overall quality of life experienced by the area's residents.

Public comments provided during the EIS scoping period raised concerns related to avoiding impacts to agricultural land, an indication of the value placed on preservation of agricultural life.

Impacts to cultural values can be minimized primarily by paralleling existing transmission infrastructure. Although some permanent impacts to cultural values may be felt on a local basis, particularly where transmission lines run close to communities whose values are at odds with the presence of new, large infrastructure projects, at a county-wide or regional level, conflict with cultural values is not expected from the proposed Project.

Land-Based Economies. Constructing and operating the proposed Project could potentially impact land-based economies and could prevent or limit other uses of the land. Transmission line structures could potentially interfere with farming, forestry, or mining operations.

Agriculture is present in the West Section, and the proposed Project could potentially impact farmland, organic farms, livestock, aerial spraying, irrigation system, and precision farming practices.

The proposed Project could interfere with forestry operations by limiting timber harvesting, damaging trees, compacting soil, or causing erosion.

There are no mining resources located within the 200-foot ROW of the proposed routes or variations in the West Section, although there is an aggregate source located within 1,500 feet of the Roseau Lake WMA Variation in the Roseau Lake WMA Variation Area. In addition, the proposed Project could interfere with surface estate mineral resources and could impact future mining operations.

Archaeology and Historic Architectural Resources. Ground-disturbing activities could damage or destroy buried archaeological resources as well as historic architectural sites if they are located within the ROW (direct Area of Potential Effect [APE]). Further, historic architectural sites within one mile of the proposed Project (indirect APE) could be impacted if the proposed Project results in changes to the setting of historic architectural sites if these historic architectural or built resources are determined to be National Register of Historic Places-eligible (NRHP-eligible) and if the setting is determined to be a character defining feature that contributes to the significance of the resource.

The potential effects of the proposed Project on historic properties, including cultural resources, cannot be fully determined prior to approval of the proposed Project. DOE intends to execute a Programmatic Agreement (PA) in consultation with the Minnesota State Historic Preservation Office, the Advisory Council on Historic Preservation, federally-recognized Indian tribes, the Applicant, representatives of local governments, and other consulting parties, to ensure that stipulations developed to identify cultural resources and historic properties, determine the effects of the proposed Project on historic properties, and determine measures to avoid, minimize, and mitigate adverse effects on cultural resources and historic properties are implemented.

Natural Environment. Water resources include rivers and streams, lakes and ponds, wetlands, floodplains, and groundwater resources. Impacts on water resources may include the potential for soil erosion and subsequent sedimentation of local water resources. Water resources could also become contaminated during construction, due to accidental spilling of fuels or other hazardous substances. Impacts on wetlands may include conversion of wetland types from forested and shrub wetlands to open wetland types. In some cases, the proposed Project may need to cross areas of floodplain and/or wetlands that are too large to span, requiring permanent placement of structures within these areas.

Impacts could be mitigated by using construction matting to traverse wetlands, limiting crossing of watercourses, spanning, timing construction in these areas to take place during frozen conditions, and using low ground pressure equipment to the extent practical. Where permanent placement of structures in floodplains and/or wetlands is unavoidable, these activities would require appropriate permits and approvals.

Vegetation in the West Section consists primarily of herbaceous agricultural vegetation, upland forests, and lowland swamps. Construction activities could impact existing vegetation, and removing vegetation could indirectly impact native vegetation by increasing the potential for the spread of invasive species and noxious weeds, which have potential to dominate and displace native plants and plant communities, permanently altering ecosystem functions.

Wildlife in the West Section includes a wide range of resident and migratory wildlife species. The West Section contains natural wildlife habitat as well as managed wildlife habitat, such as Wildlife Management Areas (WMAs).

During construction, wildlife within the anticipated ROW would temporarily be displaced. Long-term adverse impacts on wildlife could come from the loss or conversion of habitat and habitat fragmentation. Wildlife species previously occupying forested communities in the ROW would be displaced in favor of species that prefer more open vegetation communities. Impacts would be expected to be extensive in areas where new ROW would be created and more localized in situations where an existing ROW is expanded. Species that rely on shrubby or grassland habitats may be less susceptible.

Once the project is built, there would be potential for avian collision and electrocution with transmission conductors.

Rare and Unique Natural Resources. Six federally threatened or endangered species are known to be present in the counties where the West Section is located. Six state threatened or endangered species have been documented within one mile of some the proposed routes and variations in the West Section. In addition, 17 state-special concern species have been documented within one-mile of some of the proposed routes and variations in the West Section: nine vascular plants, four birds, one mammal, two mussels, and one fish.

Several rare communities have been identified within or adjacent to the variation areas in the West

Section, many of them located within one of the three state forests in this area.

Construction and operation of the proposed Project could have short- and long-term impacts on rare and unique natural resources. Construction could temporarily displace some rare species or rare communities. Construction could also cause the loss or conversion of habitat and habitat fragmentation. Rare species could also be impacted by the introduction of non-native species, which could alter the quality and function of habitats.

Corridor Sharing. In the West Section, the proposed Project would parallel existing 230 kV and 500 kV transmission lines, roads, field lines, trails, and public land survey sections. By paralleling existing corridors, and thereby reducing the need for new transmission line corridors, potential impacts on human settlements, land-based economies, and the natural environment would be expected to be minimized.

Electric System Reliability. One of the Applicant's stated purposes for the proposed Project is to enhance electrical system reliability and help meet long-term regional needs. All of the proposed routes and variations in the West Section include segments that would run parallel and adjacent to, but not within, the ROW of one of the two existing high voltage transmission lines.

Construction, operation, maintenance, or emergency repairs of the proposed Project would not interfere with the operation of existing transmission lines as the appropriate separation distance would be maintained for clearance and safety. As such, no impacts would be expected as a result of construction, operation, maintenance, or emergency repairs of the proposed Project.

Costs that Depend on Design and Route. Projected costs for the routes and variations in the West Section are provided in Section 5.3.8. These cost estimates are based on an estimated cost per mile for the general structure type planned for each proposed route or variation. Since property acquisition, access costs, or segment-specific design criteria are uncertain, these are not full construction estimates and were developed for comparative purposes only.

S.9.2 Route-Specific Impacts to Central Section

Human Settlement. Much of the Central Section is forested and contains extensive peatlands, and a number of state forests occur in the section.

No county parks, state parks, state forest campgrounds, national parks, or water access points are present within the 200-foot ROW or within 1,500 feet of the anticipated alignment of any of the proposed routes and variations in the Central Section. State trails, state forests, scenic byways, snowmobile and water trails are crossed by the ROW in the Central Section.

General impacts on existing aesthetic resources in the Central Section are similar to those in the West Section. Short-term aesthetic impacts could result from ROW clearing, temporary construction access roads, temporary construction areas, and vehicle and equipment operations. Long-term impacts on aesthetic resources are most likely to occur once the transmission line is operating.

Land-Use Compatibility. The predominant land use in the Central Section and within the 200-foot ROW is undeveloped forest and swampland, much of which is state forest land and state fee land. The Central Section also includes some limited concentrations of agricultural land uses near the northern and southern borders of the section. Developed land, including residences, are scattered near the agriculture land and incorporated cities. Several airports and air strips are also located near developed areas, but not within the 200-foot ROW. In addition, there are scattered parcels of USFWS interest lands in the northwest part of the Central Section that are crossed by the ROW. Any route crossing USFWS interest lands (including easements) would require a right-of-way permit under 50 CFR Part 29.

Impacts from constructing and operating the proposed Project are similar to those discussed for the West Section. (See Land-Use Compatibility discussion in Section S.9.1.).

Cultural Values. Cultural values in the Central Section are in many ways similar to the cultural values in the West Section. Cultural values unique to the Central Section are an individualistic orientation that places value on undisturbed independence in the wilderness. The proposed Project, however, is not expected to result in any unique impacts to designated wilderness areas and cultural values in the Central Section.

Land-Based Economies. Agriculture is limited in the Central Section, although the proposed Project could potentially impact farmland, organic farms, livestock, aerial spraying, irrigation system and precision farming practices.

The proposed Project could interfere with forestry operations by limiting timber harvesting, damaging trees, compacting soil, or causing erosion.

In the Central Section, there are aggregate sources located within the 200-foot ROW of the Proposed Orange Route (2 sites) in the Pine Island Variation Area; the Proposed Orange Route (2 sites) and J2 Segment Option Variation (1 site) in the J2 Segment Option Variation Area; and the Proposed Orange Route (1 site) and the Cutfoot Variation (1 site) in the Cutfoot Variation Area. There are also several aggregate sources located within 1,500 feet of the proposed routes and variations in the Central Section. In addition, the proposed Project could impact future mining operations.

Archaeology and Historic Architectural Resources. Archaeological and historic architectural sites present within the ROW and historic architectural sites located within 1 mile of the anticipated alignment could be impacted by the proposed Project similar to that described for the West Section. (See Archaeology and Historic Architectural Resources discussion in Section S.9.1.)

Natural Environment. Water resources include rivers and streams, lakes and ponds, wetlands, floodplains, and groundwater resources. The proposed Project's impacts on water resources are similar to those described for the West Section. (See Natural Environment discussion in Section S.9.1.)

Vegetation consists primarily of upland forests and lowland swamps. The proposed Project's impacts on vegetation are similar to those described for the West Section. (See Natural Environment discussion in Section S.9.1.)

Wildlife in the Central Section includes a wide range of resident and migratory wildlife species. The Central Section contains natural wildlife habitat as well as managed wildlife habitat, such as WMAs. The proposed Project's impacts on wildlife are similar to those described for the West Section. (See Natural Environment discussion in Section S.9.1.)

Rare and Unique Natural Resources. Six federally threatened or endangered species are known to be present in the counties where the Central Section is located. Six state threatened or endangered species have been documented within one mile of some of the proposed routes and variations in the Central Section. In addition, 13 state-special concern species have been documented within one-mile of some of the proposed routes and variations in the Central Section: seven vascular plants, two birds, one insect, two mussels, and one fish.

Several rare communities have been identified within or adjacent to the variation areas in the Central Section, many of them located within one of the eight state forests in this area. Potential short- and long-term impacts on rare and unique natural resources in the Central Section are similar to those described for the West Section. (See Rare and Unique Natural Resources discussion in Section S.9.1.)

Corridor Sharing. In the Central Section, the proposed Project would parallel existing 230 kV and 500 kV transmission lines, roads, field lines, trails, and public land survey sections. By paralleling existing corridors, and thereby reducing the need for new transmission line corridors, potential impacts on human settlements, land-based economies, and the natural environment would be expected to be minimized.

Electric System Reliability. All of the Applicant's proposed routes and variations in the Central Section include segments that would run parallel and adjacent to, but not within, the ROW of one of the two existing high voltage transmission lines. Impacts associated with construction, operation, maintenance, or emergency repair of the proposed Project in the Central Section are similar to those described for the West Section. (See Electric System Reliability discussion in Section S.9.1.)

Costs that Depend on Design and Route. Projected costs for the routes and variations in the Central Section are given in Section 5.4.8. These cost estimates are based on an estimated cost per mile for the general structure type planned for each proposed route or variation. Since property acquisition, access costs, or segment-specific design criteria are uncertain, these are not full construction estimates and were developed for comparative purposes only.

S.9.3 Route-Specific Impacts to East Section

Human Settlement. Much of the East Section is characterized by forest, wetlands, lakes, and ponds. No state parks, state forest campgrounds, national forests, scenic byways, water trails, or national parks were found within 1,500 feet of the centerline of the proposed routes and variations in the East Section. Although state trails, state forests, and snowmobile trails are crossed by the ROW of various routes and variations in the East Section.

General impacts on existing aesthetic resources in the East Section are similar to those in the West Section. Short-term aesthetic impacts could result

from ROW clearing, temporary construction access roads, temporary construction areas, and vehicle and equipment operations. Long-term impacts on aesthetic resources are most likely to occur once the transmission line is operating.

Land-Use Compatibility. The predominant land uses in the East Section are state forests and fee lands, undeveloped forest, and wetlands. There is also sparsely scattered agriculture and developed land. A large number watercourses and waterbodies are present in the East Section, and there are also a number of private airstrips and airports.

Constructing and operating the proposed Project in the East Section would result in similar impacts as anticipated in the West Section. (See Land-Use Compatibility discussion in Section S.9.1.)

Cultural Values. Cultural values in the East Section are in many ways similar to the cultural values in the West and Central Sections. Cultural values unique to the East Section are largely tied to the transition to lake and cabin country and, at the south end of the East Section, intersection with the western portion of the Mesabi Iron Range.

The communities in Balsam and Lawrence appear to strongly value the aesthetics of their communities as well the small town, rural atmosphere. The Mesabi Iron Range is characterized by a more industrial, blue collar population.

The proposed Project, however, is not expected to result in any unique impacts to cultural values.

Land-Based Economies. Agriculture is limited in the East Section, although the proposed Project could potentially impact farmland, organic farms, livestock, aerial spraying, irrigation systems, and precision farming systems.

The proposed Project could interfere with forestry operations in the East Section by limiting timber harvesting, damaging trees, compacting soil, or causing erosion.

Several active and abandoned metallic mineral, iron ore, and taconite mining sites are found along the proposed routes and variations in the East Section. These proposed routes and variations cross active state metallic mineral leases in zones having high potential for metallic mineral resources. The Mesabi Iron Range has known iron resources, which have been developed into an economic resource in various locations. According to the Minnesota Department of Natural Resources (MnDNR), the proposed routes do not encumber known state mineral resources.

The construction of the proposed Project could impact future mining operations if the structures interfere with access to mineable resources or the ability to remove mineral resources.

Archaeology and Historic Architectural Resources. Archaeological and historic architectural sites present within the ROW and historic architectural sites located within 1 mile of the anticipated alignment could be impacted by the proposed Project similar to that described for the West Section. (See Archaeology and Historic Architectural Resources discussion in Section S.9.1.)

Natural Environment. Water resources in the East Section include watercourses, waterbodies, wetlands, floodplains, and groundwater resources. The proposed Project's impacts on water resources are similar to those described for the West Section. (See Natural Environment discussion in Section S.9.1.)

Vegetation in the East Section consists primarily of upland forests and lowland swamps. The proposed Project's impacts on vegetation are similar to those described for the West Section. (See Natural Environment discussion in Section S.9.1.)

Wildlife in the East Section includes a wide range of resident and migratory wildlife species. The East Section contains natural wildlife habitat as well as managed wildlife habitat, such as WMAs. The proposed Project's impacts on wildlife are similar to those described for the West Section. (See Natural Environment discussion in Section S.9.1.)

Rare and Unique Natural Resources. Three federally threatened or endangered species are known to be present in the counties where the East Section is located. Three state threatened species have been documented within one mile of some of the proposed routes and variations in the East Section. In addition, six state special concern species have been documented within one-mile of some of the proposed routes and variations in the East Section: three vascular plants, one bird, and two mussels.

Several rare communities have been identified within or adjacent to the variation areas in the East Section, many of them located within state forests. Potential short- and long-term impacts on rare and unique natural resources in the East Section are similar to those described for the West Section. (See Rare and Unique Natural Resources discussion in Section S.9.1.)

Corridor Sharing. In the East Section, the proposed Project would parallel existing 115 kV, 230 kV, and 500 kV transmission lines, roads, field lines, trails, and public land survey sections. By paralleling

existing corridors, and thereby reducing the need for new transmission line corridors, potential impacts on human settlements, land-based economies, and the natural environment would be expected to be minimized.

Electric System Reliability. Both of the Applicant's proposed routes and three variations in the East Section include segments that would run parallel and adjacent to, but not within, the ROW of two existing high voltage transmission lines. Impacts associated with construction, operation, maintenance, or emergency repairs of the proposed Project in the Central Section are similar to those described for the West Section. (See Electric System Reliability discussion in Section S.9.1.)

Costs that Depend on Design and Route. Projected costs for the routes and variations in the East Section are given in Section 5.5.8. These cost estimates are based on an estimated cost per mile for the general structure type planned for each proposed route or variation. Since property acquisition, access costs, or segment-specific design criteria are uncertain, these are not full construction estimates and were developed for comparative purposes only.

S.10 Comparative Environmental Consequences

Data and analyses presented in Chapter 6 are commensurate with the potential significance of the impact and with the level of concern raised during the scoping process. The following resource areas are presented: human settlement (aesthetics and land use compatibility), water resources, vegetation, wildlife, rare and unique resources, archaeology and historic architectural resources, the reliability of the electrical system, and the costs of constructing, operating, and maintaining the facility which are dependent on design and route.

S.10.1 West Section

The West Section contains five variation areas: Border Crossing, Roseau Lake WMA, Cedar Bend WMA, Beltrami North, and Beltrami North Central.

S.10.1.1 West Section: Border Crossing Variation

The Border Crossing Variation Area contains five international border crossings and the transmission lines associated with five route alternatives: Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, Border Crossing Hwy 310 Variation, Border Crossing 500kV Variation, and Border Crossing 230kV Variation.

Human Settlement. The Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation would not parallel any existing corridors at the proposed border crossings but due to the lack of residences and historic architectural sites within the ROW and 1,500 feet, potential impacts would not be expected. The border crossing for the Border Crossing Hwy 310 Variation is located within 1,000 feet of a snowmobile trail and on state forest, but parallels an existing corridor and is not located near residences; therefore impacts to aesthetics are not anticipated.

Based on proximity to residences, state forests, and other sensitive viewing areas, and the contrast, length, and extent of paralleling existing transmission lines and roads, the Border Crossing 230kV Variation and the Border Crossing 500kV Variation would likely have fewer aesthetic impacts than the Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, or Border Crossing Hwy 310 Variation..

All transmission line alternatives associated with the Border Crossing Variation Area would cross state forest land (ranging from 96 acres to 394 acres) and snowmobile trails. The transmission line alternatives associated with the Border Crossing 500kV Variation and Border Crossing 230kV Variation are likely to produce less contrast because they parallel existing transmission line corridors of similar size and design along their entire lengths. The Border Crossing 500kV Variation and Border Crossing 230kV Variation have the least impacts on forests and/or swamps (2,797 and 1,896 acres, respectively, compared to 4,456 to 5,837 acres) and agricultural land (819 and 1,057 acres, respectively compared to 1,901 to 3,609 acres) and the extent of paralleling existing transmission line corridors for more of their length (100 percent for both, compared to 7 to 10 percent) than the Proposed Border Crossing Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation. As a result, the Border Crossing 500kV Variation and Border Crossing 230kV Variation would be most compatible with surrounding land uses.

Land-Based Economies. The border crossings for the Proposed Border Crossing-Blue/Orange Route, Border Crossing 500kV Variation, and Border Crossing Hwy 310 Variation would have the least impact on farmland because there are fewer acres of land designated as prime farmland present (85 acres and 77 acres of land designated as "prime farmland if drained" and "all areas are prime farmland within" the ROW for the Border Crossing 500kV Variation and Border Crossing Hwy 310 Variation, respectively and 92 acres to 167 acres of land designated as

“prime farmland if drained” and “all areas are prime farmland” within the ROW the other alternatives in this variation area). The Border Crossing 230kV Variation crosses the least state forest land (96 acres within the ROW for the Border Crossing 230kV Variation and 120 acres to 394 acres within the ROW if the other alternatives in this variation area); this border crossing would therefore have the least impact on state forests.

Given the extent of paralleling existing transmission lines, the transmission lines associated with the Border Crossing 230kV Variation would have the least impact on farmland and state forests. No mining resources are located within the Border Crossing Variation Area, so mining resources would not be impacted by the proposed route or variations.

Archaeology and Historic Architectural Resources. No archaeological or historic architectural resources are located within the direct APE of the Proposed Border Crossing-Blue/Orange Route, Border Crossing Hwy 310 Variation, and Border Crossing 230kV Variation, however the Border Crossing Pine Creek Variation and the Border Crossing 500kV Variation both have one archaeological resource present within the ROW, which could be affected by ground-disturbing activities associated with construction of the proposed Project. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural properties. If previously unidentified archaeological resources are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. There are no watercourse crossings at any of the international border crossings. All border crossings are all located within a wetland or a portion of the ROW overlaps with a wetland. The border crossing for the Proposed Border Crossing-Blue/Orange Route is located in forested wetland and would result in conversion of forested wetland to an herbaceous wetland type through removal of woody vegetation in the ROW. The border crossing for the Border Crossing Pine Creek Variation is located within a Federal Emergency Management Agency (FEMA) floodplain. It is expected that the proposed Project would be designed and permitted according to current Federal Flood Risk Management Standards.

The transmission line associated with the Border Crossing 230kV Variation has the shortest length, fewest PWI (no crossings compared to two or more crossings) and impaired water crossings (no crossings compared to one crossing), and second

fewest crossings of non-PWI water resources (nine crossings compared to seven crossings). The transmission lines associated with the Border Crossing 500kV Variation and Border Crossing 230kV Variation would not cross floodplains, while the other alternative would cross 213 acres or more of floodplains. None of the transmission lines associated with the Proposed Border Crossing-Blue/Orange Route or Border Crossing variations would cross waterbodies or PWI waters, but all would cross non-PWI watercourses and ditches. The transmission line associated with the Border Crossing 230kV Variation contains the least combined forested and shrub wetlands (72 acres compared to 137 or more acres) and would result in the least wetland type conversion. None of the floodplain or wetland crossings would be spannable.

The border crossings for the Proposed Border Crossing-Blue/Orange Route, Border Crossing Hwy 310 Variation, and Border Crossing 230kV Variation are located primarily in forested land cover types within the Lost River State Forest, while the Border Crossing Pine Creek Variation border crossing is located in herbaceous agricultural vegetation.

The transmission line associated with the Border Crossing 230kV Variation would have the smallest amount (125 acres compared to 184 acres to 411 acres for the other alternatives) of forested land cover types within the ROW of the proposed routes and variations in the Border Crossing Variation Area. The Border Crossing 500kV Variation and Border Crossing 230kV Variation would parallel existing transmission line corridor for their entire length, and would therefore avoid forest fragmentation.

There are no managed wildlife habitats crossed by the border crossings for the Proposed Border Crossing-Blue/Orange Route and all Border Crossing variations. The transmission line associated with the Border Crossing 230kV Variation has the shortest length and would not pass through any WMAs, Grassland Bird Conservation Areas, or the Gray Owl Management Area; therefore it would likely have the least impact on natural and managed wildlife habitat.

Rare and Unique Natural Resources. There are no documented rare species within one mile of the border crossings for the Border Crossing 230kV Variation or Border Crossing 500kV Variation. The border crossing for the Proposed Border Crossing-Blue/Orange Route has the most occurrences of documented rare species within one mile of it (five records compared to one record).

The transmission lines associated with the Proposed Border Crossing-Blue/Orange Route and the

Border Crossing Pine Creek Variation have the most documented rare species within one mile of their respective ROWs (eleven and eight records, respectively, compared to five or less records).

Minnesota Biological Survey (MBS) Sites of Biodiversity Significance ranked as outstanding, MBS native plant communities, and MnDNR High Conservation Value Forest are present within the ROW of the border crossings for the Proposed Border Crossing-Blue/Orange Route and the Border Crossing Hwy 310 Variation. MBS Sites of Biodiversity Significance ranked as moderate are present within the ROW of the border crossings for the Border Crossing 230kV Variation and the Border Crossing 500kV Variation, but no MnDNR High Conservation Value Forest or MBS native plant communities are present. The most acres of rare communities within 200 feet of them, including Minnesota Biological Survey (MBS) Sites of Biodiversity Significance, High Conservation Value Forest, or MBS native plant communities. There are no rare communities within the ROW of the border crossing for the Border Crossing Pine Creek Variation.

Several rare communities have been identified within the ROW of the transmission lines associated with the proposed route and variations in the Border Crossing Variation Area. The transmission line associated with the Proposed Border Crossing-Blue/Orange Route would likely impact the greatest number of rare communities because there are more MBS Sites of Biodiversity Significance (381 acres compared to 326 acres or less), High conservation Value Forest (82 acres compared to 29 acres or less), and MBS native plant communities (124 acres compared to 69 or less acres). The transmission line associated with the Border Crossing 230kV Variation has the fewest acres of rare communities in the ROW. The Border Crossing 500kV Variation and 230kV Variation would cross native plant communities in areas previously disturbed because they parallel an existing transmission line corridor.

Corridor Sharing. The border crossings and transmission lines associated with the Border Crossing 500kV Variation and Border Crossing 230kV Variation parallel existing transmission line corridor for 100 percent of their lengths. The other alternatives parallel existing corridor for less than 50 percent of their lengths; paralleling existing transmission line corridors for less than 10 percent of their lengths.

Costs that Depend on Design and Route. As the longest alternative, the Border Crossing Pine Creek Variation would cost the most to build, while the

shortest alternative, the Border Crossing 230kV Variation, would cost the least to build.

5.10.1.2 West Section: Roseau Lake WMA Variation

The Roseau Lake WMA Variation Area contains three route alternatives: the Proposed Blue/Orange Route, Roseau Lake WMA Variation 1, and Roseau Lake WMA Variation 2.

Human Settlement. Based on proximity to residences (12 residences within 1,500 feet compared to 23 and 50 for Roseau Lake WMA Variation 1 and 2, respectively), historic architectural resources (none within 5,280 feet compared to one and two for Roseau Lake WMA Variation 1 and 2, respectively), state forests (one state forest crossed by each alignment), length (30.7 miles, compared to 44.1 and 37.5 miles for Roseau Lake WMA Variation 1 and 2, respectively), and the extent of paralleling existing transmission lines (33 percent of length compared to 7 and 27 percent for Roseau Lake WMA Variation 1 and 2, respectively), the Proposed Blue/Orange Route would have less aesthetic impact than the other alternatives.

Roseau Lake WMA Variation 1, compared to the Proposed Blue/Orange Route and Roseau Lake WMA Variation 2, would have the least impact on state forest (6 acres, compared to 334 and 52 acres, respectively), state fee lands (6 acres compared to 453 and 145 acres, respectively), and forested and/or swamp lands (2,615 acres compared to 7,350 and 4,269 acres, respectively); although it parallels existing corridors the least amount (7 percent compared to 33 and 27 percent, respectively).

Land-Based Economies. The Proposed Blue/Orange Route, which parallels existing corridors for 60 percent of its length and has the shortest length, would have the least impact on farmland. None of the three alternatives, however, would impact more than 25 acres of farmland of statewide importance.

The Roseau Lake WMA Variation 1, which would parallel existing corridors for 54 percent of its length and pass through fewer acres of State Forest land (6 acres within the ROW of Roseau Lake WMA Variation 1, 52 acres within the ROW of Roseau Lake WMA Variation 2, and 334 acres within the ROW of the Proposed Blue/Orange Route), would have the least impact on forest lands. No mining resources exist within Roseau Lake WMA Variation Area.

Archaeology and Historic Architectural Resources. No archaeological or historic architectural sites are located within the direct APE for the Proposed Blue/Orange Route or either variation. Both Roseau Lake

WMA variations would have historic architectural sites located within the indirect APE (one mile) (one and two sites, respectively). Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural properties. If previously unidentified archaeological resources are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. Roseau Lake WMA Variation 1 would cross the most PWI and non-PWI watercourses (10 and 38 crossings, respectively), while the Proposed Blue-Orange Route and the Roseau Lake WMA Variation 1 would each cross one non-PWI waterbody. Neither the proposed route nor the variations would cross PWI waterbodies. The Proposed Blue/Orange Route would cross more floodplains (321 acres) than Roseau Lake WMA Variation 1 (202 acres) and more than five times as many wetlands (547 acres compared to 102 acres, respectively). None of these floodplain or wetland crossings would be spannable. The Proposed Blue/Orange Route and both variations would require conversion of forested and shrub wetland areas to herbaceous wetlands since woody vegetation would have to be removed from the ROW. Roseau Lake WMA Variation 1 has fewer acres of forested and shrub wetlands (55 acres compared to 141 acres or more) and would require less wetland type conversion.

The Proposed Blue/Orange Route would pass through the most forested land (515 acres, compared to 275 acres or less), resulting in more impacts on forested vegetation, although that would be mitigated by its sharing the most corridor, which would reduce forest fragmentation. The two variations would pass through more herbaceous agricultural vegetation. While direct, adverse impacts on forested areas would be long term, they would be expected to be minimal because of the small amount of disturbance relative to the large amount of surrounding contiguous forest.

Roseau Lake WMA Variation 1 would have the least impact on natural and managed wildlife habitat because it does not travel through a WMA and passes through the least amount of Grassland Bird Conservation Area (40 acres compared to 131 acres for the Proposed Blue/Orange Route and 220 acres for Roseau Lake WMA Variation 2).

Rare and Unique Natural Resources. The Proposed Blue/Orange Route has the most documented rare species within one mile of the ROW (seven records compared to four records). However, the full extent

of potential impacts from the Proposed Blue/Orange Route or either variation cannot be determined without pre-construction field surveys. Coordination with relevant federal, state, and local agencies will continue during development of the Project.

Roseau Lake WMA Variation 1 would have the least impact on rare communities, as the ROW has the fewest acres of MBS Sites of Biodiversity Significance (14 acres compared to 153 acres for Roseau Lake WMA Variation 2 and 404 acres for the Proposed Blue/Orange Route), High Conservation Value Forest (6 acres compared to 22 acres for the Proposed Blue/Orange Route), and MBS native plant communities (5 acres compared to 75 acres for Roseau Lake WMA Variation 2 and 107 acres for the Proposed Blue/Orange Route).

Corridor Sharing. The Proposed Blue/Orange Route would parallel the greatest percentage of existing transmission line corridor (33 percent), while Roseau Lake WMA Variation 1 would parallel the least amount (7 percent).

Costs that Depend on Design and Route. As the longest alternative, Roseau Lake WMA Variation 1 would cost the most to construct, while the shortest alternative, the Proposed Blue/Orange Route, would cost the least to construct.

S.10.1.3 West Section: Cedar Bend WMA Variation Area

The Cedar Bend WMA Variation Area contains two route alternatives: the Proposed Blue/Orange Route and the Cedar Bend WMA Variation.

Human Settlement. Based on proximity to residences (11 residences within 1,500 feet compared to 101 for the Cedar Bend WMA Variation), historic architectural site (zero sites within 5,280 feet compared to eight sites for the Cedar Bend WMA Variation), and forests (two forests crossed by each alternative), the Proposed Blue/Orange Route would have less aesthetic impact than the Cedar Bend WMA Variation. One scenic byway and two snowmobile trails are within 1,500 feet of the Proposed Blue/Orange Route and the Cedar Bend WMA Variation.

The Proposed Blue/Orange Route and the Cedar Bend WMA Variation would cross state forest (372 acres compared to 78 acres, respectively), state fee lands (441 acres compared to 84 acres, respectively), USFWS interest lands (6 acres compared to zero acres, respectively), and forested and/or swamp lands (8,045 acres compared to 4,180 acres, respectively); with the Cedar Bend Variation likely having less impact on these lands. However, Cedar Bend Variation would likely have a greater impact

on agricultural land than the Proposed Blue/Orange Route (2,625 acres and 844 acres, respectively).

Land-Based Economies. The Proposed Blue/Orange Route, because it parallels an existing transmission line corridor for its entire length and crosses fewer acres of prime farmland (83 acres of land designated as prime farmland if drained and all areas are prime farmland within the ROW for the Proposed Blue/Orange Route and 186 acres of land designated as “prime farmland if drained” and “all areas are prime farmland” within the ROW for the Cedar Bend WMA Variation), would have the least impact on farmland. The Cedar Bend WMA Variation, however, would have the least impact on the state forest lands (78 acres of state forest within the ROW of the Cedar Bend WMA Variation and 186 acres of state forest within the ROW of the Proposed Blue/Orange Route). The Proposed Blue/Orange Route would also traverse several acres of mining lands with state mineral leases, with the potential to impact future mining activities in these areas, while the Cedar Bend WMA Variation would not traverse any areas.

Archaeology and Historic Architectural Resources. No archaeological sites or historic architectural structures are present within the ROW (direct APE) of the Proposed Blue/Orange Route but one archaeological site is located within the ROW of the Cedar Bend WMA Variation. The Cedar Bend WMA Variation also has eight historic architectural sites located within 1 mile of the anticipated alignment compared to zero for the Proposed Blue/Orange Route. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological resources are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Blue/Orange Route and the Cedar Bend WMA Variation would cross approximately the same number of PWI (four and five crossings, respectively), non-PWI (12 and 11 crossings, respectively) and impaired waters (two and three crossings, respectively), all of which would be spannable. The Proposed Blue/Orange Route would not cross any floodplains, while the Cedar Bend WMA Variation would cross floodplains (32 acres). Both would have to cross wetlands too large to span, although the Proposed Blue/Orange Route would have to cross three times the area (466 acres compared to 154 acres for the Cedar Bend WMA Variation).

The Proposed Blue/Orange Route and the Cedar Bend WMA Variation would require conversion of

forested and shrub wetland areas to herbaceous wetlands since woody vegetation would have to be removed from the ROW. Cedar Bend WMA Variation has fewer acres of forested and shrub wetlands (109 acres compared to 381 acres) and would require less wetland type conversion.

The Proposed Blue/Orange Route would pass through more forested land (543 acres compared to 266 acres for the Cedar Bend WMA Variation), including state forest (372 acres compared to 78 acres for the Cedar Bend WMA Variation). Both the Proposed Blue/Orange Route and the Cedar Bend WMA Variation, however, would parallel existing transmission line corridors for their entire lengths, which would reduce forest fragmentation. The Cedar Bend WMA Variation would pass through more herbaceous agricultural vegetation. While direct, adverse impacts to forested areas would be long term, they would be expected to be minimal because of the amount of surrounding contiguous forest.

The Cedar Bend WMA Variation has fewer acres of wildlife habitat within the ROW and would likely have the least impact on natural and managed wildlife habitat, as it does not pass through a WMA, passes through less Grassland Bird Conservation Areas (10 acres compared to 50 acres for the Proposed Blue/Orange Route), and does not cross a MnDNR-designated shallow lake.

Rare and Unique Natural Resources. The Proposed Blue/Orange Route may result in more impacts on rare species, as two records of terrestrial species have been documented within one mile of the ROW, while only one record of a rare fish has been documented within one mile of the ROW of the Cedar Bend WMA Variation. All watercourses would likely be spanned so impacts to fish are not anticipated. However, the full extent of potential impacts from the Proposed Blue/Orange Route or the Cedar Bend WMA Variation cannot be determined without pre-construction field surveys.

There are more MBS Sites of Biodiversity Significance present within the ROW of the Proposed Blue/Orange Route (454 acres) than the Cedar Bend WMA Variation (112 acres). In addition, High Conservation Value Forest and MBS native plant communities are present within the ROW of the Proposed Blue/Orange Route, while none are present within the ROW of the Cedar Bend WMA Variation. Because of this, the Proposed Blue/Orange Route would likely have more impact on rare communities.

Corridor Sharing. The Proposed Blue/Orange Route and Cedar Bend WMA Variation would both parallel

existing transmission line corridors for their entire lengths.

Costs that Depend on Design and Route. As the longer alternative, the Proposed Blue/Orange Route would cost more to construct than the Cedar Bend WMA Variation.

S.10.1.4 West Section: Beltrami North Variation Area

The Beltrami North Variation Area contains three route alternatives: the Proposed Blue/Orange Route, Beltrami North Variation 1, and Beltrami North Variation 2.

Human Settlement. Because the Proposed Blue/Orange Route is moderate in length (16.5 miles compared to 15.8 and 19.7 miles for the Beltrami North Variation 1 and 2, respectively), parallels an existing transmission line of similar size and design for its full length (compared to 72 percent and 53 percent for the Beltrami North Variation 1 and 2, respectively), and impacts very few residences (three residences within 1,500 feet compared to six and one residence for the Beltrami North Variation 1 and 2, respectively) and other sensitive visual resources (no historic architectural sites within 5,280 feet compared to zero and two sites for the Beltrami North Variation 1 and 2, respectively), the Proposed Blue/Orange Route would have the least aesthetic impact.

Beltrami North Variation 1 would have the least impact on state forest (291 acres compared to 372 and 462 acres, respectively for the Proposed Blue/Orange Route and the Beltrami North Variation 2) or state fee lands (297 acres compared to 364 and 450 acres, respectively for the Proposed Blue/Orange Route and the Beltrami North Variation 2). The Proposed Blue/Orange Route would cross USFWS interest lands (6 acres) whereas Beltrami North Variation 1 and 2 do not cross these lands. Consultation with the USFWS regarding the crossing of these USFWS interest lands is on-going.

Land-Based Economies. The Proposed Blue/Orange Route and the two variations pass through similar amounts of farmland (approximately 27 acres of land designated as “prime farmland if drained and “all areas are prime farmland” within the ROW of each alternative). Beltrami North Variation 1 would have the least impact on forest lands (291 acres of state forest within the ROW of Beltrami North Variation 1, 465 acres of state forest within the ROW of Beltrami North Variation 2, and 372 acres of state forest within the ROW of the Proposed Blue/Orange Route).

Beltrami North Variation 2 would likely impact the most acres of state mineral lease lands and therefore would be expected to have the greatest potential impact on future mining activity (approximately 150 acres of state mining land within the ROW of Beltrami North Variation 2, and less than 100 acres of state mining land within the ROW of the Proposed Blue/Orange Route and Beltrami North Variation 1).

Archaeology and Historic Architectural Resources. No archaeological or historic architectural sites are located within the direct or indirect APE of the Proposed Blue/Orange Route and Beltrami North Variation 1; however Beltrami North Variation 2 has an archaeological site within the direct APE and two historic architectural sites within the indirect APE. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural site. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. Beltrami North Variation 2 would cross the fewest PWI waters (three crossings), while Beltrami North Variation 1 would cross the most (nine crossings). Beltrami North Variation 1 would cross the fewest non-PWI waters (four crossings), while Beltrami North Variation 2 would cross the most (12 crossings). The Proposed Blue/Orange Route and Beltrami North Variation 2 would cross the fewest impaired waters (two crossings each), while Beltrami North Variation 1 would cross the most (eight crossings). All of these watercourse crossings would be spannable.

The Proposed Blue/Orange Route and both Beltrami North variations would require conversion of forested and shrub wetland areas to herbaceous wetlands since woody vegetation would have to be removed from the ROW. Beltrami North Variation 1 has the fewest acres of forested and shrub wetlands (285 acres), while Beltrami North Variation 2 would have the most (345 acres) and require the most wetland type conversion. None of these wetland crossings would be spannable.

Beltrami North Variation 2 would pass through the most forested land (473 acres compared to 389 acres or less), including state forest (462 acres compared to 372 acres or less). In addition, Beltrami North Variation 2 parallels the least amount of existing transmission line corridor and crosses more state forest, which would result in more forest fragmentation. While direct, adverse impacts to forested areas would be long-term, they would be

expected to be minimal because of the amount of surrounding contiguous forest.

Beltrami North Variation 2 would pass through the Big Bog Important Bird Area and require the creation of a new corridor, which could impact bird habitat. In addition, the Proposed Blue/Orange Route and Beltrami North Variation 2 would cross an unnamed MnDNR-designated shallow lake, which could impact wildlife that use this lake. However, in this location, the Beltrami North Variation 2 would parallel and existing transmission line corridor.

Rare and Unique Natural Resources. Beltrami North Variation 2 would likely result in more impacts on rare species because more rare species have been documented within a mile of the ROW (seven records) than the Proposed Blue/Orange Route (two records) or Beltrami North Variation 1 (one record). However, the full extent of potential impacts from the Proposed Blue/Orange Route and the variations cannot be determined without pre-construction field surveys.

The Beltrami North Variation 2 passes through more MBS Sites of Biodiversity Significance (460 acres) compared to the Proposed Blue/Orange Route (369 acres) and the Beltrami North Variation 1 (276 acres). In addition, Beltrami North Variation 2 would pass through High Conservation Value Forest and MBS native plant communities, while the Proposed Blue/Orange Route and Beltrami North Variation 1 would not pass through these resources. Because of this, Beltrami North Variation 2 would likely have more impact on rare communities.

Corridor Sharing. The Proposed Blue/Orange Route would parallel existing transmission line corridors for its entire length, Beltrami North Variation 1 would parallel existing transmission line corridor for 72 percent of its length, and Beltrami North Variation 2 would parallel existing corridor for 53 percent of its length.

Costs that Depend on Design and Route. As the longest alternative, Beltrami North Variation 2 would cost the most to construct, while the shortest option, Beltrami North Variation 1, would cost the least construct.

S.10.1.5 West Section: Beltrami North Central Variation Area

The Beltrami North Central Variation Area contains six route alternatives: the Proposed Blue/Orange Route and Beltrami North Central Variations 1 through 5.

Human Settlement. The Beltrami North Central Variation Area alternatives would all be located within 1,500 feet of two state forests and one snowmobile trail. Because the Proposed Blue/Orange Route is the shortest alternative (11.6 miles compared to 12.2 miles to 15.0 miles) and would parallel an existing transmission line of similar size and design for its entire length (compared to 48 to 92 percent), it would have the least aesthetic impact. The aesthetic impact of the Proposed Blue/Orange Route and the Beltrami North Central variations would be expected to be minimal.

The Proposed Blue/Orange Route would parallel an existing corridor for its entire length but would cross the most USFWS interest lands (18 acres compared to 0 to 1 acre), while Beltrami North Central Variation 4 avoids the greatest amount of state forest (178 acres compared to 184 acres to 255 acres) and state fee lands (178 acres compared to 184 acres to 246) and does not cross any USFWS interest lands.

Land-Based Economies. Beltrami North Central Variation 2 would not impact any prime farmland or farmland of statewide importance, while the Beltrami North Central Variation 4 and Beltrami North Central Variation 5 would impact 20 acres of farmland of statewide importance and 6 acres of prime farmland. Beltrami North Central Variation 4, which parallels an existing 230 kV transmission line corridor for 92 percent of its length and crosses the least state forest land (178 acres of state forest within the ROW of Beltrami North Central Variation 4, 185 acres of state forest within the ROW of Beltrami North Central Variation 5, and more than 225 acres of state forest within the ROW of all other alternatives in this variation area), would have the least impact on state forest lands. There is no mining activity in the Beltrami North Central Variation Area.

Archaeology and Historic Architectural Resources. Beltrami North Central Variation 4 and Beltrami North Central Variations 5 each have one historic architectural site within the indirect APE (one mile). Neither the Proposed Blue/Orange Route nor any of the variations would directly impact any archaeological or historic architectural sites. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological resources are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Blue/Orange Route would cross the least amount of PWI waters (no crossings compared to one or more crossings),

floodplains (one acre compared to two acres) and forested/shrub wetlands (249 acres compared to 265 or more acres), and the second least amount of non-PWI waters (five crossings compared to four crossings). Watercourse and floodplain crossings would be spannable, while the Proposed Blue/Orange Route and Beltrami North Central Variations 1 through 5 would cross wetlands too large to span. Since the Proposed Blue/Orange Route crosses the least forested/shrub wetland area, it would require less wetland type conversion.

The Proposed Blue/Orange Route and all of the Beltrami North Central variations would generally pass through similar amounts of forested land and state forest. The Proposed Blue/Orange Route and the Beltrami North Central Variation 4, however, would parallel the most existing transmission line corridor (100 percent and 92 percent, respectively, compared to 48 percent to 70 percent for the other variations) and would therefore fragment the least amount of forest.

The Proposed Blue/Orange Route and all variations would pass through the Big Bog Important Bird Area. All but Beltrami North Central Variation 2, however, would parallel an existing transmission line corridor through this area.

Rare and Unique Natural Resources. No rare species have been documented within one mile of the ROW of Beltrami North Central Variation 4, while between three and four rare species have been documented within the ROW of the Proposed Blue/Orange Route and Beltrami North Central Variations 1, 2, 3, and 5. However, the Proposed Blue/Orange Route would parallel an existing transmission line corridor for its entire length, which would likely minimize impacts. The full extent of potential impacts from the Proposed Blue/Orange Route and the variations cannot be determined without pre-construction field surveys.

MBS Sites of Biodiversity Significance are present in the ROW of the Proposed Blue/Orange Route and all variations. Because the Proposed Blue/Orange Route would parallel an existing transmission line corridor for its entire length and Beltrami North Central Variation 4 for 92 percent of its length, these alternatives would have the least impact on rare communities.

Corridor Sharing. The Proposed Blue/Orange Route would parallel existing transmission line corridor for its entire length, Beltrami North Variation 4 would parallel existing transmission line corridor for 92 percent of its length, Beltrami North Variation 3 and 5 would parallel existing transmission line corridor

for 70 percent of their lengths, and Beltrami North Variation 1 and Beltrami North Variation 2 would parallel existing corridor for just less than 50 percent of their lengths.

Costs that Depend on Design and Route. Beltrami North Variation 5 would be the longest alternative, however, Beltrami North Variation 4 would cost the most to construct. The Proposed Blue/Orange Route would be the shortest alternative, however Beltrami North Variation 1 would cost the least to construct.

S.10.1.6 Relative Merits Summary—West Section

Border Crossing Variation Area

Within the Border Crossing Variation Area, the analysis indicates a general tradeoff between impacts to elements of the human settlement factors (e.g., the aesthetics element of the human settlement factor and the agriculture element of land-based economies) and impacts to elements of the natural environment factors (e.g., the water resources element of the natural environment factor and the rare communities element of the rare and unique resources factor). The Proposed Border Crossing-Blue/Orange Route and the Border Crossing Pine Creek Variation, for example, would have more potential impacts to the aesthetics element of human settlement because they would pass the greatest number of residences and parallel the least amount of existing transmission line corridor. The Border Crossing Pine Creek Variation would pass the most farmland and would therefore have more potential impacts to the agriculture element of land-based economies. The Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation would have more impacts to all three elements of the natural environment factor and to the rare communities' element of the rare and unique natural resources factor. In particular, the Proposed Border Crossing-Blue/Orange Route would have the most potential impacts to forested and shrub wetlands and MBS native plant communities and MBS Sites of Biodiversity Significance. The Border Crossing Pine Creek Variation would avoid some of these impacts to these elements of the natural environment and rare and unique natural resources factors by avoiding the wetlands, state forest land, and MBS Sites of Biodiversity Significance ranked outstanding immediately south of the international border. This variation would also provide more distance between the proposed Project and the Pine Creek Peatland SNA than the Proposed Border Crossing-Blue/Orange Route, but by doing so would create more aesthetic and farmland impacts by passing near one

more residence than the Proposed Border Crossing-Blue/Orange Route and crossing more agricultural land.

By paralleling existing transmission line corridors, the Border Crossing 230kV Variation and Border Crossing 500kV Variation would achieve a balance of sorts in terms of potential impacts to the aesthetic element of human settlement, the agricultural element of land-based economies, and all three elements of the natural environment. While these two variations would pass near residences and agricultural land, the paralleling of existing transmission lines would likely result in marginal aesthetic impacts to residents in the area and marginal impacts to agricultural land. These variations would intersect less wetland habitat and rare communities and would further minimize potential impacts by paralleling existing infrastructure and thereby minimizing habitat fragmentation.

The Border Crossing 230kV Variation and Border Crossing 500kV Variation are also much shorter than the other alternatives in this variation area. Their shorter length would result in a smaller total area of impact and lower impact in terms of the cost of construction factor.

Impacts to the archaeological and historic architectural resources factor would be expected to be slightly greater for the Border Crossing 500kV Variation and Border Crossing Pine Creek Variation as both variations would cross sections identified as containing known cultural resources.

Roseau Lake WMA Variation Area

Similar to the Border Crossing Variation Area, the analysis of the Roseau Lake WMA Variation Area indicates a tradeoff between impacts to human settlement factors and impacts to natural environment factors. Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 would both have fewer impacts on all three elements of natural environment and on the rare communities element of the rare and unique resource factor than the Roseau Lake WMA Proposed Blue/Orange Route as they would avoid crossing the Roseau Lake WMA, MBS Sites of Biodiversity Significance ranked moderate, and extensive wetland areas. However, the Roseau Lake WMA variations, particularly Roseau Lake WMA Variation 1, would impact the aesthetic element of the human settlement factor and the agricultural element of the land-based economies factor more than the Proposed Blue/Orange Route. Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 would pass through agricultural land and are located near more residences. Roseau

Lake WMA Variation 1 would also have more impact on the elements of human settlement and land-based economies because it would parallel a minimal amount of existing corridors and therefore, it would create new aesthetic impacts and a new encumbrance on farmland. Both variations are longer than the Proposed Blue/Orange Route and would result in a greater total area of impact and higher impact in terms of the cost of construction factor.

Impacts to the cultural resources factor would be expected to be greater for Roseau Lake WMA Variation 2 than for the other two alternatives in this variation area, as the Roseau Lake WMA Variation 2 passes near or through more sections identified with known cultural resources.

Cedar Bend WMA Variation Area

Both alternatives in the Cedar Bend Variation Area would minimize potential impacts by paralleling existing transmission line corridors for their entire lengths. While paralleling existing corridors would minimize habitat fragmentation (less impacts to the fauna element of the natural environment factor) along the Proposed Blue/Orange Route, and would make the Cedar Bend WMA Variation less conspicuous in terms of potential impacts to the aesthetic element of human settlement, the analysis indicates a tradeoff between impacts to human settlement factors and impacts to natural environment factors between the two alternatives in this variation area.

The Cedar Bend WMA Variation was proposed to minimize impacts to the flora and fauna elements of the natural environment factor and the rare communities element of the and rare and unique resources by avoiding crossing the Cedar Bend WMA and Beltrami Island State Forest, which is crossed by the Proposed Blue/Orange Route. In avoiding these natural resources, the Cedar Bend WMA Variation would impact the aesthetic element of the human settlement factor and the agricultural element of the land-based economies factor by crossing farmland in more populated areas and would create aesthetic impacts by passing near approximately ten times as many residences. The Cedar Bend WMA Variation also passes near more areas where known cultural resources are located, potentially creating more impacts to the archaeological and historic architectural resources factor.

Beltrami North Variation Area

The alternatives in the Beltrami North Variation Area are differentiated primarily in terms of three factors: impacts to the natural environment, cost of construction, and potential cultural resource

impacts. The Proposed Blue/Orange Route would minimize impacts to the fauna element of the natural environment factor by paralleling existing corridors and avoiding habitat fragmentation. Beltrami North Variation 1 would parallel less existing corridor than the Proposed Blue/Orange Route, but would minimize impacts to the water resources and flora elements of the natural environment factor by passing through fewer wetlands and fewer acres of forest. Both the Proposed Blue/Orange Route and Beltrami North Variation 1 are similar in length and therefore would be similar in terms of the construction costs factor.

Beltrami North Variation 2, on the other hand, is longer than the Proposed Blue/Orange Route and Beltrami North Variation 1 and would likely require many more angle structures, making it more expensive to construct. In addition, the Beltrami North Variation 2 would have relatively more impacts to the water resources and flora elements of the natural environment factor and the rare communities element of the rare and unique resources factor, passing through more wetland, forest, MBS Sites of Biodiversity Significance, High Conservation Value Forest, MBS native plant communities, and an Important Bird Area. In addition, Beltrami North Variation 2 would have more impacts to the archaeological and historic architectural resources factor as it passes near more sections identified with known archaeological and historic architectural resources.

Beltrami North Central Variation Area

Within the Beltrami North Central Variation Area, the analysis indicates that impacts to the aesthetics element of the human settlement factor and the agriculture element of the land-based economies factor would be minimized by Beltrami North Central Variation 1 and the Proposed Blue/Orange Route, as these alternatives would combine paralleling existing transmission line corridors and passing by relatively fewer residences than any of the other alternatives in this variation area. In contrast, Beltrami North Central Variation 4 and Beltrami North Central Variation 5 would result in more impacts to the aesthetics element of the human settlement factor and the agricultural element of and land-based economies factor, as they would cross slightly more farmland and would be in proximity to more residences. The Proposed Blue/Orange Route would have more impacts to the land use compatibility element of the human settlement factor because it would pass through USFWS lands; however it would do so while paralleling an existing transmission line corridor.

All of the alternatives in this variation area would have high potential for impacts to the water resources and wetland elements of the natural environment factor, passing through mostly forested and wetland areas. Beltrami North Central Variation 5 would cross the least amount of forested and shrub wetlands. Of the all the alternatives in this variation area, Beltrami North Central Variation 2 would have more impacts to the elements of the natural environment factor and to rare and unique resource impacts as it would pass through the Big Bog Important Bird Area and an MBS Site of Biodiversity Significance ranked high, without paralleling any existing infrastructure corridors through these areas. While the Proposed Blue/Orange Route would cross some of these same sensitive areas, paralleling the existing 500 kV transmission line corridor would result in fewer impacts to the fauna element of the natural environment factor associated with habitat fragmentation. Beltrami North Central Variation 4 would have fewer impacts to the fauna element of the natural environment factor and to the rare communities element of the rare and unique resources factor than the other alternatives in this variation area, as it would avoid the sensitive areas crossed by the Beltrami North Central Variation 2 and the Proposed Blue/Orange Route, and would also parallel an existing 230 kV transmission line corridor for its entire length.

The Proposed Blue/Orange Route and Beltrami North Central Variation 1 would have shorter lengths and would cost less to build.

S.10.2 Central Section

The Central Section contains eight variation areas: Pine Island, Beltrami South Central, Beltrami South, North Black River, C2 Segment Option, J2 Segment Option, Northome, and Cutfoot.

S.10.2.1 Central Section: Pine Island Variation Area

The Pine Island Variation Area has two route alternatives: the Proposed Blue Route and the Proposed Orange Route.

Human Settlement. Based on proximity to other sensitive viewing areas like historic architectural sites and state forests (two historic architectural sites within 5,280 feet of the Proposed Blue Route compared to seven historic architectural sites for the Proposed Orange Route, and four state forests for the Proposed Blue Route compared to six state forests for the Proposed Orange Route), and the extent of paralleling existing transmission lines (39 percent for the Proposed Blue Route compared to

23 percent for the Proposed Orange Route), the Proposed Blue Route would result in fewer aesthetic impacts. The ROW for the proposed routes would be within 1,500 feet of one state trail, snowmobile trails (three and four, respectively), and one state water trail. Despite that, both proposed routes are long (109.8 and 105.4 miles, respectively) and only parallel existing transmission lines of similar size and design for a relatively small percentage of their lengths (39 and 23 percent, respectively), therefore, aesthetic impacts of both proposed routes would potentially be significant.

The Proposed Blue Route would likely impact more acres of state forest (2,291 acres compared to 1,980 acres for the Proposed Orange Route) but would avoid crossing a greater amount of state fee lands (2,095 acres compared to 2,310 acres for the Proposed Orange Route), and USFWS interest lands (8 acres compared to 16 acres for the Proposed Orange Route). It would also parallel existing transmission line corridor more (39 percent compared to 23 percent for the Proposed Orange Route).

Land-Based Economies. Both the Proposed Blue Route and the Proposed Orange Route would impact 70 acres of land designated as “all areas are prime farmland”. The Proposed Blue Route would have fewer potential impacts to agriculture as it has fewer acres of land designated as “prime farmland if drained” (307 acres in the ROW of the Proposed Blue Route and 503 acres in the ROW of the Proposed Orange Route) and would parallel an existing transmission line for a greater proportion of its length (approximately 40 percent of the Proposed Blue Route compared to 23 percent of the Proposed Orange Route). The Proposed Orange Route would impact fewer acres of state forest lands (2,291 acres of state forest within the ROW of the Proposed Orange Route and 1,980 acres of state forest within the ROW of the Proposed Blue Route). The Proposed Orange Route would also impact fewer acres of state mining lands (370 acres of state mineral leases in the ROW of the Proposed Orange Route and 1,205 within the ROW of the Proposed Blue Route). In addition, two aggregate resources are present within the ROW of the Proposed Orange Route, while none are present in the ROW of the Proposed Blue Route.

Archaeology and Historic Architectural Resources. Neither route has any archaeological or historic architectural sites within its ROW. The Proposed Orange Route has a higher number of historic architectural sites within 1 mile (seven sites compared to two sites). Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for

archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Orange Route would cross the most PWI waters (25 crossings compared to 18 crossings for the Proposed Blue Route), while the Proposed Blue Route would cross slightly more non-PWI waters (48 crossings compared to 46 crossings for the Proposed Orange Route). Each proposed route would cross one impaired water, and the Proposed Blue Route would cross one MnDNR-designated trout stream. All water course crossings would be spannable. The Proposed Blue Route would also cross the greatest amount of floodplains (20 acres compared to 11 acres for the Proposed Orange Route) and wetlands (2,102 acres compared to 1,875 acres for the Proposed Orange Route). Floodplains would be spannable, while both the Proposed Blue Route and the Proposed Orange Route would cross wetlands too large to span.

Both proposed routes would pass through similar amounts of forested land, including state forest land, but because the Proposed Blue Route parallels existing transmission line corridor for a greater percentage of its length, it would likely have less impact on intact forested areas.

The Proposed Orange Route would pass through more WMA land (274 acres compared to 49 acres for the Proposed Blue Route) and more of the Big Bog Important Bird Area (1,722 acres compared to 1,405 acres for the Proposed Blue Route).

Rare and Unique Natural Resources. The Proposed Orange Route has more documented rare species within one mile of its ROW (14 records compared to 8 records for the Proposed Blue Route) and would likely have a greater impact on rare species. However, the full extent of potential impacts from either the Proposed Blue Route or the Proposed Orange Route cannot be determined without pre-construction field surveys. The Proposed Blue Route would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross less of this resource than the Proposed Orange Route.

Rare communities are present in the ROW of the Proposed Blue Route and Proposed Orange Route. Because the Proposed Blue Route would parallel more existing transmission line corridor (39 percent compared to 23 percent for the Proposed Orange Route), it would likely have less impact on these communities.

Corridor Sharing. The Proposed Blue Route and Proposed Orange Route would parallel existing transmission line corridor for 39 percent and 23 percent of their lengths, respectively. Both proposed routes would parallel existing road/trail, field line, and other corridors for less than 10 percent of their length.

Costs that Depend on Design and Route. As the longer alternative, the Proposed Blue Route would cost more to build than the Proposed Orange Route.

S.10.2.2 Central Section: Beltrami South Central Variation Area

The Beltrami South Central Variation Area contains two route alternatives: the Proposed Orange Route and the Beltrami South Central Variation.

Human Settlement. Because it is slightly shorter (1.2 miles compared to 1.7 miles for the Beltrami South Central Variation), and parallels an existing 500 kV transmission line for its entire length (compared to no paralleling for the Beltrami South Central Variation), and crosses less state forest land (30 acres compared to 43 acres for the Beltrami South Central Variation) the Proposed Orange Route would have the fewest aesthetic impacts and would be expected to be more compatible with existing land uses than the Beltrami South Central Variation, although it crosses more USFWS interest lands (16 acres compared to zero acres for the Beltrami South Central Variation).

Land-Based Economies. No prime farmland or mining lands are present in the ROW of either the Proposed Orange Route or the Beltrami South Central. The Proposed Orange Route would have less impact on forest lands with 30 acres of state forest land in it's ROW compared to 43 acres in the Beltrami South Central Variation ROW.

Archaeology and Historic Architectural Resources. No known archaeological or historic architectural resources are present within the Beltrami South Central Variation Area. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Orange Route contains less combined forested and shrub wetlands than the Beltrami South Central Variation (28 acres compared to 39 acres, respectively) and would result in less wetland type conversion. Both the

Proposed Orange Route and the Beltrami South Central Variation would cross wetlands too large to span.

The Proposed Orange Route would pass through slightly less forested land (30 acres compared to 43 acres for the Beltrami South Central Variation), including state forest, and would parallel existing transmission line corridor for its entire length, thereby resulting in less forest fragmentation.

Both the Proposed Orange Route and the Beltrami South Central Variation would pass through the Big Bog Important Bird Area. The Proposed Orange Route, however, would traverse a smaller portion (30 acres compared to 43 acres for the Beltrami South Central Variation) and would not require that a new transmission line corridor be created.

Rare and Unique Natural Resources. Four rare species have been documented within one mile of both the Proposed Orange Route and Beltrami South Central Variation; impacts to rare species would likely be similar with either alternative. However, the full extent of potential impacts from either the Proposed Orange Route or the Beltrami South Central Variation cannot be determined without pre-construction field surveys.

The Proposed Orange Route would pass through fewer MBS Sites of Biodiversity Significance (30 acres compared to 43 acres for the Beltrami South Central Variation), and would do so while paralleling an existing transmission line corridor; therefore this alternative would likely have less impacts on this resource.

Corridor Sharing. The Proposed Orange Route parallels existing transmission line corridors for its entire length. The Beltrami South Central Variation does not parallel any existing corridor.

Costs that Depend on Design and Route. As the shorter alternative, the Proposed Orange Route would cost less to construct and less per mile to construct.

S.10.2.3 Central Section: Beltrami South Variation Area

The Beltrami South Variation Area contains two route alternatives: the Proposed Orange Route and the Beltrami South Variation.

Human Settlement. State forest lands (one state forest within 1,500 feet of each alternative), but no residences, historic architectural sites, state trails, state parks, national forest, scenic byways, or snowmobile or water trails, would be located within

the 200-foot ROWs of the Proposed Orange Route or the Beltrami South Variation. The Proposed Orange Route, however, is shorter (5.6 miles compared to 7.5 miles for the Beltrami South Variation) and parallels transmission line corridor for its entire length compared to no paralleling for the Beltrami South Variation, so it would likely have the fewest adverse impacts on aesthetics. It also crosses less forested and/or swamp area (2,185 acres compared to 2,887 acres for the Beltrami South Variation), so it would be more compatible with existing land uses.

Land-Based Economies. Neither the Proposed Orange Route nor the Beltrami South Variation crosses prime farmland. The Proposed Orange Route, crosses less state forest and mineral lease land (136 acres of state forest and 58 acres of state mineral lease land for the Proposed Orange Route compared to 136 acres of state forest and 58 acres of state mineral lease land for the Proposed Orange Route), is shorter, and parallels an existing transmission line for its entire length, thereby having the least impact on forest and mining lands.

Archaeology and Historic Architectural Resources. No known archaeological or historic architectural resources are present within the Beltrami South Variation Area. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Orange Route contains less combined forested and shrub wetlands than the Beltrami South Variation (133 acres compared to 180 acres, respectively) and would result in less wetland type conversion. Both the Proposed Orange Route and the Beltrami South Variation would cross wetlands too large to span.

The Proposed Orange Route would pass through slightly less forested land (135 acres compared to 183 acres for the Beltrami South Variation), including state forest (136 acres compared to 183 acres for the Beltrami South Variation), and because it parallels existing transmission line corridor, it would fragment less forested land.

Both the Proposed Orange Route and the Beltrami South Variation would pass through the Big Bog Important Bird Area. The Proposed Orange Route, however, would traverse a smaller portion (136 acres compared to 183 acres for the Beltrami South

Variation) and would not require creation of a new transmission line corridor.

Rare and Unique Natural Resources. Two rare *Botrychium* (moonwort) species have been documented within one mile of the Beltrami South Variation, one of which was also documented within one mile of the Proposed Orange Route. Because species in this genus prefer disturbed, open habitats, impacts would be similar with either alternative. However, the full extent of potential impacts from either the Proposed Orange Route or the Beltrami South Variation cannot be determined without pre-construction field surveys. The Proposed Orange Route would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross less of this resource and would do so in an area where critical habitat designated for gray wolf has already been fragmented.

The Proposed Orange Route would pass through fewer MBS Sites of Biodiversity Significance (120 acres compared to 160 acres for the Beltrami South Variation) and would parallel existing transmission line corridor; it would therefore likely have the fewest adverse impacts on these resources.

Corridor Sharing. The Proposed Orange Route parallels existing transmission line corridor for its entire length. The Beltrami South Variation does not parallel any corridor.

Costs that Depend on Design and Route. As the shorter alternative, the Proposed Orange Route would cost less to construct and less per mile to construct.

S.10.2.4 Central Section: North Black River Variation Area

The North Black River Variation Area contains two route alternatives: the Proposed Blue Route and the North Black River Variation.

Human Settlement. Although the North Black River Variation would be slightly longer (9.2 miles compared to 8.4 miles for the Proposed Blue Route) and would impact several more residences than the Proposed Blue Route (five residences within 1,500 feet for the North Black River Variation compared to one residence for the Proposed Blue Route), it would likely have fewer aesthetic impacts because it would parallel an existing transmission line for its entire length compared to the Proposed Blue Route which does not parallel an existing transmission line. Neither alternative would be expected to have aesthetic impacts, as historic architectural sites, state trails, state parks, national forest, scenic byways, or

water trails are not located within the 200-foot ROW of either the Proposed Blue Route or the North Black River Variation. Snowmobile trails are crossed by both alternatives.

The Proposed Blue Route crosses less forested area (3,190 acres compared to 3,296 acres for the North Black River Variation) so it would be more compatible with existing land uses.

Land-Based Economies. The North Black River Variation would pass through more acres of farmland (50 acres of land designated as “prime farmland if drained” and 14 acres of farmland of statewide importance within the North Black River Variation ROW compared to 12 acres of land designated as “prime farmland if drained” and 29 acres of farmland of statewide importance within the Proposed Blue Route ROW). However, because the North Black River Variation would parallel an existing transmission line for its entire length, it would be expected to have fewer impacts on farmland.

The North Black River Variation would pass through less state forest and mining land (156 acres of state forest and 362 acres of state mineral lease land for the North Black River Variation ROW compared to 188 acres of state forest and 405 acres of state mineral lease land for the Proposed Blue Route ROW), so it would likely have fewer adverse impacts on these resources.

Archaeology and Historic Architectural Resources. No known archaeological or historic architectural resources are present within the North Black River Variation Area. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. Both the Proposed Blue Route and the North Black River Variation would cross non-PWI waters four times. All these crossings are spannable. Both the Proposed Blue Route and the North Black River Variation would cross wetlands, although the North Black River Variation would cross less combined forested and shrub wetlands than the Proposed Blue Route (156 acres compared to 185 acres, respectively) and would therefore result in less wetland type conversion. Both the Proposed Blue Route and the North Black River Variation would cross wetlands too large to span.

Both the Proposed Blue Route and the North Black River Variation would pass through similar amounts of forested land, including state forest, but because the North Black River Variation parallels existing transmission line corridor, it would cause less fragmentation of intact forest in areas.

Both the Proposed Blue Route and the North Black River Variation would pass through the Big Bog Important Bird Area. The North Black River Variation would cross slightly more of this area (214 acres compared to 191 acres for the Proposed Blue Route), but because it would parallel existing transmission line corridor, it would likely have less impact.

Rare and Unique Natural Resources. No state or federally-listed species have been documented within one mile of the Proposed Blue Route or the North Black River Variation. However, the full extent of potential impacts from either the Proposed Blue Route or the North Black River Variation cannot be determined without pre-construction field surveys.

The North Black River Variation would pass through fewer acres of MBS Sites of Biodiversity Significance (109 acres compared to 165 acres for the Proposed Blue Route) and would parallel an existing transmission line corridor; therefore it would fragment less intact forest in areas where forest vegetation is present.

Corridor Sharing. The North Black River Variation would parallel corridor with existing transmission lines for its entire length. The Proposed Blue Route would not parallel any existing corridor.

Costs that Depend on Design and Route. Although the North Black River Variation would be the longer alternative, it would cost the less to build and less per mile.

S.10.2.5 Central Section: C2 Segment Option Variation Area

The C2 Segment Option Variation Area contains two route alternatives: the Proposed Blue Route and the C2 Segment Option Variation.

Human Settlement. Although the C2 Segment Option Variation would be longer than the Proposed Blue Route (46.0 miles compared to 32.8 miles, respectively) and would impact substantially more residences (29 residences within 1,500 feet compared to zero residences within 1,500 feet, respectively). The C2 Segment Option Variation also parallels an existing transmission line for a large portion of the route (81 percent of total length compared to zero percent for the Proposed Blue Route) and therefore is likely to result in somewhat fewer aesthetic

impacts than the Proposed Blue Route. Both the Proposed Blue Route and C2 Segment Option Variation would be within 1,500 feet of a state trail, state forest land (two and three forests, respectively), snowmobile trails (two and one, respectively), and a water trail.

The C2 Segment Option Variation crosses more forested and agricultural land (16,121 acres and 167 acres, respectively) than the Proposed Blue Route (11,922 acres and zero acres, respectively), although the Proposed Blue Route would contain more state forest (797 acres compared to 274 acres for the C2 Segment Option Variation) and state fee land (731 acres compared to 640 acres for the C2 Segment Option Variation). Because the C2 Segment Option Variation parallels an existing transmission line corridor for 81 percent of its length compared to zero percent for the Proposed Blue Route, it would be more compatible with surrounding land uses.

Land-Based Economies. The Proposed Blue Route would pass through fewer acres of farmland, including prime farmland (2 acres within the ROW of the Proposed Blue Route and 25 acres within the ROW of the C2 Segment Option Variation), "prime farmland if drained," (92 acres within the ROW of the Proposed Blue Route and 124 acres within the ROW of the C2 Segment Option Variation) and farmland of statewide importance (78 acres within the ROW of the Proposed Blue Route and 177 acres within the ROW of the Segment Option Variation) and may have fewer impacts on agriculture.

The C2 Segment Option Variation would impact fewer acres of state forest land (247 acres within the ROW) compared to the Proposed Blue Route (797 acres within the ROW).

Because the C2 Segment Option Variation passes through more mining lands with state mineral leases (67 acres of state mineral lease land within the C2 Segment Option Variation ROW and 16 acres of state mineral lease land within the Proposed Blue Route ROW), it is more likely to potentially interfere with future mining activities in this area.

Archaeology and Historic Architectural Resources. No known archaeological or historic architectural resources are present within the North Black River Variation Area. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The C2 Segment Option Variation would cross fewer PWI and non-PWI waters (eight crossings compared to 17 crossings for the Proposed Blue Route) but more impaired waters (two crossings compared to one crossing for the Proposed Blue Route). All of these watercourses would be spannable. Both the Proposed Blue Route and the C2 Segment Option Variation would cross floodplains and wetlands, and the C2 Segment Option Variation would cross more acres of each (8 acres compared to 28 acres of floodplain for the Proposed Blue Route; 728 acres compared to 829 acres of wetland for the Proposed Blue Route). Both the Proposed Blue Route and the C2 Segment Option Variation would cross wetlands too large to span.

The C2 Segment Option Variation would pass through more forested land (1,080 acres compared to 789 acres for the Proposed Blue Route), but the Proposed Blue Route would pass through more state forest land (797 acres compared to 274 acres for the C2 Segment Option Variation), and even though the C2 Segment Option Variation is longer, it would parallel existing transmission line corridor for much of its length (81 percent), thereby causing less fragmentation of intact forest.

Both the Proposed Blue Route and the C2 Segment Option Variation would also pass through the Big Bog Important Bird Area. The C2 Segment Option Variation would traverse less area (406 acres compared to 469 acres for the Proposed Blue Route) and parallel existing transmission line corridor, therefore it would likely have less impact on this resource.

Rare and Unique Natural Resources. The C2 Segment Option Variation Area contains one state threatened vascular plant within one mile. Habitat for this vascular plant species is likely present within one mile of both the Proposed Blue Route and the C2 Segment Option Variation. Because the Proposed Blue Route would require the creation of new corridor for its entire length, while the C2 Segment Option Variation would parallel an existing transmission line for over 80 percent of its length, the Proposed Blue Route could have more impact on rare species. However, the full extent of potential impacts from either the Proposed Blue Route or C2 Segment Option Variation cannot be determined without pre-construction field surveys.

The C2 Segment Option Variation would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross this resource in an area where critical habitat designated for gray wolf has already been fragmented.

Both the Proposed Blue Route and the C2 Segment Option Variation would pass through MBS Sites of Biodiversity Significance and MnDNR Ecologically Important Lowland Conifers. However, because it would parallel an existing corridor for over 80 percent of its length, the C2 Segment Option would likely have less impact on these resources.

Corridor Sharing. The C2 Segment Option Variation would parallel existing transmission line corridor for 81 percent of its length. The Proposed Blue Route would not parallel any existing corridor.

Costs that Depend on Design and Route. As the shortest alternative, the Proposed Blue Route would cost less to build and less per mile to build.

S.10.2.6 Central Section: J2 Segment Option Variation Area

The J2 Segment Option Variation Area contains two route alternatives: the Proposed Orange Route and the J2 Segment Option Variation.

Human Settlement. Given the length (42.2 miles for the Proposed Orange Route compared to 45.2 miles), and proximity to residences (zero and six residences within 1,500 feet for the Proposed Orange Route and J2 Segment Option Variation, respectively), historic architectural resources (two and seven historic architectural sites within 1,500 feet, for the Proposed Orange Route and J2 Segment Option Variation, respectively), state scenic byways (zero compared to two within 1,500 feet for the Proposed Orange Route and J2 Segment Option Variation, respectively), and snowmobile trails (two compared to four within 1,500 feet for the Proposed Orange Route and J2 Segment Option Variation, respectively), the Proposed Orange Route would have less aesthetic impact than the J2 Segment Option Variation. Both alternatives would be located within 1,500 feet of a state trail and state forest (three compared to two for the Proposed Orange Route and J2 Segment Option Variation, respectively), and snowmobile trails.

The Proposed Orange Route would cross more state forest land (851 acres compared to 715 acres for the J2 Segment Option Variation) and state fee land (945 acres compared to 840 acres for the J2 Segment Option Variation) but the J2 Segment Option Variation would cross more USFWS interest lands (28 acres compared to zero acres for the Proposed Orange Route). Long-term changes to land use would be expected to be minimal.

Land-Based Economies. The Proposed Orange Route, which is shorter, would have less impact on farmland (434 acres of land designated as “prime farmland if drained” and “all areas are prime farmland” within

the J2 Segment Option Variation ROW, and 459 acres of land designated as “prime farmland if drained” and “all areas are prime farmland” within the Proposed Orange Route ROW), but because it would contain more state forest lands (851 acres of state forest within the Proposed Orange Route ROW and 715 acres of state forest within the J2 Segment Option Variation ROW), it would be expected to have the greater potential impact on forestry. The Proposed Orange Route also has slightly more mining lands in its ROW (82 acres of state mineral lease land within the Proposed Orange Route ROW versus 73 acres of state mineral lease land within the J2 Segment Option Variation ROW).

Archaeology and Historic Architectural Resources. No archaeological or historic architectural sites are located within the ROW of the Proposed Orange Route or J2 Segment Option Variation but both have historic architectural sites located within one mile (indirect APE) that could potentially be affected (two and seven sites, respectively). Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Orange Route would cross more PWI waters but fewer non-PWI waters than the J2 Segment Option Variation (six compared to three PWI water crossings, respectively and 24 compared to 36 non-PWI water crossings, respectively). The Proposed Orange Route would also cross floodplains, while the J2 Segment Option Variation would not cross any. These watercourses and floodplains would all be spannable. The Proposed Orange Route would also cross more forested and shrub wetlands (312 acres compared to 483 acres for the J2 Segment Option Variation), which would result in more wetland type conversion. Both the Proposed Orange Route and the J2 Segment Option Variation would cross wetlands too large to span.

The Proposed Orange Route and the J2 Segment Option Variation would pass through similar amounts of forested land, with the Proposed Orange Route passing through more state forest land (851 acres compared to 715 acres for the J2 Segment Option Variation). Therefore, they would result in similar fragmentation of intact forest, with the Proposed Orange Route fragmenting more state forest land.

The Proposed Orange Route would pass through 262 acres of the Big Bog Important Bird Area, while the J2 Segment Option Variation would pass through 72 acres of the Chippewa Plains Important Bird Area.

Rare and Unique Natural Resources. The Proposed Orange Route has more documented rare species within one mile of its ROW (four records compared to two records for the J2 Segment Option Variation). However, the full extent of potential impacts from either of the Proposed Orange Route or J2 Segment Option Variation cannot be determined without pre-construction field surveys. The J2 Segment Option Variation has two colonial waterbird nesting sites within 1,500 feet of its anticipated alignment, while no colonial waterbird nesting sites have been documented within one mile of the Proposed Orange Route. The J2 Segment Option Variation would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross less of this resource than the Proposed Orange Route.

The Proposed Orange Route would pass through more acres of MBS Sites of Biodiversity Significance (489 acres compared to 185 acres for the J2 Segment Option Variation) and would therefore have a greater adverse impact on these resources.

Corridor Sharing. Neither the Proposed Orange Route nor the J2 Segment Option Variation would parallel existing transmission line corridor.

Costs that Depend on Design and Route. As the shorter alternative, the Proposed Orange Route would cost less to build, but cost about the same per mile to build.

S.10.2.7 Central Section: Northome Variation Area

The Northome Variation Area contains two route alternatives: the J2 Segment Option Variation and the Northome Variation.

Human Settlement. Both the J2 Segment Option Variation and the Northome Variation would be within 1,500 feet of a state forest, and the Northome Variation is also within 1,500 feet of a national forest, although it does not cross the ROW. Because both alternatives are short (3.7 and 4.0 miles, respectively) and impact no residences and few other sensitive visual resources (state and national forests), aesthetic impacts would be expected to be minimal. No historic architectural sites, state trails, state parks, scenic byways, snowmobile or water trails are within the ROW of either alternative.

The Northome Variation ROW contains a greater amount of state fee land (81 acres compared to 39 acres for the J2 Segment Option Variation) while the J2 Segment Option Variation crosses more USFWS interest lands (28 acres compared to zero acres for the Northome Variation). Both alternatives contain less than half an acre of state forest land.

Land-Based Economies. The Northome Variation, which is longer, would pass through more farmland, including more prime farmland and “prime farmland if drained” (43 acres of land designated as “prime farmland if drained” and “all areas are prime farmland” for the Northome Variation ROW, and 22 acres of land designated as “prime farmland if drained” and “all areas are prime farmland” for the J2 Segment Option Variation ROW). The Northome Variation would, however, impact less farmland of statewide importance (28 acres of farmland of statewide importance for the Northome Variation ROW, and 39 acres of land designated as “prime farmland if drained” and “all areas are prime farmland” for the J2 Segment Option Variation ROW).

The J2 Segment Option Variation and the Northome Variation would impact minimal amounts of state forest lands. No mining lands would be located within the ROW of either alternative.

Archaeology and Historic Architectural Resources. No archaeological or historic architectural resources are located within the direct and indirect APEs for the J2 Segment Option Variation or the Northome Variation. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The J2 Segment Option Variation would cross more non-PWI waters (six crossings compared to one crossing for the Northome Variation), all of which would be spannable. The J2 Segment Option Variation would also contain more acres of forested and shrub wetlands (eight acres compared to 13 acres for the Northome Variation), which would result in more wetland type conversion. Both the J2 Segment Option Variation and the Northome Variation would cross wetlands too large to span.

The J2 Segment Option Variation and the Northome Variation would pass through similar amounts of forested land and would therefore fragment similar amounts of intact forest.

The Northome Variation would cross a MnDNR-designated shallow lake along a new transmission line corridor, which could impact the wildlife that uses this lake. Due to its longer length, the Northome Variation could also have a greater overall impact on wildlife.

Rare and Unique Natural Resources. No federally- or state-listed species have been documented within one mile of either alternative. However, the full extent of impacts from either the Proposed J2 Segment Option Variation and Northome Variation cannot be determined without pre-construction field surveys. One and two colonial waterbird nesting sites have been documented within one mile of the J2 Segment Option Variation and of the Northome Variation, respectively.

No documented rare communities appear within the ROW of the J2 Segment Option Variation or the Northome Variation.

Corridor Sharing. Neither the J2 Segment Option Variation nor the Northome Variation parallel any existing corridors.

Costs that Depend on Design and Route. As the shorter alternative, the J2 Segment Option Variation would cost less to build and less per mile to build.

S.10.2.8 Central Section: Cutoff Variation Area

The Cutoff Variation Area contains two route alternatives: the Proposed Orange Route and the Cutoff Variation.

Human Settlement. The ROWs of both the Proposed Orange Route and the Cutoff Variation are within 1,500 feet of three state forests, but neither alternative would be likely to impact other aesthetic resources or residences with high visual sensitivity such as historic architectural resources, state trails, state parks, national forest, scenic byways, snowmobile or water trails as they are not within the ROW or within 1,500 feet of the anticipated alignments. Because the Cutoff Variation is slightly longer (4.8 miles compared to 4.2 miles for the Proposed Orange Route), it would have a greater impact on aesthetics.

The Proposed Orange Route and the Cutoff Variation contain roughly the same amount of forest lands (1,652 acres compared to 1,874 acres, respectively), and neither alternative contains any farmland. No long-term changes to land use would be expected to be minimal from either alternative.

Land-Based Economies. The Proposed Orange Route would pass through more acres of farmland, including “prime farmland if drained” (53 acres within the ROW) than the Cutoff Variation (32 acres within the ROW). Each alternative would impact less than 5 acres of farmland of statewide importance and would not impact prime farmland. The Cutoff Variation would cross slightly more acres of state forest lands (116 acres within the ROW) than the Proposed Orange Route (103 acres within the ROW), and therefore may have more impact on these lands. The Proposed Orange Route would cross more state mining lands (29 acres of state mineral lease land within the ROW of the Proposed Orange route and 4 acres of state mineral lease land within the ROW of the Cutoff variation), and both alternatives would have one aggregate resource within its ROW.

Archaeology and Historic Architectural Resources. Neither the Proposed Orange Route nor the Cutoff Variation affects any archaeological or historic architectural resources in the direct and indirect APEs. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Orange Route would cross two non-PWI waters, while the Cutoff Variation would not cross any. Both of these non-PWI waterbodies would be spannable. The Cutoff Variation contains more forested and shrub wetlands and would result in a greater amount of wetland type conversion (52 acres compared to 64 acres for the Proposed Orange Route). Both the Proposed Orange Route and the Cutoff Variation would cross wetlands too large to span.

Because the Cutoff Variation is longer, it would pass through more forested land (115 acres compared to 99 acres for the Proposed Orange Route), including more state forest land (116 acres compared to 103 acres for the Proposed Orange Route), and would result in more fragmentation of intact forest.

Rare and Unique Natural Resources. No state- or federally-listed species have been documented within one mile of the Proposed Orange Route or the Cutoff Variation. However, the full extent of potential impacts from either the Proposed Orange Route or Cutoff Variation cannot be determined without pre-construction field surveys. The Proposed Orange Route would be expected to have less potential impact on critical habitat designated for

gray wolf because it would cross slightly less of this resource than the Cutfoot Variation.

The Cutfoot Variation would pass through more acres of MBS Sites of Biodiversity Significance (60 acres) than the Proposed Orange Route (43 acres) and therefore would likely have more impact on this resource.

Corridor Sharing. Neither the Proposed Orange Route nor the Cutfoot would parallel any existing corridors.

Costs that Depend on Design and Route. The Proposed Orange Route would cost less to build but slightly more per mile to build.

S.10.2.9 Relative Merits Summary—Central Section

Pine Island Variation Area

Within the Pine Island Variation Area, the analysis indicates a tradeoff between impacts to human settlement factors and impacts to natural environment factors. Though both routes would pass through reaches of forest lands and floodplain and forested wetlands too large to span, the Proposed Orange Route would cross the least, resulting in placement of fewer structures in floodplains and requiring the least wetland type conversion. The Proposed Blue Route would have a greater impact on the watercourse/waterbody crossing indicator of the water resources element as it would cross a trout stream, potentially requiring vegetation along the banks of the stream to be cleared. With respect to the vegetation, wildlife, and rare and unique natural resources elements of the natural environment factor, the Proposed Blue Route would cross more state forest land, wetlands and Ecologically Important Lowland Conifer stands, while the Proposed Orange Route would cross greater areas of MBS Sites of Biodiversity Significance, a WMA, and Important Bird Areas and also has more documented Natural Heritage Information System ((NHIS) records within one mile.

The Proposed Blue Route would impact the aesthetics element of the human settlement factor by passing near more residences than the Proposed Orange Route. Though the Proposed Orange Route would pass near the Big Bog Recreation area, a valued resource with respect to both the aesthetics element and the recreation and tourism element of the human settlement factor, the Proposed Orange Route would not be visible from the Big Bog Recreation Area. Both the Proposed Blue Route and the Proposed Orange Route would cross USFWS land, affecting the land use compatibility

element of the human settlement factor; however, the Proposed Blue Route could avoid USFWS land by using the Silver Creek Alignment Modification. The Proposed Blue Route would cross more mineral resources, affecting the mining and mineral resources element of the land based economies factor, though the Proposed Orange Route would pass in close proximity to more aggregate resources. The Proposed Blue Route would parallel existing corridors, including transmission line corridors, for a greater length than the Proposed Orange Route; however, the Proposed Orange Route is shorter and would incur lower construction, operation, and maintenance costs.

Beltrami South Central Variation Area

Within the Beltrami South Central Variation Area, the analysis indicates that due to its overall greater length, lack of paralleling existing corridors, and sharply-angled route, the Beltrami South Central Variation would have greater impacts than the Proposed Orange Route for the elements of three key factors: natural environment, rare and unique resources, and construction cost. The Beltrami South Central Variation would avoid USFWS land; however, it would cross the most forest land, wetland, and portions of the Important Bird Area. The Beltrami South Central Variation would cross the most forested and shrub wetland, requiring the most wetland type conversion. Furthermore, the Beltrami South Central Variation would not parallel any existing corridors and would be longer than the Proposed Orange Route, requiring more corner structures and costing more to build.

Beltrami South Variation Area

Within the Beltrami South Variation Area, the analysis indicates that due to its overall greater length, lack of paralleling existing corridors, and numerous angle structures, the Beltrami South Variation would have greater impacts than the Proposed Orange Route for the elements of three key factors: natural environment, rare and unique resources, and construction cost. The Beltrami South Variation would avoid USFWS lands; however, it would cross the most forest land, mineral leasing areas, wetlands, portions of the Important Bird Area, and MBS Sites of Biodiversity Significance. The Beltrami South Variation would cross the most forested and shrub wetland, requiring the most wetland type conversion. Furthermore, the Beltrami South Variation would not parallel any existing corridors and would be longer than the Proposed Orange Route, requiring more corner structures and costing more to build.

North Black River Variation Area

In the North Black River Variation Area, the analysis indicates a potential tradeoff between impacts to the aesthetic element of the human settlement factor and to elements of the land-based economies, natural environment, and rare and unique natural resources factors. The North Black River Variation would have more impacts to the aesthetics element of the human settlement factor as it passes close to more residences than the Proposed Blue Route, but these impacts are moderated to some extent by paralleling existing roadway and transmission line corridors.

The Proposed Blue Route would cross more forested land, mineral leases, wetland, and MBS Sites of Biodiversity Significance. In addition, the Proposed Blue Route would cross the most forested and shrub wetland, requiring the most wetland type conversion. Impacts associated with the North Black River Variation would primarily be moderated by paralleling existing corridors; the proposed Blue Route would not parallel any corridors. Though the North Black River Variation is longer, the Proposed Blue Route would have a slightly higher construction cost.

C2 Segment Option Variation Area

In the C2 Segment Option Variation Area, the analysis indicates a potential tradeoff between elements of the human settlement, natural environment, and rare and unique resources factors. The Proposed Blue Route parallels a very small amount of existing corridors and impacts the forestry and agriculture elements of the land based economies factor by passing through more state trust land and farmland; however, it does not pass in close proximity to any residences, thereby minimizing impacts to the aesthetic element of *human settlement*. The C2 Segment Option Variation, on the other hand, would have more potential impacts to the aesthetic element of human settlement as it passes near more residences while paralleling the existing 230 kV transmission line corridor. The C2 Segment Option Variation would also cross more mineral lease areas.

The C2 Segment Option Variation would moderate impacts to the vegetation and wildlife elements of the natural environmental factor by paralleling existing corridors. However, the C2 Segment Option Variation would cross the most watercourses/waterbodies, FEMA floodplain, wetlands, gray wolf designated critical habitat, and more SNA WPAs. The Proposed Blue Route would cross more MBS Sites of Biodiversity Significance and would not moderate impacts by paralleling existing corridors. The C2

Segment Option Variation would cross the most forested and shrub wetland and would require more wetland type conversion. Due to its longer length and many angle structures, the C2 Segment Option Variation would cost more to construct than the Proposed Blue Route.

J2 Segment Option Variation Area

In the J2 Segment Option Variation Area, the analysis indicates a potential tradeoff between impacts to elements of the of the human settlement factor and to elements of the land-based economies, natural environment, and rare and unique natural resources factors. The J2 Segment Option Variation would cross more farmland, an SNA, and would pass by more residences. The J2 Segment Option Variation would also cross several sections with known archaeological and historic architectural resources. However, the Proposed Orange Route would cross more state forest land, mineral lease areas, aggregate resources, and MBS Sites of Biodiversity Significance. The Proposed Orange Route would cross the most shrub and forested wetland, requiring the most wetland type conversion. This alternative would also span FEMA-designated floodplains, crosses more gray wolf designated critical habitat, and has more documented NHIS records of rare species within one mile of it. Though the construction cost per mile would be similar for either alternative, the J2 Segment Option Variation would cost more to construct due to its greater length.

Northome Variation Area

In the Northome Variation Area, the analysis indicates that due to its overall greater length and additional angle structures, the Northome Variation would have greater impacts than the J2 Segment Option Variation for the following factors: land based economies, archaeological and historic architectural resources, natural environment, rare and unique natural resources, and construction cost. The Northome Variation would pass closer to aggregate resources, would cross a section with known archaeological and historic architectural resources, and would cross more MBS Sites of Biodiversity Significance. Though the J2 Segment Option Variation crosses more wetlands, the Northome Variation is longer and, as such, would have a greater impact on vegetation and wildlife and would cost more to construct.

The J2 Segment Option Variation would have a greater impact on the land use compatibility element of the human settlement factor by crossing USFWS land. It would also cross the most forested and shrub wetland, requiring the most wetland type conversion.

Cutoff Variation Area

In the Cutoff Variation Area, the analysis indicates that due to its overall greater length and additional angle structures, the Cutoff Variation would have greater impacts than the Proposed Orange Route for the following factors: natural environment, rare and unique natural resources, and construction cost. The Cutoff Variation could cross more state forest land, watercourses/waterbodies, wetlands, and MBS Sites of Biodiversity Significance. However, the Proposed Orange Route would cross more farmland and mineral lease areas and would also cross a section identified as containing known archaeological sites. The Cutoff Variation would cost more to construct because it is longer, though its cost per mile is slightly less than that of the Proposed Orange Route.

S.10.3 East Section

The East Section contains five variation areas: Effie, East Bear Lake, Balsam, Dead Man's Pond, and Blackberry.

S.10.3.1 East Section: Effie Variation Area

The Effie Variation Area contains three route alternatives: the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation.

Human Settlement. Although the Effie Variation is longer compared to the Proposed Blue Route and Proposed Orange Route (49.8 miles compared to 41.1 and 44.6 miles, respectively) and would impact more residences (14 residences within 1,500 feet compared to four and five residences, respectively) and aesthetic resources (three historic architectural sites within 5,280 feet, compared to one and one site, respectively), it parallels two existing transmission lines for 80 percent of its length compared to no paralleling for the Proposed Blue Route and Proposed Orange Route and would therefore likely have the least impact on aesthetic resources. All three route alternatives would have a state trail, two state forests, and snowmobile trails (between four and six) within 1,500 of the anticipated alignment. Historic architectural sites, state parks, national forests, scenic byways, and water trails are not crossed by any of the route alternatives.

Although the Effie Variation ROW would have a greater amount of state forest land (1,086 acres compared to 909 and 958 acres, respectively), state fee land (772 acres compared to 645 and 694 acres, respectively), and state conservation land (293 acres compared to 200 and 196 acres, respectively) than the two proposed routes, it parallels existing transmission line corridors for 80 percent of its length (compared to no paralleling for the proposed

routes), which would likely make it the most compatible with surrounding land uses.

Land-Based Economies. The Proposed Blue Route, which is the shortest route, would have the least impact on farmland, including farmland of statewide importance (121 acres of farmland of statewide importance within the Proposed Blue Route ROW, 123 acres of farmland of statewide importance within the Proposed Orange Route ROW, and 159 acres of farmland of statewide importance within the Effie Variation ROW), prime farmland (246 acres of land designated as "prime farmland if drained" and "all areas are prime farmland" within the Proposed Blue Route ROW, 387 acres of land designated as "prime farmland if drained" and "all areas are prime farmland" within the Proposed Orange Route ROW, and 506 acres of land designated as "prime farmland if drained" and "all areas are prime farmland" within the Effie Variation ROW). The Proposed Blue Route would also have the least impact on state forest lands (909 acres of state forest within the Proposed Blue Route ROW, 958 acres of acres of state forest within the Proposed Orange Route ROW, and 1,086 acres of acres of state forest within the Effie Variation ROW).

Although the Effie Variation crosses the most state mineral lease lands (647 acres of state mineral lease lands within the Proposed Blue Route ROW, 819 acres of acres of state mineral lease lands within the Proposed Orange Route ROW, and 824 acres of state mineral lease lands within the Effie Variation ROW), it does so while paralleling an existing transmission line corridor. All three alternatives would cross a volcanic belt with known metallic mineral occurrences (gold, copper-zinc-lead, iron). No known aggregate resources are located within the Effie Variation Area.

Archaeology and Historic Architectural Resources. The Effie Variation has an archaeological site within the direct APE and more historic architectural sites within the indirect APE relative to either of the proposed routes (three sites compared to one site each for the Proposed Blue Route and Orange Route). Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Orange Route and the Effie Variation would cross the most PWI waters (13 crossings each). The Effie Variation would cross the most non-PWI waters (15 crossings

compared to 11 crossings or fewer for the other alternatives) and is the only alternative that would cross MnDNR-designated trout streams (six crossings). Only the proposed routes would cross floodplains. All these crossings are spannable. The Proposed Blue Route would cross the most forested and shrub wetlands (418 acres compared to 377 acres or less for the other alternatives), requiring the most wetland type conversion. All of the alternatives would require crossing wetlands too large to span.

Although the Effie Variation would pass through the most forested land (1,164 acres compared to 978 acres to 1,047 acres for the other alternatives), including state forest land (1,086 acres compared to 909 acres to 958 acres for the other alternatives), it would parallel an existing transmission line corridor for the majority of its length and would likely have the least impact on forested lands.

Unlike the Proposed Blue Route and Proposed Orange Route, the Effie Variation would avoid the Chippewa Plains Important Bird Area and would parallel an existing transmission line corridor for the majority of its length, which would result in less fragmentation of forested habitats.

Rare and Unique Natural Resources. The Effie Variation has the fewest rare species within one mile of its ROW (three records compared to five to six records for the proposed routes) and the fewest colonial waterbird nesting sites (two sites compared to three sites for the proposed routes). Because the Effie Variation parallels existing transmission line corridor, it would likely have the fewest impacts on rare species. However, the full extent of potential impacts from the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation cannot be determined without pre-construction field surveys. Although the Effie Variation would cross more critical habitat designated for gray wolf than the proposed routes, it would be expected to have less potential impact on this resource because it would cross in an area where critical habitat designated for gray wolf has already been fragmented.

The Proposed Blue Route, Proposed Orange Route, and the Effie Variation would all pass through MBS Sites of Biodiversity Significance. Because the Effie Variation would parallel an existing transmission line for 80 percent of its length, it is likely to have the least impact on this resource.

Corridor Sharing. The Effie Variation would parallel existing transmission line corridor for 80 percent of its length. The Proposed Blue Route and Proposed Orange Route would not parallel any transmission line corridor.

Electrical System Reliability. The Effie Variation would parallel 500 kV and 230 kV transmission lines for 80 percent of its length. Three high voltage transmission lines in adjacent corridors could decrease the reliability of the proposed Project. When facilities are close together, 1) there is a greater risk that a single event could take out multiple lines, and 2) repairing the lines could be more difficult, which could increase outage times, should an outage occur.

Costs that Depend on Design and Route. As the shortest alternative, the Proposed Blue Route would cost the least to build, but the Proposed Orange Route would cost the least per mile to build.

S.10.3.2 East Section: East Bear Lake Variation Area

The East Bear Lake Variation Area contains two route alternatives: the Proposed Orange Route and the East Bear Lake Variation.

Human Settlement. The Proposed Orange Route and East Bear Lake Variation would impact similar numbers of aesthetic resources, including a state trail, state forest, and three snowmobile trails within 1,500 feet of the anticipated alignment. No historic architectural sites, state parks, national forests, scenic byways, or water trails are within the ROW of either route alternative. The East Bear Variation, however, although slightly longer (10.5 miles compared to 8.9 miles for the Proposed Orange Route), would parallel two existing transmission lines for 42 percent of its length compared to zero percent for the Proposed Orange Route and would therefore likely have fewer aesthetic impacts.

The East Bear Lake Variation ROW would contain a greater amount of state forest land (256 acres compared to 217 acres for the Proposed Orange Route) and state fee land (256 acres compared to 217 acres for the Proposed Orange Route), but because it would parallel existing transmission line corridor (42 percent of its length compared to zero percent for the Proposed Orange Route), it would be more compatible with current land use.

Land-Based Economies. The East Bear Lake Variation would pass through more acres of farmland, including prime farmland (160 acres of land designated as "prime farmland if drained" and "all areas are prime farmland" within the East Bear Lake Variation ROW and 85 acres of land designated as "prime farmland if drained" and "all areas are prime farmland" within the Proposed Orange Route ROW). However, because the East Bear Lake Variation parallels existing transmission line corridor for just under half of its length, it may have less impact on

farmland. The Proposed Orange Route would pass through fewer acres of state forest lands (217 acres of state forest within the Proposed Orange Route ROW and 256 acres of acres of state forest within the East Bear Lake Variation ROW) and would have the least impact on forestry.

The East Bear Lake Variation would pass through more state mining lands (193 acres of state mineral lease lands within the East Bear Lake Variation ROW and 96 acres of acres of state mineral lease lands within the Proposed Orange Route ROW), although both alternatives could potentially interfere with future mining activities in this area.

Archaeology and Historic Architectural Resources. Neither alternative is known to contain any archaeological or historic architectural resources. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Orange Route would cross more PWI waters (four crossings compared to two crossings for the East Bear Lake Variation) but fewer non-PWI-waters (no crossings compared to three crossings for the East Bear Lake Variation); all crossings would be spannable. The Proposed Orange Route would cross more forested and shrub wetlands (99 acres compared to 87 acres for the East Bear Lake Variation), requiring the most wetland type conversion. Both the Proposed Orange Route and the East Bear Lake Variation would cross wetlands too large to span.

Although the East Bear Lake Variation would pass through more forested land (251 acres compared to 216 acres for the Proposed Orange Route), including state forest land (256 acres compared to 217 acres for the Proposed Orange Route), and is longer than the Proposed Orange Route, it would parallel existing transmission line corridor and would likely result in fewer impacts on intact forested land and would fragment less forested habitat and thereby displace fewer wildlife species associated with those forest communities.

Rare and Unique Natural Resources. One state-special concern vascular plant species was documented within one mile of both the Proposed Orange Route and East Bear Lake Variation. In addition, two state-special concern mussel species have been documented within one mile of the Proposed Orange Route, one of which was also documented

within one mile of the East Bear Lake Variation. Because it is anticipated that all watercourses would be spanned, impacts to these rare mussels are not expected. Because the Proposed Orange Route would require creation of new corridor for its entire length, it would likely result in more impacts on rare species relative to the East Bear Lake Variation; however, the full extent of potential impacts from either the Proposed Orange Route or East Bear Lake Variation cannot be determined without pre-construction field surveys.

Although the East Bear Lake Variation would pass through more MBS Sites of Biodiversity Significance (255 acres compared to 217 acres for the Proposed Orange Route), it would likely have less impact on this resource because it parallels and existing transmission line corridor for over 40 percent of its length.

Corridor Sharing. The East Bear Lake Variation would parallel existing transmission line corridor for 42 percent of its length. The Proposed Orange Route would parallel other existing corridors for 55 percent of its length.

Costs that Depend on Design and Route. As the shorter alternative, the Proposed Orange Route would cost less to build and less per mile to build.

S.10.3.3 East Section: Balsam Variation Area

The Balsam Variation Area contains three route alternatives: the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation.

Human Settlement. Considering the proximity of residences (seven residences for the Proposed Blue Route compared to 21 and 11 for the Proposed Orange Route and Balsam Variation, respectively), and snowmobile trails (two trails for the Proposed Blue Route compared to two and three trails for the Proposed Orange Route and Balsam Variation, respectively) within 1,500 feet of the anticipated alignment and other historic architectural sites within one mile (13 sites for the Proposed Blue Route compared to 24 and 28 sites for the Proposed Orange Route and Balsam Variation, respectively), the Proposed Blue Route would have the fewest aesthetic impacts compared to the Proposed Orange Route and Balsam Variation. Aesthetic impacts of all three alternatives, however, could potentially be significant.

All three alternatives would cross primarily through forested lands. The Proposed Orange Route avoids the most state fee lands (50 acres) compared to 67 and 107 acres for the Proposed Blue Route and Balsam Variation, respectively, thereby avoiding

long-term changes to land use. The Balsam Variation, however, would parallel an abandoned transmission line corridor for two-thirds of its length compared to the Proposed Blue Route and Proposed Orange Route following an existing or abandoned transmission line for 15 and 36 percent of their lengths, respectively.

Land-Based Economies. The Balsam Variation, which has the least acres of farmland (203 acres of land designated as “prime farmland if drained”, “all areas are prime farmland” and “farmland of statewide importance” within the Balsam Variation ROW, 206 acres of land designated as “prime farmland if drained”, “all areas are prime farmland” and “farmland of statewide importance” within the Proposed Blue Route ROW, and 203 acres of land designated as “prime farmland if drained”, “all areas are prime farmland” and “farmland of statewide importance” within the Proposed Orange Route ROW) and parallels an abandoned transmission line corridor for approximately two-thirds of its length, would likely have the least impact on farmlands.

The Balsam Variation is the only alternative that would cross state mining lands (89 acres of state mineral lease lands within the ROW), and it could potentially interfere with future mining activities in this area.

Archaeology and Historic Architectural Resources. There are no known archaeological or historic architectural sites located within the ROW of the Proposed Blue Route, Proposed Orange Route, or Balsam Variation but all have many historic architectural sites within one mile of the anticipated alignment (13, 24, and 28, respectively). Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Blue Route would cross the most PWI waters (seven crossings compared to five or fewer crossings for the other alternatives), and the Proposed Orange Route would cross the most non-PWI waters (four crossings compared to three or fewer crossings for the other alternatives); all crossings would be spannable. The Proposed Orange Route and the Balsam Variation would both cross floodplains (26 acres and 22 acres, respectively) too large to span, with the Proposed Orange Route crossing the most floodplain. The Balsam Variation would cross the most forested and shrub wetlands (83 acres compared to 59 acres

or less for the other alternatives), requiring the most wetland type conversion. The Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation would all require crossing wetlands too large to span.

Although the Balsam Variation would pass through the most forest land (401 acres compared to 299 acres to 318 acres for the Proposed Blue Route and Proposed Orange Route, respectively), it would parallel an abandoned transmission line corridor for about two-thirds of its length and would thereby have the least impact on intact forested areas and would likely fragment less forested habitat and thereby displace fewer wildlife species associated with those forest communities. The Balsam Variation, however, would be located within approximately 500 feet of the Chippewa Plains Important Bird Area and could impact more birds and other wildlife associated with that area.

Rare and Unique Natural Resources. The three state special concern species documented within one mile of the three alternatives are aquatic, and because waters would be spanned, impacts would not be expected. However, the full extent of potential impacts from the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation cannot be determined without pre-construction field surveys.

The Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation would all pass through MBS Sites of Biodiversity Significance, but by paralleling an abandoned transmission line corridor, the Balsam Variation would have the least impact on this resource.

Corridor Sharing. The Balsam Variation would parallel an abandoned transmission line corridor for 66 percent of its length, while the other alternatives would parallel existing corridors for less than half of their lengths.

Electrical System Reliability. The Proposed Blue Route and Proposed Orange Route would parallel two 115 kV transmission lines for approximately 15 percent of their lengths. Three high voltage transmission lines in adjacent corridors could decrease the reliability of the proposed Project. When facilities are close together, 1) there is a greater risk that a single event could take out multiple lines, and 2) repairing the lines could be more difficult, which could increase outage times, should an outage occur.

Costs that Depend on Design and Route. As the shortest alternative, the Proposed Blue Route would cost the least to build, but the Balsam Variation would cost the least per mile to build.

S.10.3.4 East Section: Dead Man's Pond Variation Area

The Dead Man's Pond Variation Area contains two route alternatives: the Proposed Blue Route and the Dead Man's Pond Variation.

Human Settlement. Because the Proposed Blue Route would impact fewer residences within 1,500 feet of the anticipated alignment (two residences compared to four residences for the Dead Man's Pond Variation), and would be slightly shorter (2.2 miles compared to 2.3 miles for the Dead Man's Pond Variation), it would be expected to have fewer impacts on aesthetics. Because both alternatives are relatively short and do not directly cross any sensitive aesthetic resources, aesthetic impacts would be expected to be limited.

The 200-foot ROW of the Proposed Blue Route would contain slightly less state fee land than the Dead Man's Pond Variation (19 acres compared to 37 acres, respectively) and would parallel a road/trail for a portion of its length (17 percent compared to zero percent, respectively). Therefore, the Proposed Blue Route would be slightly more compatible with existing land uses.

Land-Based Economies. The Proposed Blue Route would pass through fewer acres of farmland (20 acres of land designated as "prime farmland if drained" or "all areas are prime farmland" within the Proposed Blue Route ROW and 39 acres of land designated as "prime farmland if drained" or "all areas are prime farmland" within the Dead Man's Pond Variation ROW), including prime farmland, and would therefore likely have less impact on agriculture. No state mining lands are located within the ROW of either alternative.

Archaeology and Historic Architectural Resources. Each alternative would have one historic architectural site within one mile of its anticipated alignment. Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. There would be no PWI or non-PWI water crossings for either the Proposed Blue Route or the Dead Man's Pond Variation. Both alternatives would cross wetlands. The Proposed Blue Route would have more forested and shrub wetland (14 acres compared to four acres for the Dead Man's Pond Variation) and would require more wetland type conversion. Both the Proposed Blue

Route and the Dead Man's Pond Variation would likely cross wetlands too large to span.

The Proposed Blue Route and the Dead Man's Pond Variation would pass through a similar amount of forested land and would therefore fragment similar amounts of intact forest and would likely impact similar amounts of wildlife habitat.

Rare and Unique Natural Resources. No state- or federally-listed species have been documented within one mile of the Proposed Blue Route or the Dead Man's Pond Variation. However, the full extent of potential impacts from either the Proposed Blue Route or Dead Man's Pond Variation cannot be determined without pre-construction field surveys.

No rare communities been documented within the ROW of the Proposed Blue Route or the Dead Man's Pond Variation.

Corridor Sharing. The Proposed Blue Route would parallel existing road/trail corridors for 17 percent of its length, while the Dead Man's Pond Variation would not parallel any existing corridors.

Costs that Depend on Design and Route. While both alternatives are similar in length, the Proposed Blue Route would cost less to build and less per mile to build.

S.10.3.5 East Section: Blackberry Variation Area

The Blackberry Variation Area contains two route alternatives: the Proposed Blue Route and the Proposed Orange Route.

Human Settlement. Although the Proposed Orange Route impacts more residences within 1,500 feet than the Proposed Blue Route (22 and 11 residences, respectively), it would impact slightly fewer historic architectural sites within one mile (one and six sites, respectively) and would likely produce less contrast by paralleling an existing large transmission line for a greater percentage of its length (37 percent and 20 percent, respectively). The Proposed Orange Route is therefore likely to result in slightly fewer aesthetic impacts. A snowmobile trail is located within 1,500 feet of both alternatives.

The 200-foot ROW for the Proposed Orange Route would have a slightly greater amount of state fee land than the Proposed Blue Route (54 acres compared to 41 acres, respectively), but because it parallels more existing transmission line corridor, it would be slightly more compatible with surrounding land uses.

Land-Based Economies. The Proposed Blue Route would pass through less farmland, including prime farmland and would likely have less impact on agriculture (71 acres of land designated as “prime farmland if drained” or “all areas are prime farmland” within the Proposed Blue Route ROW and 88 acres of land designated as “prime farmland if drained” or “all areas are prime farmland” within the Proposed Orange Route ROW). Neither alternative would impact more than 15 acres of farmland of statewide importance. The Proposed Orange Route would likely have less impact on of state mining land (33 acres of state mineral lands within the Proposed Orange Route ROW, 37 acres of state mineral lands within the proposed Blue Route ROW).

Archaeology and Historic Architectural Resources. Neither the Proposed Blue Route nor the Proposed Orange Route has any archaeological or historic architectural sites within the ROW. The Proposed Orange Route would have fewer historic architectural sites within one mile than does the Proposed Blue Route (one compared to six sites, respectively). Further cultural resources investigations would need to be conducted in compliance with federal and/or state regulations for archaeological and historic architectural resources. If previously unidentified archaeological sites are discovered during construction, adverse effects will be resolved according to the terms of the Section 106 PA.

Natural Environment. The Proposed Orange Route would cross the most PWI waters (three crossings compared to one crossing for the Proposed Blue Route), and both the Proposed Blue Route and the Proposed Orange Route would each cross a Minnesota Pollution Control Agency (MPCA)-listed impaired water once. All of these crossings would be spannable. The Proposed Blue Route would cross more forested and shrub wetlands (51 acres compared to 39 acres for the Proposed Orange Route), requiring more wetland type conversion. Both the Proposed Blue Route and the Proposed Orange Route would likely require crossing wetlands too large to span.

The Proposed Blue Route and the Proposed Orange Route would fragment similar amounts of intact forest and would likely impact similar amounts of wildlife habitat.

Rare and Unique Natural Resources. Two state-threatened vascular plants have been documented within one mile of the Proposed Blue Route and the Proposed Orange Route. In addition, a state-special concern bird has been documented within one mile of the Proposed Orange Route; however, preferred habitat for this species is also likely available within

the vicinity of the Proposed Blue Route. Although the Proposed Blue Route is just under a mile shorter in length than the Proposed Orange Route, it would require creation of new corridor for a greater percentage of its length. The full extent of potential impacts on rare species from either the Proposed Blue Route or the Proposed Orange Route cannot be determined without pre-construction field surveys.

The Proposed Orange Route would pass through more MBS Sites of Biodiversity Significance (79 acres compared to 57 acres for the Proposed Blue Route), but it would also parallel an existing transmission line corridor through a portion of these sites, which would minimize impacts to this resource.

Corridor Sharing. The Proposed Orange Route would parallel existing transmission line corridor for 37 percent of its length. The Proposed Blue Route would parallel existing transmission line corridor for 20 percent of its length.

Electrical System Reliability. The Proposed Blue Route would parallel 230 kV and 115 kV transmission lines for approximately 20 percent of its length, and the Proposed Orange Route would parallel two 115 kV transmission lines for approximately 40 percent of its length. Three high voltage transmission lines in adjacent corridors could decrease the reliability of the proposed Project. When facilities are close together, 1) there is a greater risk that a single event could take out multiple lines, and 2) repairing the lines could be more difficult, which could increase outage times, should an outage occur.

Costs that Depend on Design and Route. As the shorter alternative, the Proposed Blue Route would cost less to build and less per mile to build.

S.10.3.6 Relative Merits Summary—East Section

Effie Variation Area

Within the Effie Variation Area, the analysis indicates a tradeoff between impacts to human settlement factors and impacts to natural environment factors. The Effie Variation would parallel two existing transmission line corridors, therefore minimizing impacts to the flora and fauna elements of the natural resources factor and to the rare and unique natural resources factor by reducing habitat fragmentation, avoiding state forest land, and avoiding the MBS Sites of Biodiversity Significance in the Bear Wolf Peatland. However, the Effie Variation would be a longer route, therefore creating greater impacts to the aesthetics element of the human settlement factor by passing near more residences. Because of its longer length, the Effie Variation

would also be more expensive to construct. The Proposed Blue Route and Proposed Orange Route are both alternatives to avoid these aesthetic and cost impacts, but would not parallel existing corridors and would have more impacts to the fauna element of the natural environment factor and to the rare communities element of the rare and unique resources factor, due to habitat fragmentation and proximity to MBS Sites of Biodiversity Significance in the Bear Wolf Peatland.

The Applicant has indicated that paralleling an existing transmission line corridor (with two existing transmission lines) along the Effie Variation could reduce electric system reliability because three high voltage transmission lines would be in parallel corridors, which may increase vulnerability to simultaneous outages and increase safety risks associated with transmission line maintenance and repair.

East Bear Lake Variation Area

Similar to the Effie Variation, the East Bear Lake Variation in the East Bear Variation would parallel an existing transmission line corridor, therefore reducing impacts to the elements of the natural environment factor and the rare communities element of the rare and unique resources factor by avoiding habitat fragmentation, and the MBS Sites of Biodiversity Significance in the Bear Wolf Peatland. However, unlike the Effie Variation, the East Bear Lake Variation does so without shifting impacts to the aesthetics element of the human settlement factor.

Because of its slightly longer length and need for angle structures, the East Bear Lake Variation would be more expensive to construct than the Proposed Orange Route. The Proposed Orange Route would have more impacts to the flora and fauna elements of natural environment factor and to the rare communities' element of the rare and unique resources factor due to habitat fragmentation, its proximity to MBS Sites of Biodiversity Significance in the Bear Wolf Peatland, and lack of paralleling an existing transmission line.

The Applicant has indicated that paralleling an existing transmission line corridor (with two existing transmission lines) along the East Bear Lake Variation could reduce electric system reliability because three high voltage transmission lines would be in parallel corridors, which may increase vulnerability to simultaneous outages and increase safety risks associated with transmission line maintenance and repair.

Balsam Variation Area

In the Balsam Variation Area, there would be a tradeoff between impacts to the land use and aesthetics elements of the human settlement factor, and impacts to the mining element of land-based economies factor and the construction cost factor. The Proposed Blue Route and Balsam Variation avoid impacts to the land use element of human settlement factor as they are located further from communities in Balsam and Lawrence townships. In addition, the Balsam Variation would have fewer impacts to the aesthetics element of the human settlement factor by passing close to fewer residences than Proposed Blue Route or Proposed Orange Route.

The Balsam Variation, however, would have more potential impacts to the mining and mineral resources element of the land-based economies factor as it is longer and would have more potential for impacts in terms of encumbering areas that have been explored for mineral resources in the Taconite area. The Balsam Variation may result in fewer impacts to the flora and fauna elements of the natural resource factor as it would parallel an abandoned transmission line corridor for much of its length and may result in fewer impacts associated with new habitat fragmentation than the Proposed Blue Route or Proposed Orange Route.

The Applicant has indicated that corridor sharing along the Proposed Blue Route and Proposed Orange Route may reduce electric system reliability because it would place three high voltage transmission lines parallel along the same corridor, which may increase vulnerability to simultaneous outages and increase safety risks associated with transmission line maintenance and repair.

Dead Man's Pond Variation Area

Within the Dead Man's Pond Variation Area, the analysis indicates that the Dead Man's Pond Variation would create more potential impacts to the aesthetics element of the human settlement factor than the Proposed Blue Route by passing closer to additional residences. The Dead Man's Pond Variation would also create more potential impacts to the agriculture element of the land-based economies factor than the Proposed Blue Route by crossing more farmland.

The Proposed Blue Route may result in fewer impacts to the flora and fauna elements of the natural resource factor as it parallels a corridor for part of its length and may result in fewer impacts associated with new habitat fragmentation than the Dead Man's Pond Variation. Because it would likely require more

angle structures, the Dead Man's Pond Variation would also be more expensive to construct.

Blackberry Variation Area

In the Blackberry Variation Area, the Proposed Orange Route would result in more impacts to the aesthetics element of the human settlement factor, the vegetation element of the natural environment factor, and the rare communities element of the rare and unique resources factor than the Proposed Blue Route, as the Proposed Orange Route passes through areas with more residences, lakes, and designated MBS Sites of Biodiversity Significance. In addition, the Proposed Orange Route is a slightly longer route and would likely require more angle structures than the Proposed Blue Route, so it would be more costly to construct.

The Proposed Orange Route would offer more opportunity for corridor sharing than the Proposed Blue Route. While both alternatives parallel existing transmission line corridor, the Proposed Orange Route parallels more corridor than the Proposed Blue Route.

The Applicant has indicated that corridor sharing along the Proposed Blue Route and Proposed Orange Route could reduce electric system reliability because three high voltage transmission lines would be in parallel corridors, which may increase vulnerability to simultaneous outages and increase safety risks associated with transmission line maintenance and repair.

S.10.4 Alignment Modifications

Minor adjustments to alternative route segments, or alignment modifications, were proposed during the scoping period. The purpose for each alignment modification is to avoid a specific issue raised by the commenters. In the sections that follow, only the issues that differ between the proposed route and the alignment modification are described.

S.10.4.1 West Section

No alignment modifications were proposed for the West Section.

S.10.4.2 Central Section

Four alignment modifications were proposed for the Central Section: Silver Creek WMA, Airstrip, Mizpah, and Gravel Pit.

Silver Creek WMA Alignment Modification. The Silver Creek WMA Alignment Modification, located in the north-central portion of the Pine Island Variation Area, shifts the centerline approximately 150 feet

south onto state forest land and avoids impacts to federal land and the Silver Creek WMA. It does not, however, parallel an existing corridor like the Proposed Blue Route and would result in more fragmentation of intact state forest.

Airstrip Alignment Modification. The Airstrip Alignment Modification, located in the east portion of the C2 Segment Option Variation Area, shifts the centerline approximately 725 feet west to avoid impacts to a private airstrip located east of the existing 230 kV transmission line. This alignment modification would be located approximately 1,000 feet west of the existing 230 kV transmission line and would provide additional distance for use of the landing strip.

Mizpah Alignment Modification. The Mizpah Alignment Modification, located in the J2 Segment Option Variation Area, would shift the centerline north from a mix of private and state lands onto only state lands. Both the Proposed Orange Route and this alignment modification would require creation of new corridor for their entire length and would fragment intact forest.

Gravel Pit Alignment Modification. The Gravel Pit Alignment Modification, located in the southeast portion of the J2 Variation Area, shifts the centerline approximately 750 feet east to avoid impacts to a private gravel pit and to remove privately-owned land from the ROW. In addition, the Effie dump would be located more than 100 feet west and outside of the ROW.

S.10.4.3 East Section

Five alignment modifications were proposed for the East Section: Bass Lake, Wilson Lake, Grass Lake, Dead Man's Pond, and Trout Lake.

Bass Lake Alignment Modification. The Bass Lake Alignment Modification, located in the central portion of the Effie Variation Area, shifts the centerline approximately 750 feet southwest and away from the Bass Lake Itasca County Park (which includes a campground). This would, however, shift the alignment closer to the Larson Lake State Forest campground and crosses lands designated as Outstanding Rank for the Preliminary MBS Sites of Biodiversity Significance. Land ownership includes slightly more state land and less private corporate land than the Proposed Blue/Orange Route.

Wilson Lake Alignment Modification. The Wilson Lake Alignment Modification, located in the central portion of the Effie Variation Area, shifts the centerline approximately 500 feet east from corporate and state forest lands onto an alignment

with a greater percentage of state forest land and crosses lands designated as Moderate Rank for the Preliminary MBS Sites of Biodiversity Significance.

Grass Lake Alignment Modification. The Grass Lake Alignment Modification, located in the northeast portion of the Balsam Variation Area, shifts the centerline approximately 900 feet east to avoid crossing Grass Lake. In addition, this alignment modification also shifts the transmission line away from one residence on the south end of Grass Lake, but shifts the alignment closer to six residences on the west side of Bray Lake.

Dead Man's Pond Alignment Modification. The Dead Man's Pond Alignment Modification, located in the central portion of the Dead Man's Pond Variation Area, shifts the centerline approximately 1,000 feet west and away from one residence located near CSAH 8, but shifts the alignment closer to two residences located along CSAH 57. It also crosses Dead Man's Pond, a PWI waterbody, and lands designated as Moderate Rank for the Preliminary MBS Sites of Biodiversity Significance.

Trout Lake Alignment Modification. The Trout Lake Alignment Modification, located in the central portion of the Blackberry Variation Area, shifts the centerline away from two residences located west of the Proposed Blue Route, leaving only one residence located within 1,000 feet to the southeast.

S.10.5 Hops

Five Hops, all located within the West Section, were identified for the proposed Project

Hop 1. Hop 1, located in the southeastern portion of the Cedar Bend WMA Variation Area and the northwestern corner of the Beltrami North Central Variation Area, is approximately 0.7 miles. It crosses the existing 500 kV transmission line and either shrub or forested wetlands and MBS Sites of Biodiversity Significance ranked as high or moderate significance.

Hop 2. Hop 2, located in the southeastern portion of the Cedar Bend WMA Variation Area and the northwestern corner of the Beltrami North Central Variation Area, is approximately 1 mile. This hop, which parallels an existing 230 kV transmission line for its entire length, crosses Lake of the Woods and Beltrami Island state forests and both shrub or forested wetlands and MBS Sites of Biodiversity Significance ranked as high or moderate significance.

Hop 3. Hop 3, located in the southeastern portion of the Cedar Bend WMA Variation Area and the

northwestern corner of the Beltrami North Central Variation Area, is approximately 1.2 miles. It crosses the existing 500 kV transmission line and either shrub or forested wetlands and MBS Sites of Biodiversity Significance ranked as high or moderate significance.

Hop 4. Hop 4, located in the eastern portion of the Beltrami North Variation Area and the northwestern corner of the Beltrami North Central Variation Area, is approximately 1 mile. This hop does not cross any existing transmission lines, but it does cross either shrub or forested wetlands and MBS Sites of Biodiversity Significance ranked as high significance.

Hop 5. Hop 5, located in the southwestern portion of the Beltrami North Central Variation Area, is approximately 3.5 miles. This hop crosses Lake of the Woods and Beltrami Island state forests, the Border Trails snowmobile trail and an unnamed watercourse. It also crosses the existing 500 kV transmission line, emergent, shrub, or forested wetlands and MBS Sites of Biodiversity Significance ranked as high or unknown significance.

S.10.6 Associated Facilities

The associated facilities for the proposed Project include the 500 kV Compensation Station, regeneration stations, and Blackberry 500 kV Substation.

S.10.6.1 West Section

The associated facilities located in the West Section include two regeneration stations and the proposed 500 kV series compensation station.

Proposed Regeneration Stations. The two proposed regeneration stations located along the Proposed Blue/Orange Route within the West Section are both situated in upland areas, one with a residence within 0.6 miles and the other with a residence within 0.13 miles. Land in both cases is privately owned.

Proposed 500 kV series compensation station. The nearest residence to the 60-acre site for the proposed 500 kV series compensation station is located approximately 0.4 miles away. Land ownership includes private land with MnDNR-identified potential mineral resources and scattered emergent wetlands. Based on the United States Geological Survey (USGS) National Landscape Conservation System (NLCS) Gap Analysis Program (GAP) data, the southern half of the site is in the U.S. Department of Agriculture (USDA)-Farm Service Agency Conservation Reserve Program. The compensation station could contrast strongly with its

surroundings and could be viewed from residences or other sensitive visual resources.

S.10.6.2 Central Section

The associated facilities located in the Central Section include the four proposed regeneration stations.

Proposed Regeneration Stations. The four regeneration stations consist of fairly small buildings and although they may contrast somewhat with their surroundings, the new transmission line nearby would produce stronger contrast and be more dominant due to its substantially taller height and contrasting form. For these reasons, aesthetic impacts of the regeneration stations would be expected to be minimal.

S.10.6.3 East Section

The associated facilities located in the East Section include the two proposed regeneration stations and the proposed 500 kV Blackberry Substation.

Proposed Regeneration Stations. Both regeneration stations would be located in upland areas, one with a residence located 0.4 miles away, and the Big Fork River 0.5 miles away. The other would have a residence 0.2 miles away.

Proposed Blackberry 500 kV Substation. The proposed Blackberry Substation would be located approximately 0.25 miles east of the existing Blackberry Substation, with three residences located within a quarter mile. The fenced area of the substation directly impacts 0.3 acres of a shallow marsh/forested wetland complex, but wetlands south of the fenced substation site would not be impacted by the proposed Project. No other natural resources were identified within or near the fenced substation area.

Because the proposed Blackberry Substation would be visible in the same views from surrounding locations, the addition of the proposed substation adjacent to the existing substation and transmission lines would result in only an incremental increase in contrast for these views, and the aesthetic impacts of the new Blackberry Substation would be expected to be minimal.

S.11 Cumulative and Other Impacts

In addition to analyzing the individual impacts of the alternatives, the federal environmental review process requires consideration of the cumulative environmental impacts of multiple actions within an area.

S.11.1 Other Actions Considered for Potential Cumulative Impacts

Past actions are considered part of the existing environment and are not considered here.

Present and Reasonably Foreseeable Future Actions. One power plant and the associated transmission line and natural gas pipeline (Excelsior Energy's Mesaba Project) and one 230 kV transmission line (Minnesota Power's Nashwauk Project) have been issued route permits by the MN PUC but have not yet been constructed. Sections of the approved routes for both of these projects are within the Applicant's proposed routes. In addition, as part of the route permit process for the proposed Enbridge Sandpiper oil pipeline project, the MN PUC has included one route for consideration that would cross alternatives for the proposed Project ROW. The proposed Enbridge Line 3 project, another oil pipeline, would parallel the same route as the proposed Enbridge Sandpiper project, also crossing portions of the proposed Project ROW alternatives.

Iron-ore mining from previously developed stockpiles, basins, underground workings, or open pits ("scram" mining) would be within four to six miles of the proposed routes and variations, and one variation would cross a 115 kV transmission line that serves one of the scram mining facilities.

S.11.2 Cumulative Impacts

The following sections summarize the resources that were analyzed for potential impacts in Chapter 6 of this EIS.

S.11.2.1 Human Settlement

Aesthetics. Though many of the aesthetic impacts of the proposed Project would be short-term during construction, the presence of transmission structures in the landscape and clearing the ROW of trees would result in a long-term change in local aesthetics. In addition, utilities paralleling existing corridors can cumulatively create wide, long areas of visual disturbance.

The reasonably foreseeable future projects mentioned above are all in the Balsam and Blackberry variation areas where there are more population centers, infrastructure, and mining activity. The Sandpiper Pipeline RA-06 route, if selected, and the Enbridge Line 3 project would intersect the Proposed Blue/Orange Route, but would be located underground and would cross the 200-foot ROW for the proposed Project. The potential cumulative aesthetic impacts in this area

would be expected to be minimal because they would only involve paralleling transmission lines for approximately nine miles, and this infrastructure would not be incompatible with existing conditions.

Air Quality, Greenhouse Gas Emissions, and Climate Change. Construction activities for the proposed Project and other reasonably foreseeable future projects would generate criteria pollutant emissions, but these would be short-term and localized. The proposed Project would reduce indirect criteria pollutants and GHGs because it would reduce the need for coal-fired generation in Minnesota by replacing it with wind and hydroelectric generation (for detailed information on air quality, see Section 5.2.1.3). If the large electric power generating plant for the Mesaba Energy project were built, it would result in long-term emissions from operations. None of the reasonably foreseeable future projects individually or cumulatively, however, would contribute to air emission impacts because the projects would be in attainment for all NAAQS.

Socioeconomics. If all the reasonably foreseeable future projects mentioned above were constructed at the same time, there would be a cumulative socioeconomic benefit, primarily in the form of short-term construction employment, value-added services, and long-term revenue from taxes. The proposed Project would employ an average of 120 construction workers annually during the five year construction period, and during the pre-construction and construction phases would generate approximately \$26.5 million dollars in state and local taxes.

The Mesaba Energy Project, if constructed, would also employ 1,600 during its peak year of construction, plus create another 955 new jobs through increased consumer spending. The Enbridge Sandpiper pipeline project and the Enbridge Line 3 project would also create new employment during construction in the area, and could contribute to a temporary housing shortage in the area all these projects were to be constructed at the same time. Because Grand Rapids is within commuting distance of the construction area of these reasonably foreseeable future projects, any housing shortage would be expected to be minimal.

In addition, the proposed Project would benefit the entire MISO footprint, by reducing wind curtailments and better using both wind and hydro resources, thereby increasing the efficiency of the energy supply system as a whole. MISO estimated that these benefits, over a 20-year period, would total \$1.6 billion based on 2012 dollars.

S.11.2.2 Land-Based Economies

Agriculture. The proposed Project and other reasonably foreseeable future projects, could cumulatively increase impacts on agriculture. However, these cumulative impacts to agriculture would only occur in the Balsam and Blackberry variation areas; since farmland is not common in these variation areas, adverse cumulative impacts would be expected to be minimal.

Forestry. The proposed Project and other reasonably foreseeable future projects could collectively result in adverse, localized cumulative impacts to forestry and timber operations. The cumulative impacts of the foreseeable projects would, however, occur in the southern portion of the Balsam Variation Area and the Blackberry Variation Area, where there are fewer areas of state forests and state fee lands. The cumulative impacts to forestry and timber operations from the reasonably foreseeable future projects are therefore expected to be minimal.

Mining and Mineral Resources. The Proposed Blue Route and the transmission line and pipeline routes for the Mesaba Energy project all cross one area of known mineral resources in the north portion of the Blackberry Variation Area. Route RA-06 for the Enbridge Sandpiper pipeline project and the Enbridge Line 3 project also would cross through areas with known mineral resources. If all of these projects were eventually constructed, they might all need to be relocated in the future in order to access that mineral resource area.

According to the Applicant, the proposed Project is needed in part to meet increased industrial and mining electricity demand, especially on the Iron Range. The proposed Project would also facilitate recent contracts for firm power sales from Manitoba Hydro to the Wisconsin Public Service Corporation. The potential indirect, cumulative impacts of the proposed Project on mining development and the related environmental impacts are too remote and speculative to evaluate meaningfully.

S.11.2.3 Archaeology and Historic Architectural Resources

Indirect, long-term, adverse visual effects on architectural resources are likely to occur wherever the cumulative projects are visibly prominent and appear inconsistent with other architectural resources. Since this would mainly occur in a developed area, none of the cumulative projects would be expected to be inconsistent with other architectural resources.

As the proposed routes and variations have not been surveyed, cultural resource assessments are required to comply with federal and/or state regulations.

S.11.2.4 Natural Resources

Water Resources. The long-term impacts of removing woody wetland vegetation and maintaining herbaceous wetland vegetation in the ROWs of all cumulative projects would result in adverse impacts to wetland hydrology, vegetation composition, and wetland function. Adverse cumulative wetland impacts would be expected to be minimal given the amount of surrounding forested and shrub wetlands in the region. The Applicant for the proposed Project and other reasonably foreseeable future project proponents would need to mitigate wetland impacts as part of permit negotiations for their individual projects.

Vegetation. Permanently removing trees and shrubs along project ROWs could result in cumulative impacts if these reasonably foreseeable future projects are constructed close to one another and do not minimize impacts through paralleling existing corridors.

Wildlife. Clearing vegetation and trees and disturbing wildlife habitats could physically harm or displace wildlife species. In addition, indirect impacts such as disturbance related to construction noise could occur. For non-listed wildlife species, these impacts would be minimal because these species do not suffer from population level declines, and these impacts would be localized and there would be abundant forested habitat in the vicinity.

S.11.2.5 Rare Species and Communities

Rare Species. The proposed Project, when considered with any other reasonably foreseeable future project that could involve removing trees, could contribute to cumulative impacts on the northern long-eared bat, which relies on forested habitat for roosting. Cumulative impacts could also be detrimental to individual rare vascular plant communities, although some rare vascular plant species colonize disturbed areas and could benefit from new habitat created as a result of ground disturbance from multiple projects. A Biological Assessment is being prepared and consultation with the USFWS is on-going. Avoidance, minimization, and mitigation measures for federally listed species will need to be coordinated with the USFWS in compliance with the ESA.

Rare Communities. Permanently removing trees and shrubs along project ROWs could result in cumulative impacts if reasonably foreseeable future

projects are constructed close to one another and do not minimize impacts through paralleling existing corridors.

S.11.3 Adverse Impacts that Cannot Be Avoided

Despite minimization and mitigation efforts, some project impacts cannot be avoided. Unavoidable adverse effects related to the proposed Project construction would last only as long as the construction period and would include: soil compaction, erosion, and vegetation degradation; disturbance to and displacement of some species of wildlife; disturbance to nearby residences; traffic delays in some areas; and minor air quality impacts due to fugitive dust.

Unavoidable adverse effects related to the proposed Project that would last at least as long as the life of the proposed Project would include: the addition of transmission structures and lines to the visual landscape; habitat type changes and fragmentation; adverse impacts to wildlife and wildlife habitat due to project-related changes to wetland type (palustrine forested [PFO] and palustrine shrub [PSS] to palustrine emergent [PEM]) and the removal of other vegetation; and direct adverse impacts to wildlife as a result of avian collisions.

S.11.3.1 Irreversible and Irrecoverable Commitment of Resources

Irreversible and irretrievable commitments of resources refer to impacts on or losses of resources that cannot be reversed or recovered, even after an activity has ended. Irreversible commitment applies primarily to nonrenewable resources, such as minerals or cultural resources, and to those resources that are renewable only over long time spans, such as soil productivity. Irrecoverable commitment applies to the loss of production, harvest, or natural resources.

S.11.3.2 Rare Species

Activities involving heavy machinery could result in the direct mortality of individual listed species. The loss of an individual of a protected species would be adverse, but is not expected to have irreversible or irretrievable impacts on the species as a whole. A Biological Assessment is being prepared and consultation with the USFWS is on-going. Avoidance, minimization, and mitigation measures for federally listed species will need to be coordinated with the USFWS in compliance with the ESA.

S.11.3.3 Wetland Type Conversion

Removing woody vegetation within forested or shrub wetlands would convert these areas to a different vegetation community and wetland type. This would be considered an irretrievable and irreversible impact because the area would be continuously managed in an emergent, herbaceous state for the life of the project.

S.11.3.4 Other

Materials, energy, landfill space, and human resources irretrievably used to construct the proposed Project are not in such short supply as to be meaningful.

1.0 Introduction and Regulatory Framework

On April 15, 2014, Minnesota Power, a regulated utility division of ALLETE, Inc. (Applicant) applied to the U.S. Department of Energy (DOE) for a Presidential permit to construct, operate, maintain, and connect an approximately 220-mile long, 500-kilovolt (kV) overhead, single-circuit, alternating current (AC) electric transmission system crossing the international border between the Canadian Province of Manitoba and Roseau County, Minnesota. On the same date, the Applicant also applied to the Minnesota Public Utilities Commission (MN PUC) for a Route Permit under the Minnesota Power Plant Siting Act (PPSA). The proposed transmission line would run from the Applicant's proposed international border crossing in Roseau County, Minnesota to the existing Blackberry Substation near Grand Rapids, Minnesota.

On October 29, 2014, the Applicant submitted an amendment to their Presidential permit and Route Permit applications to both DOE and the MN PUC, respectively, for the proposed Great Northern Transmission Line (GNTL) Project (proposed Project). The amended Presidential permit application changed the location of the proposed international border crossing under DOE's consideration.¹² The proposed Project, as amended, is described in detail below in Chapter 2.

In addition to the federal Presidential permit and the state Route Permit, the proposed Project will require a certificate of need from the MN PUC and a variety of state, federal, and local permits. This chapter of the Environmental Impact Statement (EIS) summarizes these permits, the joint federal and state EIS process, and the responsible regulatory agencies

DOE is acting as federal joint lead agency with the Minnesota Department of Commerce–Energy Environmental Review and Analysis (DOC-EERA) acting as state joint lead agency per 40 Code of Federal Regulations (CFR) 1501.5(b). In order to avoid duplication with state environmental review procedures, DOE and Minnesota Department of Commerce—Energy Environmental Review and Analysis (DOC-EERA) have prepared a single EIS to comply with environmental review requirements under National Environmental Policy Act (NEPA) and the Minnesota PPSA.

1.1 Organization of this EIS

This joint federal/state EIS analyzes the environmental impacts of the proposed Project, a range of reasonable action alternatives, and the

No Action alternative. The EIS is organized into the following eight chapters, followed by appendices.

Chapter 1 – Regulatory Framework: Describes the regulatory framework associated with the proposed Project, including the purpose and need for agency action, major federal permits (including the U.S. DOE Presidential permit), federal consultation requirements, state permitting requirements (including the MN PUC Route Permit), other state and local permits, and a summary of agencies, tribes, and persons consulted.

Chapter 2 – Proposed Project: Describes the project as proposed by the Applicant including proposed routes, structures, objectives, route selection process, estimated costs, and proposed schedule. Chapter 2 also describes the Applicant's engineering, design, and construction plans, land acquisition processes, and Applicant proposed measures to avoid and minimize environmental impacts.

Chapter 3 – No Action Alternative: Describes the "No Action alternative," in which the DOE would not issue a Presidential permit and the proposed Project would not be built. The analysis of the No Action alternative summarizes the impacts of not constructing the project and provides a baseline for analyzing and comparing potential environmental impacts from DOE's proposed action and alternatives.¹³

Chapter 4 – Route and Alignment Alternatives Proposed during Scoping: Describes the four border crossing alternatives, 22 route variations, and nine alignment modifications that were proposed by agencies and the public during scoping. Chapter 4 also summarizes the process used by DOE in coordination with the DOC-EERA to jointly determine which border crossings and routes to include in the scope of this EIS. Chapter 4 also describes how the selected routes, route variations, and alignments are analyzed by dividing the 220-mile long project area into the three major sections: the West Section, the Central Section, and the East Section.

Chapter 5 – Affected Environment and Potential Impacts: Describes the affected environment for the proposed Project, including descriptions of each resource, the region of influence (ROI) of the proposed Project on the resource, and impacts expected from the construction, operation, maintenance, and connection of the proposed Project. Chapter 5 first describes the impacts of the proposed Project that are common to all geographic

¹² Available at: <http://www.greatnortherneis.org/Home/documents>

¹³ Potential alternative means of meeting the Applicant's objectives, however, are addressed in the separate State of Minnesota's certificate of need process.

sections and do not vary by route or route variation. Chapter 5 then describes the resources that do vary by geographic section and for which impacts vary by route and route variation—the impacts and resources are carried forward for detailed analysis and comparison in Chapter 6.

Chapter 6 – Comparative Environmental Consequences: Presents detailed analysis and comparison of the potential human and environmental impacts of the proposed Project and alternative route variations, and describes mitigation measures by geographic section, route, and route variation.

Chapter 7 – Cumulative and Other Impacts: Describes reasonably foreseeable projects in the proposed Project area and assesses impacts of the proposed Project in the context of these reasonably foreseeable projects along with other past and present projects in the same area. Chapter 7 also describes unavoidable, irretrievable, and other impacts as required by federal and state regulations.

Chapter 8 – List of Preparers: Provides a list of the preparers of this EIS.

Chapter 9 – References: Provides references for resources used in development of this EIS.

Chapter 10 – Acronyms and Abbreviations: Lists of the acronyms and abbreviations used in this EIS.

Chapter 11 – Index: Provides an index of terms used in this EIS.

Appendices – Provides information to support the analysis in this EIS:

- **Appendix A – Tribal Consultations:** Provides documentation of and correspondence for the DOE's government-to-government consultation under Section 106 of the National Historic Preservation Act (National Historic Preservation Act (NHPA) and in accordance with Executive Order 13175.
- **Appendix B – Route Permit Generic Template and Example:** Provides MN PUC's generic Route Permit template and an example of a Route Permit recently issued by the MN PUC, which include a permitted route and anticipated alignment, as well as standard and special conditions specifying construction and operation standards.
- **Appendix C – Narrative of the Scoping Summary Report:** Provides the narrative from the EIS Scoping Summary Report summarizing

the joint scoping process and associated public and agency comments provided during the public scoping period for the proposed Project.

- **Appendix D – DOC-EERA Scoping Decision:** Provides the DOC-EERA scoping decision issued for this EIS on January 8, 2015.
- **Appendix E – Route Analysis Data Tables:** Provides detailed data for the right-of-way (ROW), route, and region-of-interest (ROI) for the proposed routes and variations analyzed in this EIS.
- **Appendix F – Rare Species Data Tables:** Provides detailed MnDNR Natural Heritage Information System rare species data for the ROW, route, and region-of-interests (ROIs) for the proposed routes and variations analyzed in this EIS.
- **Appendix G – Rare Communities Data Tables:** Provides detailed Minnesota Biological Survey native plant community rare communities data for the ROW, route, and region-of-interests (ROIs) for the proposed routes and variations analyzed in this EIS.
- **Appendix H – Noise Supplement:** Provides terminology and regulations for noise and project-specific noise information.
- **Appendix I – Applicant's Audible Noise and EMF Calculations:** Provides the Applicant's modelling results for audible noise, electric and magnetic field (EMF), and corona effects from the proposed Project.
- **Appendix J – Property Values Supplement:** Provides information and literature regarding the effect of transmission lines on property values.
- **Appendix K – EMF Supplement:** Provides information regarding EMFs.
- **Appendix L – Stray Voltage Supplement:** Provides information regarding stray voltage.
- **Appendix M – MPCA What's In My Neighborhood Sites:** Provides a list of sites in the proposed Project area identified by the Minnesota Pollution Control Agency (MPCA) program – "What's In My Neighborhood" – that may have environmental permits or registrations, or are potentially contaminated sites.
- **Appendix N – Photo Simulations:** Provides photo simulations developed for sensitive

viewsheds identified in public comments during the public scoping period for the proposed Project.

- **Appendix O** – Agricultural Impact Mitigation Plan (AIMP) Example: Provides an example of a AIMP prepared for a high-voltage transmission line project.
- **Appendix P** – Cultural Resources Report: Provides the Phase IA cultural resources survey report for the proposed Project.
- **Appendix Q** – USFWS and DOE Section 7 Consultation: Provides the USFWS letter initiating informal consultation with the DOE under Section 7(a)(2) of the Endangered Species Act (ESA) for the proposed Project.
- **Appendix R** – Biological Assessment: Provides the report which reviews the proposed Project in sufficient detail to determine if the proposed action may affect any federally threatened or endangered species and/or critical habitat.
- **Appendix S** – Detailed Map Books: Provides maps with detailed information for the ROWs and routes for the proposed routes and variations discussed in this EIS.
- **Appendix T** – NEPA Disclosure Statements: Provides signed copies of the NEPA Disclosure Statements.

1.2 Federal Permits, Approvals, and Consultations

1.2.1 United States Department of Energy – Presidential permit

Transmission lines that cross an international border require a Presidential permit from the DOE.¹⁴ DOE's National Electricity Delivery Division, in the Office of Electricity Delivery and Energy Reliability (OE), is responsible for issuing Presidential permits for electric transmission facilities. Before issuing a Presidential permit for the construction, operation, maintenance, or connection of facilities for the transmission of electric energy at the U.S. international border, DOE must determine that such a permit is consistent with the public interest and must obtain favorable recommendations from the Secretary of State and the Secretary of Defense.¹⁵

¹⁴ Pursuant to Executive Order (EO) 10485 of 1953, as amended by Executive Order 12038, and 10 Code of Federal Regulations (CFR) Section 205.320

¹⁵ Executive Order 10485, Section 1

1.2.1.1 Factors and Elements Considered

In determining consistency with the public interest, DOE considers the potential environmental impacts of the proposed Project under the NEPA, determines the Project's impact on electric reliability (including whether the proposed Project would adversely affect the operation of the U.S. electric power supply system under normal and contingency conditions), and considers any other factors that DOE may find relevant to the public interest. In making its reliability determination, DOE considers the operation of the electrical grid with a specified maximum amount of electric power transmitted over the proposed transmission line. DOE will review the interconnection studies conducted by the Applicant and the Midcontinent Independent System Operator (MISO) to determine whether a reliability finding should be issued for the proposed Project. The regulations implementing DOE's Presidential permit program have been codified at 10 CFR Part 205. DOE's issuance of a Presidential permit indicates that there is no federal objection to the proposed international border crossing and project, but does not mandate that the project be undertaken.

1.2.2 DOE Purpose of and Need for Agency Action

The purpose of and need for DOE action is to decide whether to or not to grant the Applicant a Presidential permit. If granted, the Presidential permit for the U.S. portion of the proposed Project (OE Docket Number PP-398) would authorize the Applicant to construct, operate, maintain, and connect the U.S. portion of the proposed Project that would cross the international border between the U.S. and Canada.

DOE does not, however, determine the underlying need for or the route of the proposed transmission line. These two decisions are the responsibility of the MN PUC. Therefore, portions of this EIS pertain solely to the DOE's determination; other portions pertain solely to the MN PUC's determination, while some portions pertain to both the federal and state processes.

1.2.2.1 DOE's Proposed Federal Action

DOE's preferred alternative is to grant a Presidential permit to Minnesota Power's proposed international border crossing at latitude 49 00 00.00 N and longitude 95 54 50.49 W, roughly 2.9 miles east of Highway 89 in Roseau County, Minnesota.

If the MN PUC issues a permit for a route with a different border crossing than that currently requested by the Applicant, the Applicant could

Table 1-1 Major Federal Authorizations

Issue	Authorization	Jurisdiction
Construction and water quality	Section 10 Permit	U.S. Army Corps of Engineers (USACE)
	Section 404 Permit	USACE
	Section 402 National Pollutant Discharge Elimination System (NPDES) Permit (assigned to state of Minnesota)	EPA/ Minnesota Pollution Control Agency (MPCA)
Land use and natural resources	Special Use Permit Right-of-way (ROW) Grant Right-of-way permit to cross USFWS-interest land	U.S. Forest Service (USFS); U.S. Bureau of Land Management (BLM) USFWS
	Bald and Golden Eagle Protection Act of 1972	USFWS
Transportation and safety	Permit to Cross Federal Aid Highway	U.S. Federal Highway Administration (FHWA)
	Obstruction Evaluation	Federal Aviation Administration (FAA)

submit an amended Presidential permit application to DOE that is consistent with the MN PUC route permit decision. DOE would then need to decide what, if any, further environmental review would be necessary, and whether to grant a Presidential permit for the proposed Project at the amended border crossing.

1.2.3 Other Federal Approvals

In addition to the Presidential permit, the proposed Project requires other federal permits, approvals, and decisions before construction and operation can begin. These permits and approvals are listed in Table 1-1. The two formal federal consultations required (National Historic Preservation Act (NHPA) Section 106 and Endangered Species Act (ESA) Section 7) are summarized in Section 1.2.4.

The Applicant is working with federal agencies to obtain these potentially necessary authorizations and/or to comply with the regulations listed below.

Section 10 of the Rivers and Harbors Act of 1899 Permit – USACE regulates impacts on navigable waters of the U.S. pursuant to Section 10 of the Rivers and Harbors Act of 1899. (33 U.S.C. Section 403). USACE classifies the Big Fork River as a navigable water of the U.S. and the Applicant will apply for a Section 10 permit to allow the proposed Project to cross it.

Section 404 of the Clean Water Act Permit – USACE regulates discharges of dredged or fill material into waters of the U.S. under Section 404 of the Clean Water Act. (33 U.S.C. Section 1344). The Applicant has held multiple pre-application conferences with the USACE and will apply for a Section 404 permit. The Applicant has also

coordinated prospective wetland compensatory mitigation plans with the USACE.

Section 402 of the Clean Water Act Permit – EPA requires a construction discharge permit; federal authority is assigned to the MPCA. Additional details are provided in Section 1.3.

Special Use Permit, ROW Grant, or Easement – USFWS and USFS require a Special Use Permit or a ROW Permit/Easement if the proposed Project crosses land under their jurisdictions. USFWS and USFS are authorized but not required to issue land use grants for transmission lines per Section 503 of Federal Land Policy and Management Act of 1976 and individual agency regulations. USFWS requires a transmission line ROW permit to cross USFWS interest lands. USFWS general authority for granting ROW permits is the National Wildlife Refuge System Administration Act (16 U.S.C. 668dd(d)). Regulations covering the granting of permits for ROW across USFWS interest lands (including easements) are promulgated in 50 CFR 29.21 and 29.22. The U.S. Department of Agriculture (USDA) oversees special use permits for the USFS under 36 CFR 214 Subpart B. The Applicant will work with these agencies to obtain the required permit if a crossing is required.

Bald and Golden Eagle Protection Act – USFWS oversees compliance with the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), which prohibits anyone from “taking” (including disturbance) birds, nests, or eggs without a permit from the Secretary of the Interior. The Applicant is working with USFWS to avoid, minimize, and mitigate potential impacts to bald eagles. Golden eagles are non-breeding residents throughout Minnesota, so may occur in the proposed Project area.¹⁶ Currently no take permit

¹⁶ Available at: http://www.sdakotabirds.com/species/maps/golden_eagle_map.htm

exists for the eastern population of golden eagles, so take will need to be completely avoided through applicant proposed mitigation measures.

Permit to Cross Federal Aid Highway – Transmission lines that cross a federal highway require a use and occupancy agreement. (23 CFR Section 645.213). The Applicant is working with the MnDOT, which is responsible for administering the agreements, to obtain the required approvals.

FAA Obstruction Evaluation – FAA requires proponents of projects that may affect navigable airspace to notify the Administrator of the FAA by filing a Notice of Proposed Construction or Alteration (FAA Form 7460-1) per 14 CFR Section 77.9. The FAA conducts aeronautical studies based on information provided by proponents on an FAA Form 7460-1 to protect air safety and the efficient use of the navigable airspace.

1.2.4 Federal Consultations

Prior to issuing the Presidential permit, the DOE must also complete formal consultations with state, tribal, or federal agencies, shown in Table 1-2.

Table 1-2 Federal Consultations

Consultation	Jurisdiction
Section 106 Consultation	DOE in consultation with Minnesota State Historical Society(SHPO) and Tribal Historic Preservation Offices (THPOs)
ESA Section 7 Consultation	USFWS

1.2.4.1 Section 106 of the National Historic Preservation Act (NHPA)

Section 106 of NHPA (16 U.S.C. 470) requires that federal agencies take into account the potential effects of their proposed actions (undertakings) on historic architectural properties, and to develop measures to avoid, minimize, or mitigate any adverse effects.¹⁷ NHPA also requires federal agencies to consult with Indian Tribes that may be affected by the proposed Project, the SHPO, and other appropriate parties as defined in 36 CFR Section 800.2. DOE and USACE have developed a Memorandum of Understanding that, among other things, designates DOE as the lead agency implementing Section 106 compliance for the proposed Project. DOE requested initiation of

Section 106 Consultation under the NHPA for the proposed Project in a November 19, 2014 letter to the Minnesota SHPO. DOE also notified the Advisory Council on Historic Preservation (ACHP) about DOE’s intent to develop a Programmatic Agreement (PA) for a phased approach for Section 106 identification and evaluation efforts under 36 CFR Section 800.14, and asked for ACHP’s participation as a consulting party. The ACHP accepted this invitation in a March 26, 2015 letter to DOE. DOE invited all potential Section 106 Consulting Parties, including Indian tribes, via email and letter on January 14-15, 2015, to participate in consultation over historic architectural properties and traditional cultural resources that may be affected by the proposed undertaking.¹⁸ Section 106 consultation efforts for the proposed undertaking are on-going.

As proposed, the proposed Project would not cross tribal reservation lands; however, each route could have the potential to affect cultural resources of significance to tribes. For example, some tribes and tribal members consider eagle nests sacred sites provided for in the American Indian Religious Freedom Act (42 U.S.C. 1996) (some are frequently referred to as traditional cultural properties (TCPs)), and as potential historic properties of religious and cultural importance under the NHPA. Such sites are not limited to currently-recognized Indian lands, and they occur across the entire aboriginal settlement area. In addition, some tribes may consider all eagles and eagle nests as TCPs or sacred sites, and potential historic properties of religious and cultural significance which must be considered under Section 106 of NHPA.

DOE initiated its government-to-government tribal consultation efforts in a June 27, 2014 letter to potentially affected tribes, and held consultation meetings July 15 and 22, 2014 in the proposed Project area in northern Minnesota. DOE held further tribal consultation meetings on March 24-26, 2015 in Prior Lake, Minnesota in support of its on-going efforts to identify archaeological sites, historic architectural structures, and any other properties or resources of traditional religious and cultural importance to tribes and known to occur in or near the proposed Project area (Appendix A). DOE’s government-to-government consultation efforts with potentially affected tribes for the proposed undertaking are on-going.

¹⁸ In addition to the State Historic Preservation Office (SHPO), Indian tribes, and the Advisory Council on Historic Preservation (ACHP), Section 106 consulting parties may include certain individuals and organizations with a demonstrated interest in the undertaking due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking’s effects on historic properties (36 CFR Section 800.2)

¹⁷ Section 106 of the National Historic Preservation Act (NHPA), 16 United States Code Section 470f, and its implementing regulations, 36 CFR Sections 800.1–800.16

1.2.4.2 Section 7 of the Endangered Species Act

The USFWS oversees compliance with the ESA (16 U.S.C. Section 1536), which requires that federal agencies “insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species.” DOE, as the lead federal agency for the proposed Project, prepared a Biological Assessment in accordance with the ESA to analyze potential Project-related impacts on federally-listed threatened and endangered species, candidate species, species proposed for listing, and their designated critical habitats. Consultation under Section 7 of ESA is on-going. UFWS will issue a Biological Opinion and Incidental Taking Permit statement if necessary.

1.2.4.3 Migratory Bird Treaty Act (MBTA)

The USFWS oversees compliance with the MBTA (16 USC 703-712), which regulates the taking, selling, transporting, and importing of migratory birds, their nests, eggs, parts, or products. Although not formally subject to or part of an agency consultation process, take permits are not available under the MBTA. The Applicant, therefore, has proposed mitigation measures to minimize impacts on migratory birds.

1.3 State Permits and Approvals

1.3.1 Minnesota Public Utilities Commission – Route Permit

The PPSA provides that no person may construct a high-voltage transmission line without a Route Permit from the MN PUC. Under the PPSA¹⁹, a high-voltage transmission line includes a transmission line of 100 kV or more and greater than 1,500 feet in length, with associated facilities.²⁰ As part of the Route Permit, the MN PUC will also list any conditions it will require for constructing, operating, and maintaining the proposed Project. Details of the state route permit process are provided in Minnesota Rules, chapter 7850, including the major factors that the MN PUC must use to evaluate routes.²¹

The Applicant’s Route Permit application and associated filings can be viewed on the state’s

eDockets website.²² The MN PUC found the Route Permit application complete on July 2, 2014.

1.3.1.1 Factors and Elements Considered

The MN PUC is charged with selecting routes that minimize adverse human and environmental impacts while ensuring continuing electric power system reliability and integrity. Route Permits issued by the MN PUC include a permitted route and anticipated alignment, as well as conditions specifying construction and operation standards. The MN PUC’s generic Route Permit template and an example Route Permit previously issued by the MN PUC are included in Appendix B.

Minnesota Statutes, section 216E.03, subdivision 7 identifies considerations that the MN PUC must take into account when designating transmission line routes, including minimizing environmental impacts, and minimizing conflicts with human settlement and other land uses. Minnesota Rules, part 7850.4100 lists 13 factors²³ for the MN PUC to consider when making a decision on a Route Permit:

- Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation and public services;
- Effects on public health and safety;
- Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism and mining;
- Effects on archaeological and historic resources;
- Effects on the natural environment, including effects on air and water quality resources and flora and fauna;
- Effects on rare and unique natural resources;
- Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity;
- Use or paralleling of existing ROW, survey lines, natural divisions lines and agricultural field boundaries;

¹⁹ Minnesota Statutes, section 216E.03, subdivision 2

²⁰ Minnesota Statutes, section 216E.01; subdivision 4

²¹ Minnesota Rules, part 7850.4100

²² Minnesota Public Utilities Commission (MN PUC) Docket No. E015/TL-14-21 available at: <https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult&userType=public>

²³ One additional factor is included in Minnesota Rules, part 7850.4100— “Use of existing large electric power generating plant sites” —however, it is not relevant to the decision on a transmission line route.

- Use of existing transportation, pipeline and electrical transmission systems or ROWs;
- Electrical systems reliability;
- Costs of constructing, operating and maintaining the facility which are dependent on design and route;
- Adverse human and natural environmental effects which cannot be avoided; and
- Irreversible and irretrievable commitments of resources.

The analysis in Chapter 5, Chapter 6, and Chapter 7 of this EIS addresses each of these factors by evaluating the potential impacts to individual components or “elements” of each factor. For example, effects on human settlement (the first factor in Minnesota Rules, part 7850.4100) are assessed by evaluating potential impacts to 12 different components or “elements” of human settlement including displacement, noise, property values, air quality, electronic interference, transportation and public services, environmental justice, socioeconomics, aesthetics, land use compatibility, cultural values, and recreation and tourism. Similarly, effects on the natural environment (the fifth factor in Minnesota Rules, part 7850.4100) from the proposed Project are assessed by evaluating potential impacts to three distinct components or “elements” of natural environment including, water resources, vegetation, and wildlife.

For each element, a number of “indicators”—data sources that provide an indication of potential impacts—have been analyzed in Chapter 5 and Chapter 6. For example, proximity to residences is used as one “indicator” of potential aesthetic impacts that residents may experience. Similarly, the evaluation of the water resources element of the natural environment relies on data about the acres of wetland impacted by a proposed route. The acres of wetland impact is used as one “indicator” of potential impacts on water resources.

A general analysis of indicators and impacts is provided in Chapter 5 for the elements of each factor, with the exception of “irreversible and irretrievable commitments of resources”, which is covered in Chapter 7. Chapter 6 provides a geographically refined analysis of all the elements for which the available indicators suggest variability in impacts between the alternative routes.

1.3.1.2 Minnesota Route Permit Content Requirements

Applications for transmission line route permits are subject to environmental review conducted by DOC-EERA staff (Minnesota Rules, part 7850.2500). Projects proceeding under the full permitting process, such as this one, require the preparation of a state EIS. An EIS is a document which describes the potential human and environmental impacts of the project and possible mitigation measures, including route, alignment, and site alternatives. DOC-EERA determines the scope of the EIS. DOC-EERA may include alternatives suggested by the public in the scope of the EIS if such alternatives are otherwise permissible and will assist in the MN PUC’s decision on the Route Permit.

1.3.1.3 Minnesota Route Permit Scope of Review

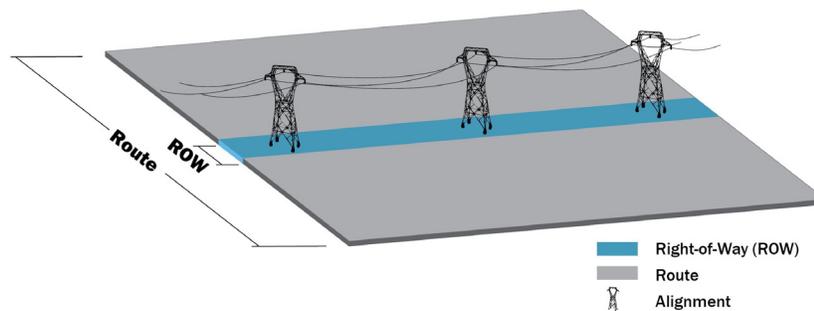
Under Minnesota law, the Route Permit process does not determine whether the proposed Project is needed. That decision is made as part of a separate process: the certificate of need. The certificate of need process is described in Section 1.3.2.

However, under the PPSA, the MN PUC needs to determine whether to issue a Route Permit for the proposed Project and must also review any alternative routes or route segments proposed according to the applicable rules,²⁴ and then needs to determine the final route. The MN PUC must make specific findings that it has considered locating a route for a new transmission line along an existing high voltage transmission line ROW or parallel to existing highway ROW and, to the extent these are not used for the route, the MN PUC must state the reasons why (Minnesota Statutes, Section 216E.03, subdivision 7). Also, before the MN PUC makes a final decision on a route permit, the MN PUC must determine whether the EIS for the project is adequate (Minnesota Rules, part 7850.2700).

Therefore, the MN PUC is not only determining whether to issue a Route Permit for the proposed Project, but it is also responsible for assessing and selecting the final route. As part of the Route Permit, the MN PUC will also list any conditions it will require for constructing, operating, and maintaining the proposed Project. Therefore, the underlying need for MN PUC action in the Route Permit docket is to decide what route to approve for the proposed Project and under what conditions.

²⁴ Minnesota Rules, part 7850

Figure 1-1 Typical Route and ROW Schematic



1.3.1.4 Route Width, Right-of-Way, and Anticipated Alignment

When it issues a Route Permit, the MN PUC approves a route, a route width, and an anticipated alignment within that route (Figure 1-1). As described below, the transmission line must be constructed within the MN PUC’s designated route unless subsequent permissions are requested and approved by the MN PUC.

The applicable regulations allow the Applicant to request a route that is wider than the actual ROW needed for the transmission line.

A “**right-of-way**” is defined in the regulations as “the land interest required within a route for the construction, maintenance, and operation of a high voltage transmission line.”²⁵

A “**route**” is defined as “the location of a high voltage transmission line between two end points. A route may have a variable width of up to 1.25 miles within which a ROW for a high voltage transmission line can be located.”²⁶

Therefore, the ROW is the area required for the safe construction and operation of the transmission line, where such safety is defined by the National Electricity Safety Code (NESC) and North American Electric Reliability Corporation (NERC) reliability standards (see part 4.8.1 in the MN PUC generic Route Permit template in Appendix B). The ROW must be within the designated route and is the area for which the Applicant obtains rights from landowners to construct and operate the transmission line.

For the proposed Project, as described in Section 2.5.9, the Applicant has requested a 200-foot ROW, with route widths that vary from 650 feet up to 3,000 feet in some limited areas. The larger route

width allows applicants to work with landowners to address their concerns and address local engineering issues that may arise after a permit is issued. The MN PUC could also designate a route width narrower than 650 feet if necessary to avoid a site-specific constraint such as a residence or a protected land use or designation. The route width, in combination with the anticipated alignment, is intended to balance flexibility and predictability during final design and construction.

The MN PUC may include conditions in a Route Permit that address the route width, ROW width, or anticipated alignment in a specific area of the project. For example, the Route Permit could require the alignment for a specific portion of the route to be north, rather than south, of a road or requiring that the route width be narrower in a certain area.

Once a Route Permit is issued by the MN PUC, the permittee would conduct detailed survey and engineering work, including, for example, soil borings. Additionally, the permittee would contact landowners to gather information about their property and their concerns and discuss how best the ROW for the project might proceed across the property. Permission to use a ROW for a transmission line across private property is typically obtained by an easement agreement. Permission to cross state property or federal interest lands, however, must be obtained through a permit or license as summarized above in Section 1.2.3.

The MN PUC Route Permits typically include a condition stating that at least 30 days before ROW preparation begins on any segment of a project, the Permittee must provide a plan and profile of the ROW that includes the specifications and drawings for ROW preparation, access roads, construction, structure specifications and locations, cleanup, and restoration for the transmission line. The plan and profile must be approved as a compliance filing before any construction can begin. Any proposed

²⁵ Minnesota Rules, part 7850.1000, subpart 15

²⁶ Minnesota Rules, part 7850.1000, subpart 16

modifications to the permitted anticipated alignment within the designated route would be required to be specifically identified and approved as part of this MN PUC plan and profile approval process.

Minor Alteration

In order to construct any portion of a permitted transmission line outside of the approved route width, the Permittee would need to either reapply for a new Route Permit or request a minor alteration under Minnesota Rules, part 7850.4800.²⁷ A minor alteration is “a change in a large electric power generating plant or high voltage transmission line that does not result in significant changes in the human or environmental impact of the facility.” The application for a minor modification would be provided in writing and would describe the alteration and explain why the alteration is minor.

Under Minnesota Rules, part 7850.4800, subpart 3,²⁸ the MN PUC must determine whether the requested changes are minor, whether to authorize the alteration, and whether to apply conditions. The MN PUC may also determine that the alteration is not minor and needs to be considered under the full permitting process. The MN PUC uses the routing factors of Minnesota Rules, part 7850.4100 to help make their determination, including the proposed alteration’s impacts to natural resources and human settlement.

1.3.2 Minnesota Public Utilities Commission – Certificate of Need

Minnesota Statutes, section 216B.243 dictates that a certificate of need is required for a “large energy facility” as that term is defined in Minnesota Statutes, section 216B.2421. A large energy facility includes “any high-voltage transmission line with a capacity of 200 kilovolts or more and greater than 1,500 feet in length” (Minnesota Statutes, section 216B.2421, subdivision 2 (2)).

The MN PUC must also determine whether there is a need for a transmission line, and establish the size, type, and required end points of the proposed Project. The Applicant filed its certificate of need application for the proposed Project with the MN PUC on October 22, 2013. Following a formal contested case hearing, the Administrative Law Judge (ALJ) issued her report on March 31, 2015, which concluded that the Applicant satisfied the certificate of need requirements and recommended the MN PUC grant a certificate of need to the Applicant for the construction of the

proposed Project and associated facilities. The MN PUC granted the certificate of need on May 15, 2015. The certificate of need application, ALJ recommendations, and MN PUC Order can be viewed on the MN PUC website.²⁹

1.3.3 Other State and Local Permits

In addition to the state certificate of need and Route Permit, other state and local permits, approvals, and decisions that may be required for the proposed Project are listed in Table 1-3.

The Applicant is working with state agencies to obtain the potentially necessary approvals and/or to comply with the regulations listed below.

Cultural and Historic Resources Review – Minnesota Statutes designate the director of the Minnesota Historical Society as the SHPO (Minnesota Statutes, section 138.081) and places responsibility for the historic preservation program with the Minnesota Historical Society. As noted in Section 1.2.4.1. DOE is leading coordination with Minnesota SHPO on the proposed Project and Section 106 consultation efforts for the proposed undertaking are on-going.

Utility Permit – A permit from MnDOT is required under Minnesota Rules, part 8810.3300, for construction, placement, or maintenance of utility lines adjacent or across highway ROWs. The Applicant is working with the MnDOT to obtain the required approvals.

Minnesota’s Endangered Species Act Consultation/Wildlife Take Permits – The MnDNR is responsible for overseeing the regulations and permitting for development projects under Minn. Stat. § 84.0895 and associated rules govern the taking (including killing, capturing, collecting, and/or possessing) of state endangered or threatened species in Minnesota. The Applicant is working with the MnDNR to obtain any take permits, as appropriate.

License to Cross Public Lands and Waters – MnDNR Division of Lands and Minerals regulates utility crossings over, under, or across any state land or public water identified in the Public Waters Inventory maps. A license to cross public waters is required under Minnesota Statutes, section 84.415 and Minnesota Rules, chapter 6135. The Applicant is

²⁷ Available at: <https://www.revisor.mn.gov/rules/?id=7850.4800>

²⁸ Available at: <https://www.revisor.mn.gov/rules/?id=7850.4100>

²⁹ MN PUC Docket No. E015/CN-12 1163, “Certificate of Need Application” is available at: [https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=\(65F60020-4419-41F0-AB43-E4D7F22A6E28\)&documentTitle=20153-108775-01](https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=(65F60020-4419-41F0-AB43-E4D7F22A6E28)&documentTitle=20153-108775-01)

Table 1-3 State and Local Permits

Issue	Minnesota State Reviews/Approvals	
Cultural resources	Cultural and Historic Resources Review and Section 106 Consultation	Minnesota Historical Society, State Historic Preservation Office (SHPO)
Transportation	Utility Permit	MnDOT
Natural resources	Endangered Species Consultation/Wildlife Take Permits	Minnesota Department of Natural Resources (MnDNR) Ecological Services
Construction and water quality	License to Cross Public Lands and Waters	MnDNR Lands and Minerals
	Public Waters Work Permit	MnDNR Waters
	Water Appropriation/Dewatering Permit	MnDNR Waters
	Wetland Conservation Act Permit	Board of Water and Soil Resources (BWSR) and/or Local Government Units
	Section 401 Water Quality Certification	Minnesota Pollution Control Agency (MPCA) (delegated federal authority)
	Section 402 National Pollutant Discharge Elimination System Permit	MPCA (delegated federal authority)
Agriculture	Agricultural Impact Mitigation Plan Permit	Minnesota Department of Agriculture (MDA)
	Noxious Weed Management Plan	MDA
Local Coordination		
Transportation and safety	Road Crossing/Right-of-Way	County, Township, City
	Public Lands	County, Township, City
	Overwidth Load	County, Township, City
	Driveway Access	County, Township, City

coordinating with MnDNR to determine necessary crossing permits.

Public Waters Work Permit – The MnDNR Public Waters Work Permit Program regulates development activities below the ordinary high water mark of wetlands, streams, and lakes identified in the Public Waters Inventory maps. Under Minnesota Statutes, section 103G.245, Subdivision 1, a Public Waters Work Permit is required for any action taken by the state, political subdivision of the state, or corporation or person that alters or develops any obstruction to public waters or changes the course, current, or cross-section of wetlands, streams, and lakes identified in the Public Waters Inventory maps. The Applicant will apply for this permit as necessary.

Water Appropriation/Dewatering Permit – During construction, temporary impacts may occur if dewatering is necessary to install the transmission structures or if pumping wells are installed to supply water for concrete batch plant operations. If dewatering or pumping is necessary, the Applicant will obtain water appropriations permits from the MnDNR.

Wetland Conservation Act Approval – Minnesota BWSR administers the state Wetland Conservation Act pursuant to Minnesota Rules, chapter 8420. The transmission line portion of the proposed

Project would be expected to be exempt under Minnesota Rules, part 8420.0420, subpart 6.³⁰ The Applicant anticipates that impacts related to the new Blackberry 500 kV Substation will require an approval. The Applicant will apply for this approval (which is applied for jointly with a Section 404 Clean Water Act Permit from USACE), as necessary.

Section 401 Water Quality Certification – MPCA regulates water quality under Section 401 of the Clean Water Act (33 U.S.C. Section 1344). The Applicant will apply for this Certification (which is applied for jointly with a Section 404 Clean Water Act Permit from USACE).

Section 402 National Pollutant Discharge Elimination System (NPDES) Permit – MPCA has been delegated federal authority to issue a NPDES permit for stormwater discharges associated with construction activities disturbing an area of one acre or more (Minnesota Rules, part 7090.0030). The permit requires the Applicant to develop and implement a Stormwater Pollution Prevention Plan (SWPPP), which includes best management practices

³⁰ Minnesota Rules, part 8420.0420, subpart 6 Utilities. A. A replacement plan is not required for impacts resulting from: (1) installation, maintenance, repair, or replacement of utility line, including pipelines, if: (a) the impacts have been avoided and minimized to the extent possible; and (b) the proposed project significantly modifies or alters less than one-half acres of wetlands.

(BMPs) to minimize discharge of pollutants from the site. The Applicant will apply for this permit once the design is complete, prior to initiation of construction.

Agricultural Impact Mitigation Plan – MDA requires an agricultural impact mitigation plan to identify measures that can be taken to avoid, mitigate, repair, and/or provide compensation for impacts caused by the transmission line construction on agricultural lands (Minnesota Statutes, section 216B.243, subdivision 7). The Applicant will develop this plan as necessary.

Noxious Weed Management Plan – MDA has the responsibility for eradication, control, and abatement of nuisance plant species (Minnesota Statutes, section 18G.04). The local County Agricultural Inspector administers the program. The Applicant will develop a vegetation maintenance and management plan for the proposed Project.

Local Coordination – Minnesota has exclusive authority to designate the route for the proposed Project (Minnesota Statutes, section 216E.10) which supersedes and preempts all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local, and special purpose government.

The Applicant has provided notice to local government units (LGUs) in compliance with Minnesota Statutes, section 216E.03, subdivision 3a and anticipates coordination with LGUs regarding the following issues listed below.

- *Road Crossing/ROW* – Coordination may be required to cross or occupy county, township, and city road ROWs.
- *Public Lands* – Coordination would be required to occupy county, township, and city lands such as forest lands, parklands, watershed districts, and other properties owned by these entities.
- *Overwidth Load* – Coordination may be required to move over-width or heavy loads on county, township, or city roads.
- *Driveway Access* – Coordination may be required to construct access roads or driveways from county, township, or city roads.

1.4 Joint Federal and State EIS Process

1.4.1 Joint Process

Pursuant to the NEPA, when evaluating an application for a Presidential permit, DOE must take into account potential environmental impacts of

the proposed facility. DOE determined that an EIS is the appropriate level of environmental review for the proposed Project, and this EIS is prepared in compliance with the Council on Environmental Quality's (CEQ) NEPA implementing regulations at 40 CFR Parts 1500-1508 and DOE's NEPA implementing regulations at 10 CFR Part 1021. Further, in accordance with DOE regulations at 10 CFR Part 1022, *Compliance with Floodplain and Wetland Environmental Review Requirements*, DOE will develop a floodplain and wetland statement of findings for the proposed Project.

In addition, under the PPSA, the MN PUC must also determine the route for the proposed line and any conditions it will require for construction, operation, and maintenance. As part of this MN PUC Route Permit decision-making process, a state EIS must be prepared.³¹

To avoid duplication, DOE and the DOC-EERA are preparing a single EIS to comply with environmental review requirements under NEPA and the PPSA. DOE is acting as federal joint lead agency with DOC-EERA acting as state joint lead agency per 40 CFR 1501.5(b).

DOE and DOC-EERA have implemented a joint planning and scoping process to encourage agency and public involvement in reviewing the proposed Project, and to identify the range of reasonable alternatives. The first phase of the formal agency public outreach process was designed to facilitate public discussion of the scope of appropriate issues to be addressed in the EIS.

DOE and DOC-EERA will continue to jointly implement public involvement and the public comment process on the Draft EIS by holding joint federal and state public hearings and informational meetings on the Draft EIS in various locations in the project area in northern Minnesota.

1.4.2 Issues Outside the Scope of this EIS – Impacts in Canada

A few scoping comments focused on the potential effects of the Project on Canadian resources.

This issue is outside of the scope of this EIS because DOE and DOC-EERA determined that an analysis of environmental and socioeconomic issues in Canada is not appropriate. While implementation of the proposed Project would require construction of a transmission line and other infrastructure in Canada, NEPA does not require an analysis of environmental impacts that occur within another sovereign nation

³¹ Minnesota Statutes, section 216E.03, subdivision 5.

that result from actions approved by that sovereign nation. For that reason, potential environmental impacts in Canada are not addressed in this EIS.

This approach is consistent with Executive Order 12114, Environmental Effects Abroad of Major Federal Actions (January 4, 1979), which requires federal agencies to prepare an analysis of potentially significant impacts from a federal action in certain defined circumstances and exempts agencies from preparing analyses in others. Section 2-3[b] of the Executive Order does not require federal agencies to evaluate impacts outside the U.S. when the foreign nation is participating with the U.S., or is otherwise involved in the action.

The proposed line in Manitoba, Canada, is being developed by Manitoba Hydro and would require a Class 3 License under The Environment Act (Manitoba) and Canadian federal authorization through the National Energy Board (NEB). An environmental review (Canadian EIS) of potential impacts from the portion of the proposed transmission line project in the Province of Manitoba will be developed and submitted as part of the authorization process associated with the facilities to be constructed in the province. That Canadian EIS will outline the project's potential impacts and provide mitigation measures to minimize potential impacts to people and the environment in Canada. That EIS will be completed to meet federal (Canadian) requirements by the NEB and under The Canadian Environmental Assessment Act, 2012. Review of that EIS will also be undertaken by various branches of both Canadian federal and provincial government listed below.

National Energy Board (NEB) - Federal – This proposed Project is an international transmission line and will require authorization from the NEB. The NEB will include a public comment period. For more information, visit www.hydro.mb.ca/mmtp. In both cases, Manitoba Hydro would provide an EIS to all necessary authorities with the filings for the project approval. See Section 2.2.1 for information about Manitoba Hydro.

Manitoba Conservation and Water Stewardship (MCWS) - Provincial – The Canadian EIS will be submitted to MCWS for review as a Class 3 development under The Environment Act (Manitoba). Following submission to MCWS, a public review period will begin and the EIS will be open for review and comment.

1.4.3 Cooperating Agencies and Coordination

DOE has invited other federal agencies to participate in the preparation of this EIS to ensure that it satisfies those agencies' environmental requirements and to engage their specialized expertise. The federal cooperating agencies are the St. Paul District of the USACE, Region 5 of the EPA, the Twin Cities Ecological Field Office (Region 3) of USFWS, DOE has invited the Red Lake Band and Bois Forte Band of Chippewa Indians to act as cooperating agencies on the EIS.

The following outlines each agency's requirements for this EIS:

USACE. USACE will use this EIS in their decision making for the permits that would be required under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. In accordance with 33 CFR Part 325 Appendix B (8)(c), USACE will coordinate with DOE to ensure this EIS supports USACE's decision-making requirements on the Applicant's Section 10 and Section 404 permit application.

USFWS. USFWS's role will include evaluating general environmental impacts on fish and wildlife. They will also evaluate potential environmental impacts on federally-listed threatened and endangered species and designated critical habitat, and may issue a Biological Opinion based on a Biological Assessment prepared for the proposed Project, as appropriate. An incidental take statement (along with reasonable and prudent measures) may be issued if appropriate. USFWS also has responsibility for enforcing the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Coordination for any necessary eagle permits will be conducted with USFWS. USFWS will also coordinate any special use permit if ROW access is requested and granted on USFWS interest properties.

EPA. Under Section 309 of the Clean Air Act, the EPA is required to review and publicly comment on the environmental impacts of major federal actions. EPA also has responsibilities under the Clean Water Act. In addition, the EPA administers various statutes and regulations, including, but not limited to, the Safe Drinking Water Act; the Pollution Prevention Act; the Resource Conservation and Recovery Act; and the Comprehensive Environmental Response, Compensation, and Liability Act.

EPA involvement as a cooperating agency will include: 1) participation in relevant project meetings and calls and 2) review and comment on preliminary

documents to the extent that staff resources allow. However, EPA will exercise its independent review and comment authorities on the Draft and Final EISs consistent with EPA responsibilities under NEPA and Section 309 of the Clean Air Act.

1.4.4 Public Involvement

On June 20, 2014, MN PUC issued a Notice of Public Information and EIS Scoping Meeting. The notice described the proposed Project and provided an overview of the MN PUC process and opportunities for public comment. The notification lists for the notice included individuals on the MN PUC's general service list and MN PUC's project contact list for the proposed Project (Minnesota Rules, part 7850.2100, subpart 1). Per Minnesota Rule 78520.2300 Subpart 2, notice of the public meeting was provided by the Applicant on MN PUC's behalf via advertisements in 11 local and regional newspapers along the proposed Project routes. Issuance of the notice commenced the state public scoping period that ended on August 15, 2014. The Applicant also provided the notice to its landowner list of potentially affected landowners.

On June 27, 2014, DOE published its Notice of Intent (NOI) to Prepare an EIS and to Conduct Public Scoping Meetings; Notice of Floodplains and Wetlands Involvement for the Great Northern Transmission Line (79 Federal Register (FR) 36493). The NOI explained that DOE would be assessing potential environmental impacts and issues associated with the proposed Project and the no-action alternative. The NOI was sent to interested parties including federal, state, and local officials; agency representatives; stakeholder organizations; local libraries, newspapers, and radio and TV stations; and private individuals in the vicinity of the proposed transmission line. Issuance of the NOI commenced a 45-day federal (NEPA) public scoping period that ended on August 11, 2014, however, DOE continued to accept scoping comments through August 15, 2014, in order to align the federal and state scoping period.

During the public scoping period, DOE and DOC-EERA conducted eight joint scoping meetings. A summary of the joint scoping process and associated public and agency comments are in the EIS Scoping Summary Report, the body of which

is provided in Appendix C.³² In short, five border crossing alternatives were suggested by the public and agencies for detailed study in the EIS during the public scoping period. Four of these border crossing alternatives were determined by DOE as potentially reasonable alternatives and are included in the scope of the EIS.

In addition, the MN PUC requested the DOC-EERA to conduct a minimum of two citizen Workgroup meetings and consult directly with LUGs within the project area. The purpose of the Workgroup is primarily to provide an additional opportunity for local government representatives to discuss their concerns, develop potential alternative route segments, review potential zoning conflicts, and ensure local input necessary for informed decision-making. The DOC-EERA held two four-hour Workgroup meetings in Grand Rapids, Minnesota, on September 30 and October 29, 2014. In addition to the two meetings, Workgroup members were provided a scoping questionnaire designed to assist Workgroup members in identifying ordinances, land use planning, or zoning issues.

Based on the scoping comments received, the DOC-EERA issued the scoping decision for this EIS on January 8, 2015 (Appendix D). The scoping decision identifies matters to be addressed in this EIS, including resources potentially impacted by the project and alternative route segments and alignment modifications – beyond those proposed routes and associated facilities proposed by the Applicant.

1.4.4.1 Draft EIS Comment Period

Federal NEPA implementing regulations require a minimum 45-day public comment period following publication of the Notice of Availability (NOA) by EPA in the FR. CEQ and DOE NEPA implementing regulations also require DOE to hold at least one public hearing on the Draft EIS in order to obtain comments from the public (40 CFR 1506.6(c) and 10 CFR 1021.313(b)). State regulations also require mailed notices and publication of the notice of Draft EIS availability and the opportunity for the public to comment in the Environmental Quarterly Bulletin (EQB) Monitor.

Publication of the joint EIS also requires DOC-EERA to hold an informational meeting to obtain

³² The full text of the Scoping Summary Report is available at: <http://www.greatnortherneis.org> (<http://www.greatnortherneis.org/Files/Scoping%20Summary%20Report%20NOV2014%20v2.pdf>) and on e-Dockets (eDockets Numbers: 201411-104621-01 to 10, 104622-01 to 09, 104623-01 to 10, 104624-01 to 08, 104625-01 to 07, and 104626-01 to 03) at: <http://mn.gov/commerce/energyfacilities/Docket.html?Id=33847#edocketFiles>

comments on the Draft EIS (Minnesota Rules, part 7850.2500, subpart 8). The federal public hearings and state informational meeting on the Draft EIS will be held jointly. State regulations require the public comment period be held open for at least ten days following the close of these joint public hearing/information meetings. The dates and times of these public comment meetings will be available on the agency project websites.³³

DOE and DOC-EERA invite comments on this Draft EIS during the 45-day comment period that begins with the EPA publication of the NOA of the Draft EIS in the FR. Comments on the Draft EIS may be made verbally or in writing at a public hearing/information meeting, or may be sent to Ms. Julie Smith at the address or email below or by fax to (202) 586-8008, or to Mr. William Storm at the address or email below. Written and oral comments will be given equal weight, and any comments received after the comment period ends will be considered to the extent practicable.

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Under Minnesota law, an ALJ will hold state public hearings and an evidentiary contested case hearing on the Route Permit application following release of the Draft EIS, during which interested persons can submit evidence supporting or challenging the proposed Project.

Following the public comment period on the joint Draft EIS, DOE, DOC-EERA, and the cooperating agencies must consider and address comments received by the public and interested parties in developing a Final EIS. The Final EIS will be made publicly available through an EPA NOA in the *Federal Register*. No sooner than 30 days following public

availability of the Final EIS, DOE may issue its Record of Decision announcing whether DOE will issue a Presidential permit for the proposed Project.

Upon closing the record, the ALJ will submit a report and recommendation to the MN PUC on the Route Permit application (Minnesota Statutes, section 216E.03, subdivisions 6 and 9 and Minnesota Rules, part 7850.2600). MN PUC will consider the ALJ's report and recommendation on which route alternative to permit, if any, and with what permit conditions should apply.

³³ Available at: <http://energy.gov/oe/downloads/application-presidential-permit-oe-docket-no-pp-398-minnesota-power-great-northern> and <http://mn.gov/commerce/energyfacilities/Docket.html?Id=33847>

2.1 Summary of Proposed Project

On April 15, 2014, the Applicant applied to the U.S. Department of Energy (DOE) for a Presidential permit to cross the U.S. / Canadian border in Roseau County, Minnesota.³⁴ The Applicant also applied to the MN PUC for a Route Permit to construct an approximately 220-mile, 500 kV alternating current (AC) high-voltage transmission line.³⁵

On October 29, 2014, the Applicant submitted an amendment to their Presidential permit and Route Permit applications to both DOE and the Minnesota Public Utilities Commission (MN PUC), respectively. The amended Presidential permit application changed the location of the proposed international border crossing under DOE's consideration to cross the U.S. / Canadian border at latitude 49 00 00.00 N and longitude 95 54 50.49 W, approximately 2.9 miles east of Highway 89 in Roseau County.

The transmission line would cross the border between the U.S. and Canada in Roseau County, Minnesota as identified above, and connect into a new 500 kV substation adjacent to the existing Blackberry Substation near Grand Rapids, Minnesota (Map 2-1).

The proposed Project would be located on all new 200-foot wide right-of-way (ROW) with a wider ROW required for certain spans at angle and corner structures, for guyed structures, or where special design requirements are dictated by topography. The ROW will be cleared of all vegetation and maintained in herbaceous or low shrub cover for the duration of the proposed Project.

The Applicant continues to evaluate several structure types and configurations that would be used for the Project, including: a self-supporting lattice structure, a lattice guyed-V structure, and a lattice guyed delta structure. The transmission towers would be steel lattice structures for the majority of the route, with the exact type of structure in any given location dependent on land type, land use, and potential effect on the surrounding landscape. The Applicant has requested 650 to 3,000 foot-wide route width for the Route Permit, depending on location, in order to provide flexibility during detailed design.

The transmission tower heights would range from approximately 100 feet to about 170 feet. In some instances, such as where the proposed

Project crosses an existing transmission line, taller structures would be required. None of the structures are anticipated to be taller than 200 feet so they would not be required to meet Federal Aviation Administration (FAA) lighting standards. The Applicant currently estimates approximately 4 to 5 structures per mile of transmission line and the structures would be placed approximately 1,000 to 1,700 feet apart, with a maximum span of 1,700 feet. Where the transmission line crosses farmland, the Applicant would use self-supporting lattice structures to minimize interference with farm operations. The area of permanent impact for the guyed structures is anticipated to be 33 square feet per structure, with a temporary construction disturbance footprint of approximately 0.92 acres per structure.

As part of the proposed Project, the Applicant is also proposing to construct associated facilities including a new 500 kilovolt (kV) substation, a new 500 kV series compensation station, and three regeneration stations with permanent and temporary access roads. Additionally, construction of the proposed Project would require temporary and permanent access roads, temporary laydown areas, temporary stringing areas, and temporary fly-in sites.

The Applicant proposes to expand the site of its existing 8.8 acre Blackberry 230/115 kV Substation near Grand Rapids, Minnesota to incorporate the new 500 kV substation, which would be constructed adjacent to and east of the existing Blackberry Substation. The new 500 kV substation required for the proposed Project would be expected to permanently impact approximately 17.8 acres. The Applicant has entered a purchase option agreement with the owner of the property adjacent to and east of the existing Blackberry 230/115 kV Substation. The new 500 kV substation would accommodate the new 500 kV transmission line, existing 230 kV transmission lines, and all associated 500 kV and 230 kV equipment.

The Applicant proposes to locate a new 500 kV series compensation station within or adjacent to the final route approved by the MN PUC. The final location for the 500 kV series compensation station would be determined by electric design optimization studies and final route selection, but would likely be located at the approximate midpoint of the Minnesota portion of the transmission line. The series compensation station will permanently impact approximately 60 acres.

The Applicant proposes to locate three regeneration stations within or adjacent to the final route

34 The Presidential permit application and application amendment are available at: <http://www.greatnortherneis.org/Home/documents>

35 Available at: <http://mn.gov/commerce/energyfacilities//resource.html?Id=33849> (The Route Permit application is nearly identical to the Presidential permit application)

approved by the MN PUC. The sites would be 75 feet by 75 feet and located on upland areas.

The Applicant has indicated that it will be necessary to construct temporary access roads within the ROW for construction. They will work with local property owners to identify suitable access locations during final design. The typical width of the temporary access road would be 16 feet.

The Applicant proposes to establish a permanent "2-track" trail on uplands within the permanent right-of-way as a result of construction traffic. This "2-track" trail would be unimproved and it is assumed that there will be no grading or filling for this permanent access.

The Applicant proposes to establish a main staging area for temporary storage of materials and equipment. There would be other temporary staging areas located along the ROW for laydown and framing prior to structure installation. The laydown areas would be approximately 20 to 40 acres, and would be located along suitable roadways approximately 40 to 50 miles apart, and would be within 5 miles from the final route approved by the MN PUC. Upland areas with prior disturbance will be preferred; however, there may be some areas where this is not feasible, so other areas may need to be used. These yards would be in place for at least one year and used to store equipment and materials and include the construction offices. The Applicant will identify specific staging areas during final design.

The Applicant proposes to establish temporary stringing sites within or adjacent to the final route approved by the MN PUC. The sites would be approximately 2.8 acres in size and spaced two miles apart.

The Applicant proposes to establish fly-in sites that would be approximately 10 acres in size, located as near to the ROW as possible, and approximately 5 to 7 miles apart. These sites would be in place for less than 1 year (likely 6 months) and are used to assemble structures for helicopter (sky crane) construction. Upland areas with prior disturbance will be preferred; however, there may be some areas where this is not feasible and other areas would be used. The Applicant will identify fly-in sites during final design.

Additional details of the proposed Project and construction methods are provided in Section 2.7 through Section 2.11.

2.2 Applicant's Objectives

According to their federal and state permit applications, the Applicant's decision to move forward with the proposed Project is primarily driven by three factors: 1) the opportunity to access new hydroelectric generation capacity in Manitoba, 2) the projected electricity shortages in their service territory and across the region by 2020, and 3) the potential to use hydroelectric power to complement the Applicant's existing wind energy investments in North Dakota. As described in their certificate of need application, the Applicant's evaluated a wide range of alternative methods to meet their long-term goals, and determined that the proposed Project best meets their objectives and provides other benefits to their region and customers.³⁶ The complex relationship between the three factors listed above and the need for this transmission line is the central issue of the MN PUC's ongoing certificate of need proceeding for this proposed Project.³⁷ The purpose of this Environmental Impact Statement (EIS), on the other hand, is to provide the information needed by federal and state regulators to make informed decisions on whether to issue permits for the proposed Project and what permit conditions would be in the public interest.

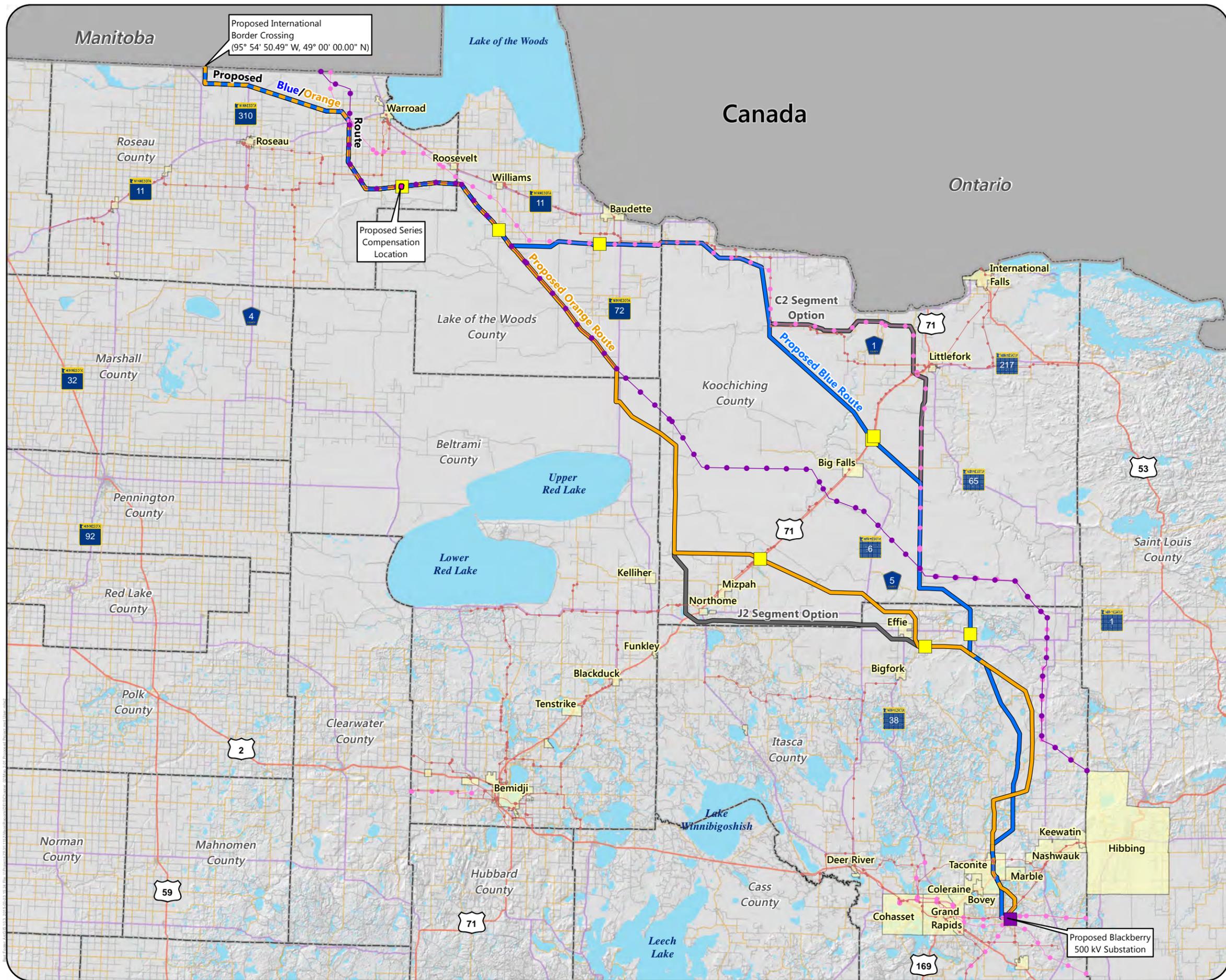
2.2.1 Manitoba Hydroelectric Capacity

Manitoba Hydro is a Canadian Crown Corporation and the province's major energy utility. It currently operates 14 hydroelectric generating stations on the Winnipeg, Saskatchewan, and Nelson rivers in Manitoba with a total generating capacity of more than 5,000 megawatts (MW), and has supplied power to Minnesota since 1970. The existing Manitoba hydroelectric facilities already supply approximately 10 percent of Minnesota's electrical needs. Manitoba Hydro estimates that up to 5,000 MW of additional hydroelectric capacity could be developed in the province if there were sufficient demand for the power and more transmission capacity.³⁸ According to Midcontinent Independent System Operator's (MISO) Manitoba Hydro Wind Synergy Study,

³⁶ *In the Matter of the Request by Minnesota Power for a Certificate of Need for the Great Northern Transmission Line*, MN PUC Docket No. E015/CN-12-1163

³⁷ *In the Matter of the Request by Minnesota Power for a Certificate of Need for the Great Northern Transmission Line*, MN PUC Docket No. E015/CN-12-1163

³⁸ Manitoba Hydro's System Development Plans, <http://www.cce.umn.edu/documents/cpe-conferences/mipsycon-papers/2012/manitobahydrossystemdevelopmentplan.pdf>, accessed December 15, 2014



Proposed International Border Crossing
(95° 54' 50.49" W, 49° 00' 00.00" N)

Proposed Series Compensation Location

Proposed Blackberry 500 kV Substation

- Proposed Regeneration Site
- Proposed Series Compensation Station
- Proposed Blackberry 500 kV Substation
- Proposed Routes**
- Blue/Orange Route
- Blue Route
- Orange Route
- Segment Option
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Streets and Highways**
- US Highway
- State Trunk Highway
- County State Aid Highway
- Local Road
- Municipal Boundary
- County Boundary
- International Boundary



Map 2-01

PROPOSED PROJECT
Great Northern Transmission Line
Draft Environmental Impact Statement



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Manitoba Hydro is looking to expand its hydro system by 2,230MW over the next 15 years.³⁹

Manitoba-based hydropower is currently exported to the U.S. on four high-voltage transmission lines: one 500 kV transmission line and three 230 kV transmission lines. However, only two of these transmission lines directly connect into Minnesota. One is a 230 kV transmission line that is jointly owned by Minnkota Power Cooperative and the Applicant, and the other is the 500 kV Forbes-Riel transmission line owned by Xcel Energy.

Both of these transmission lines cross the Manitoba-Minnesota border near Roseau, Minnesota, and connect into substations on Minnesota's Iron Range. The 230 kV transmission line crosses the Manitoba-Minnesota border approximately four miles north-northwest of County Road 137 and 540th Avenue and connects into the Shannon Substation near Hibbing, Minnesota. Xcel Energy's 500 kV transmission line crosses the international border about 1.5 miles west of the 230 kV transmission line and connects to the Forbes Substation. From there, a separate 500 kV transmission line continues from Forbes to the Chisago Substation near Minneapolis-St. Paul.

The proposed Project would add a new high-capacity grid connection between Manitoba's hydroelectric generation facilities and the U.S. The proposed Project is part of the Applicant's long-term plan, called EnergyForward, to shift from primarily coal-fired generation to an approximately equal mix of coal, natural gas, and renewables. Recent regional transmission studies have shown that these existing transmission tie lines from Manitoba cannot accommodate significant additional energy transfers into the U.S.⁴⁰

On July 2, 2014, Manitoba Hydro was granted approval to build a new hydroelectric station on the Nelson River: the 695 MW Keeyask Generating Station. This approval was based in part on the recent power agreements between Manitoba Hydro and the Applicant (described below), as well as an agreement with another U.S. electric utility. Manitoba Hydro started building the Keeyask Generating Station on July 16, 2014.

The major remaining barrier to increasing Manitoba hydroelectric power delivery to the U.S. is the lack of transmission capacity. Therefore, the Applicant's primary objective is to add at least 383 MW of new reliable transmission capacity between their system and Manitoba Hydro's system in order to meet their long-term resource-mix and wind-energy storage goals.

2.2.2 Northeast Minnesota and Regional Energy Demand

The proposed Project is designed to be able to transmit enough capacity to meet the Applicant's 383 MW requirements as well as an additional 500 MW—up to a total of 883 MW—in order to accommodate the Applicant's agreements with Manitoba Hydro and other projected requirements in the MISO region.⁴¹ Both MISO and the Applicant believe that a new 500 kV transmission line—which can carry a total of up to 883 MW of electric power—is needed to meet long-term regional needs, especially as industrial load in Minnesota's Iron Range continues to increase. As described in more detail below, the MN PUC is reviewing the Applicant's analysis of these issues in its ongoing certificate of need proceeding.⁴²

Not only would the new transmission line help meet long-term regional needs, but it would enhance system reliability. An unplanned outage of the existing 500 kV transmission Riel-Forbes tie line is the second largest contingency in the MISO footprint.⁴³ Developing a second 500 kV transmission tie line from Manitoba to the Iron Range would reduce loading on the existing Riel-Forbes 500 kV transmission line and improve the performance of the transmission system during such a contingency.⁴⁴

39 https://www.google.com/search?sourceid=navclient&aq=&aq=Miso+Manitoba+Hydro+wind+energy+study&ie=UTF-8&rlz=1T4NDKB_enUS570US570&q=Miso+Manitoba+Hydro+wind+energy+study&gs_l=hp...0.0.13675.....0.oBT5HzE-xNA

40 See, e.g., [https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=\(B4350025-B874-47BE-AC84-365B2239B082\)](https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=(B4350025-B874-47BE-AC84-365B2239B082)) at 19

41 Midcontinent Independent System Operator (MISO) is an independent, not-for-profit regional transmission organization responsible for maintaining reliable transmission of power in 15 U.S. states and the Canadian province of Manitoba. MISO also provides independent, equal, and non-discriminatory access to the electric transmission system. MISO's efficient market operations ensure and support increased grid reliability.

42 *In the Matter of the Request by Minnesota Power for a Certificate of Need for the Great Northern Transmission Line*, MN PUC Docket No. E015/CN-12-1163

43 A contingency is the loss or failure of a part of the power system (e.g. a transmission line). Current electric utility operating policies require that each utility's power system must be able to withstand and recover from any "first contingency" or any single failure such as the loss of a major component like the Riel-Forbes 500 kV transmission line.

44 See, e.g., [https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=\(B4350025-B874-47BE-AC84-365B2239B082\)](https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=(B4350025-B874-47BE-AC84-365B2239B082)) at 19

The Applicant supplies retail electric service to 144,000 customers, and wholesale electric service to 16 municipalities, within a 26,000 square-mile area in northeastern Minnesota. It operates transmission and distribution systems, including 8,866 miles of transmission lines and 169 power substations, including the existing Blackberry Substation, where the proposed Project would interconnect.

The Applicant has historically generated the majority of its electricity from coal-fired units located in northern Minnesota and west-central North Dakota. However, as part of their two most recent integrated resource plans submitted to the MN PUC, the Applicant included a portfolio of North Dakota wind resources and a 250 MW power purchase agreement (PPA) with Manitoba Hydro.

Subsequently, in the docket that approved a 250 MW PPA with Manitoba Hydro, the MN PUC affirmed that the Applicant had significant projected deficits in capacity and output over the period 2020-2035, and therefore, the company “would need a significant additional amount of peaking capacity and energy to meet its future capacity and energy needs.”⁴⁵ The details regarding the relationship between the Manitoba Hydro 250 MW agreements, the Applicant’s demand forecast, and this proposed transmission line is part of the MN PUC’s ongoing certificate of need proceeding.⁴⁶

2.2.3 North Dakota Wind Energy Renewable Optimization Opportunity

Since 2012, the Applicant has constructed nearly 500 MW of wind capacity at its Bison Wind Energy Center in south-central North Dakota near the town of New Salem. Once the 200 MW Bison 4 project is operating, the total wind energy produced by the four Bison wind projects will already bring the company to the verge of meeting Minnesota’s energy standard of 25 percent renewable energy by in 2015, nearly ten years before the statute’s 2025 deadline.

The Applicant’s North Dakota wind facilities at times produce more energy than they need or can sell to other utilities. Therefore, any cost-effective method to store and dispatch wind energy would add value to their wind energy investment. The Applicant has determined that a new 500 kV transmission tie line with the Manitoba hydroelectric system would not

⁴⁵ MN PUC Order approving the Minnesota Power – Manitoba Hydro Purchased Power Agreement and Energy Exchange Agreement, MN PUC Docket No. E-015/M-11-983, February 1, 2012

⁴⁶ In the Matter of the Request by Minnesota Power for a Certificate of Need for the Great Northern Transmission Line, MN PUC Docket No. E015/CN-12-1163

only provide them with additional hydroelectric capacity, but it would also provide an opportunity to optimize and use what would otherwise be excess wind energy on Manitoba Hydro’s system such that it can be dispatched when it is needed.

Therefore, in addition to the 250 MW PPA, the Applicant negotiated an Energy Exchange Agreement that allows the Applicant to sell excess wind energy to Manitoba Hydro when their North Dakota wind production is high and not needed for customer load. This in turn would allow Manitoba Hydro to reduce the flow of water through their hydropower plants during high wind periods, storing hydro energy by increasing the water stored behind those generating stations. The water stored during this process could be used later to generate electricity to be scheduled to Minnesota when wind energy production is low.

The Applicant and Manitoba Hydro also recently finalized the critical commercial terms for an additional 133 MW “Renewable Optimization Agreement” that the Applicant will also submit to the MN PUC for approval once the agreement has been formally approved by both parties. As summarized above, the Energy Exchange Agreement (which is part of the PPA) and the Renewable Optimization Agreement allow the Applicant and Manitoba Hydro to optimize the use of both wind-generated energy and hydropower. The PPA and the Energy Exchange Agreement were approved by the MN PUC on February 1, 2012.⁴⁷ If the MN PUC approves the additional 133 MW renewable optimization agreement, the total capacity of the recent Manitoba Hydro agreements would be 383 MW.

2.3 Applicant’s Route Selection Process

2.3.1 Summary of Process

The Applicant began their route selection process with a 20,000 square mile study area and undertook an iterative process that used several routing factors and rounds of public involvement meetings to narrow the initial study area, first into study corridors, then into preliminary route alternatives, and finally into refined route alternatives. From August 2012 to November 2013, the Applicant organized more than 75 agency and public meetings and, as noted in Section 1.4.3, prior to DOE and Minnesota Department of Commerce – Energy Environmental Review and Analysis (DOC-EERA) joint scoping meetings, the Applicant placed advertisements in 11 local and regional newspapers along the proposed Project corridor to invite the

⁴⁷ MN PUC Docket No. E-015/M-11- 938 (“938 Docket”)

public to local agency and public meetings and to announce meeting times and locations. Copies of newspaper tear sheets and affidavits are available at the DOC-EERA e-dockets website.⁴⁸

2.3.2 Study Area

The boundary of the Applicant's 20,000 square mile study area was generally developed to include the proposed Project endpoints, extending from the Minnesota-Manitoba border to the delivery location at the proposed Blackberry 500 kV Substation. The boundaries of the Applicant's study area are described in further in their Presidential permit and Route Permit applications (Minnesota Power 2014, reference (1)).

The counties in the western one-third of the Applicant's study area are primarily agricultural, characterized by a relatively dispersed population with several small, distributed population centers. The communities in these more agricultural areas to the west value the economic activities of agriculture, tourism, and manufacturing.

The counties in the eastern two-thirds of the Applicant's study area are mostly wetlands, peatlands, and forested areas with lower population density areas and large tracts of federal, state, and county owned lands located throughout the middle of the study area including southern Lake of the Woods County, northern Beltrami County, and Koochiching County. Population density increases moving south and east, with Itasca and Beltrami counties having the highest population in the study area, concentrated in large population centers such as Bemidji and Grand Rapids and Iron Range cities. The economies of the communities in this region are centered on mining, tourism, and manufacturing with relatively little agriculture.

2.3.2.1 Study Corridors

The Applicant developed several study corridors within the study area by reviewing information on environmental and human settlement, meeting with stakeholders, and performing broad environmental and engineering analyses. The Applicant's study corridors were generally 5 to 20 miles wide and met the Applicant's objective of avoiding constraints such as densely populated areas, U.S. Fish and Wildlife Service (USFWS) National Wildlife Refuges, American Indian Lands and Reservations, Minnesota Scientific and Natural Areas (SNAs), large lakes and areas with a high-density of lakes and large wetland complexes,

⁴⁸ E-dockets number 14-21, document ID 20149-103236-01 is available at: <https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showeDocketsSearch&showEdocket=true>

and contiguous areas of relatively undisturbed natural resources. The Applicant then evaluated the study corridors based on the following factors:

Constraints: Routing constraints as defined as resources or conditions that could limit or prevent transmission line development. Avoiding those resources was a goal, but not necessarily a requirement, of the Applicant's route development process. Constraints identified by the Applicant included areas restricted by regulations, or areas where impacts on resources will be difficult to mitigate.

Opportunities: Opportunities are defined as resources or conditions that will facilitate the proposed Project development, for example pre-existing linear infrastructure or other features (for example, roads, transmission lines, and public land survey divisions of land) along which the proposed Project development will be particularly compatible. These opportunities are viewed by the Applicant as avenues to facilitate the proposed Project development by reducing impacts from constraints.

Technical Guidelines: Technical guidelines are defined as the specific engineering requirements and objectives associated with the construction of the proposed Project. These technical guidelines are specific to the proposed Project and provide the technical limitations related to the design, ROW requirements, and reliability concerns.

2.3.2.2 Preliminary Route Alternatives

The Applicant developed a network of potential route segments to compare and evaluate potential route alternatives. The network included opportunities for corridor sharing while avoiding areas with a high concentration of constraints, such as municipalities, and minimizing proximity to residences.

Once the network was developed, the Applicant analyzed the potential impacts associated with the route segments. The first step was to compare groups of smaller routes (contiguous route segments typically 3 to 10 miles long) that had common start and end points and were based on the Applicant's opportunities, constraints, and technical considerations identified in Section 2.3.2.1. When all other factors were relatively equal, the Applicant generally gave preference to the route that had fewer residences in its proximity, less impact on wetlands, and was the shortest length.

Preliminary route alternatives were presented to the public at a second round of open house meetings and to individual agencies during spring 2013. These

meetings provided the public and agencies with updated information and facilitated the collection of comments for use in the next step of the route development process.

2.3.2.3 Refined Route Alternatives

The Applicant screened the preliminary route alternatives and defined the refined route alternatives based on feedback from stakeholders and the public and further analysis of the routing factors. Each route alternative was 1,000 to 3,000 feet wide.

The Applicant presented the refined route alternatives to the public at a third round of open house meetings and to individual agencies in the fall 2013. Again, the Applicant used these meetings as an opportunity to both inform stakeholders about the proposed Project and to gather additional information from the public and agencies for use in the route development process.

At the beginning of project planning, the Applicant anticipated development of two transmission lines and associated facilities – the proposed Project and a separate 345 kV transmission line between the proposed Blackberry 500 kV Substation and the Arrowhead Substation near Hermantown, Minnesota. Subsequently, the Applicant determined that there were not sufficient transmission service requests to support this 345 kV transmission line. Therefore, the Applicant is not pursuing the 345 kV transmission line at this time.

2.3.3 Border Crossing - Applicant Considerations and Preference

The proposed border crossing location is identified by the Applicant in its October 2014, amended Presidential permit application to DOE. While multiple alternate border crossings were considered during the development of proposed Project, the Applicant and Manitoba Hydro identified the proposed border crossing location as their preferred crossing due to concerns related to First Nations in Canada and environmental impacts affecting the viability of alternate border crossings. Details regarding the Applicant's border crossing selection process, including the factors and alternate border crossings they considered, are described in Section 4.11 of the April 2014 Presidential permit and Route Permit applications.⁴⁹

2.3.3.1 Border Crossing - Manitoba Hydro Considerations and Preference

Key border crossing considerations for Manitoba Hydro included determining route options that balance natural and engineering considerations while taking into consideration feedback from the public, stakeholders, and aboriginal communities. Manitoba Hydro identified Option A7 as the best option based on all considered factors. Option A1 and Option A2 were not feasible as they traverse areas of high biological diversity in Manitoba that have been noted by agencies and environmental non-governmental organizations and primarily traverse Crown lands, which have been criticized as a routing approach by the Clean Environment Commission. Additionally, Option A1 and Option A2 could raise significant concerns from First Nation communities in terms of traditional uses of the area. Manitoba Hydro maintains a website for the Manitoba-Minnesota Transmission project that details the Environmental Assessment and route selection process.⁵⁰

2.3.3.2 Border Crossing - Decision Process

Option A6 and Option A7 were infeasible from the Applicant's perspective because the associated route on the U.S side of the border would affect too many homes, farmland, and a state designated area of outstanding biological diversity. Options A1 and A2, however, were infeasible from Manitoba Hydro's perspective, so these crossings were removed from further consideration. Additionally, Manitoba Hydro preferred the most western crossing (Option A5) over the east crossing (Option A3/A4), since access to the east crossing (Option A3/A4) would also require the selection of a route with more potential environmental impacts.⁵¹

Therefore, Manitoba Hydro and the Applicant agreed that Option A5 was the best and only feasible Border Crossing Option, taking into account its acceptability to parties, environmental impacts, community impacts, and overall proposed Project schedule (Minnesota Statutes, section 216E.02, subdivision 3). Section 4.11 of the April 2014 Presidential permit and Route Permit applications (reference (1) describes DOE's consideration of border crossing alternatives during the scoping process.

49 Available at: <http://www.greatnortherneis.org/Home/documents> or <http://mn.gov/commerce/energyfacilities/resource.html?Id=33849>

50 Available at: https://www.hydro.mb.ca/projects/mb_mn_transmission/index.shtml

51 Available at: <http://www.greatnortherneis.org/Home/documents> or <http://mn.gov/commerce/energyfacilities/resource.html?Id=33849>

2.4 Applicant's Proposed Routes

The following provides a detailed description of the locations for the Applicant's proposed route alternatives and segment options (Map 2-1).

2.4.1 Blue Route

The Blue Route is the Applicant's Preferred Route. The Blue Route would originate at the Minnesota-Manitoba border roughly 2.9 miles east of Highway 89 in Roseau County, Minnesota. It would proceed southeast 0.5 miles to 410th Street, approximately 0.16 of a mile from the intersection of 410th Street and County Road 3. The Blue Route would travel south 2 miles to 390th Street and turn east following 390th Street for 10.5 miles (where 390th street then turns into County Road 118). At 0.25 miles from Highway 310 the proposed line would turn southeast and continue for another 12 miles. At 0.5 miles from 510th Avenue, the proposed line would again turn and travel 2.3 miles east to join the existing Minnkota Power 230 kV line. The Blue Route would parallel the existing Minnkota Power 230 kV line southeast for 1.8 miles and then turn south where it would meet the existing Xcel 500 kV line. Beginning at a tenth of mile north of US Highway 11, the proposed transmission line would parallel the existing Xcel 500 kV line route for 36 miles after which it would turn east, leaving the Xcel 500 kV line 2 miles southeast of the intersection of Faunce Forest Road and 19th Street Southwest in Lake of the Woods County.

The Blue Route would proceed east for 5.8 miles and then turn northeast to rejoin the existing Minnkota Power 230 kV line at its intersection with Pitt Grade Trail. The proposed line would then parallel this existing 230 kV line in an easterly direction for 31 miles to a point 1.5 miles west of the County Road 86 in Koochiching County where it would then proceed southeast for 8.3 miles and then south for 1.8 miles. At this point, the Blue Route would be roughly 1.5 mile south from the intersection of County Road 32 and County Road 36 in Koochiching County. The line would then continue southeast for 21.3 miles and intersect Highway 71 roughly 4.5 miles northeast of Big Falls, where it would continue an additional 9.6 miles to the southeast where it would rejoin the existing Minnkota Power 230 kV line, following the existing line in a southerly direction for 12.3 miles.

The Blue Route would continue south for 3 miles following Deer River Line Road (also called County Road 62). The transmission line would turn east for 3.5 miles and then turn southeast again and travel 5 miles to Itasca County near the intersection of

County Road 523 and South Lofgrin Forest Road. The proposed line would extend south for 6.4 miles, turning slightly southeast for another 2.8 miles, and then head south for 11.5 miles. At 2.8 miles north of Scooty Lake, the Blue Routewould continue to travel 7.5 miles south to County Road 530, where it would cross the West Fork Prairie River. At County Road 530, the proposed line would again turn south and continue 6.5 miles to County Road 57. The line would turn southwest for 3.7 miles, and then head south for 3.8 miles to Diamond Lake Road. The route then heads south, southeast for 2.7 miles. At the Swan River, Blue Route heads south for 4.4 miles where it would meet the existing Minnesota Power 230-kV line, paralleling it for 1 mile to the Blackberry 500 kV Substation near Grand Rapids, Minnesota. The Blue Route is 220 miles in length.

2.4.2 Orange Route

The Orange Route originates at the Minnesota-Manitoba border roughly 2.9 miles east of Highway 89 in Roseau County and continues south for approximately 2.5 miles. The Orange Route then heads east for 11 miles to Minnesota TH 310. From Section 2, Township 163N, Range 40W, the Orange Route proceeds southeast for 12 miles to Section 26, Township 163N, Range 38W.

From there, the Orange Route continues east for 2.5 miles to the existing Minnkota Power 230 kV transmission line. The Orange Route follows the 230 kV transmission line southeast for 1.75 miles to the existing Xcel Energy 500 kV transmission line. From this point, the Orange Route follows the existing Xcel Energy 500 kV transmission line to Section 25, Township 157N, Range 31W.

The Orange Route then heads south for 4.75 miles to Section 24, Township 156N, Range 31W. The Orange Route then heads east for 0.5 mile, crossing TH 72, then southeast for 10.5 miles to Section 21, Township 155N, Range 29W. The Orange Route continues south for 16.0 miles to Section 9, Township 152N, Range 29W.

From there, the Orange Route continues east for 12.0 miles to Section 8, Township 152N, Range 27W. The Orange Route then heads southeast for 13.0 miles to Section 5, Township 151N, Range 25W. The Orange Route then continues east for 5.0 miles, southeast for 4.25 miles, and then east for 4.0 miles to Section 11, Township 162N, Range 62W.

The Orange Route then heads southeast for 5.5 miles, crossing TH 1, to Section 1, Township 161N, Range 26W. The Orange Route then heads east for 6.0 miles to Section 6, Township 161N, Range

24W. The Orange Route then proceeds southeast for 11.5 miles to Section 3, Township 60N, Range 23W. The Orange Route then heads south for 15.0 miles, staying east of Bear Lake and Wolf Lake, to Section 15, Township 58N, Range 23W.

From there, the Orange Route continues southwest, utilizing an old Minnesota Power ROW to Section 26, Township 58N, Range 24W. The Orange Route then heads south, between Bass Lake and Lawrence Lake, to Section 11, Township 56N, Range 24W. From there, it follows an existing 115 kV transmission line south to Section 23, Township 56N, Range 24W. The Orange Route continues southeast, between Holman Lake and South Twin Lake, for 4.0 miles to Section 5, Township 55N, Range 23W. From there, the Orange Route heads south for 1.0 mile to the existing Minnesota Power 115 kV transmission line. The Orange Route follows the existing 115 kV transmission line southwest and then south to the new substation location. The Orange Route is 220 miles in length.

2.4.3 Segment Options

Based on comments received from the public and agencies during its route selection process, the Applicant identified two additional route segments as potential options, which it included in its Presidential permit and Route Permit applications (Minnesota Power 2014, reference (1)). These segment options, according to the Applicant, would have the following impacts compared to the primary route.

- The Applicant compared two segments for the Blue Route: Segment Option C1 which is a segment of the Blue Route, and its alternative segment - Segment Option C2. Segment Option C1 is shorter, and goes through undeveloped forest, whereas Segment Option C2 is longer, parallels an existing transmission line, and is closer to residences.
- The Applicant compared two segments for the Orange Route: Segment Option J1 which is a segment of the Orange Route, and its alternative segment - Segment Option J2. Segment Option J1 goes through undeveloped forest, whereas Segment Option J2 is closer to residences.

2.4.3.1 Segment Option C1

Segment Option C1, which is the equivalent part of the Blue Route, begins in Section 22, Township 158N, Range 27W. This segment continues to the southeast, cross-country, for 32 miles to the

Minnesota Power 230 kV transmission line in Section 6, Township 65N, Range 25W.

2.4.3.2 Segment Option C2

Segment Option C2 begins in Section 22, Township 158N, Range 27W and follows the Minnkota and Minnesota Power 230 kV transmission line east and then south for 47.0 miles to Section 6, Township 65N, Range 25W.

2.4.3.3 Segment Option J1

Segment Option J1, which is equivalent part of the Orange Route, begins in Section 9, Township 152N, Range 29W. From there, Segment Option J1 heads east for 12.0 miles to Section 8, Township 152N, Range 27W. It then heads southeast for 13.0 miles to Section 5, Township 151N, Range 25W. Segment Option J1 continues east for 5.0 miles; southeast for 4.25 miles; and east for 4.0 miles to Section 11, Township 162N, Range 62W. Segment Option J1 then heads southeast for 5.5 miles, crossing TH 1, to Section 1, Township 161N, Range 26W. Segment Option J1 then heads east for 6.0 miles to Section 6, Township 161N, Range 24W. Segment Option J1 proceeds southeast for 5.0 miles to Section 8, Township 61N, Range 24W.

2.4.3.4 Segment Option J2

Segment Option J2 begins in Section 9, Township 152N, Range 29W. It heads southeast for 2.5 miles; south for 6.0 miles; and then southeast for 2.0 miles to Section 36, Township 151N, Range 29W. Segment Option J2 then heads east for 26.0 miles to Section 24, Township 62N, Range 27W. It then heads southeast for 3.0 miles, crossing TH 1. Segment Option J2 then heads east for 2.0 miles, crossing TH 38, then southeast for 2.0 miles to Section 1, Township 61N, Range 26W. Segment Option J2 heads east for 6.0 miles to Section 6, Township 161N, Range 24W. It then heads southeast for 5.0 miles to Section 8, Township 61N, Range 24W.

2.4.4 Route Alternatives Considered but Rejected by Applicant

The Applicant considered numerous factors when selecting the two proposed route alternatives. Potential western route options were eliminated from further analysis for the following reasons:⁵²

Timing Considerations Associated with Public Opposition: Based on the amount of property it would have to acquire, and the likelihood of

⁵² See Chapter 4 of the Presidential permit/Route Permit Application for a detailed description of the Applicant's route development and screening process.

resistance from landowners, the Applicant estimated the time it would take to construct the transmission line. As part of that estimation, the Applicant took into consideration the possibility that it would have to conduct time-consuming condemnation proceedings, including Minnesota condemnation law.

Because the western-southern routes would involve a larger number of privately owned parcels, many of which are used for residential or agricultural purposes, and because public meeting attendees in the vicinity of the western and southern routes voiced more numerous and strenuous objections, the Applicant concluded that using the western-southern routes would make achieving the contractually-determined June 1, 2020, in-service date unlikely. Not achieving the June 1, 2020, in service date would be inconsistent with the Applicant's statement of purpose and need for the proposed Project. On this basis, the Applicant eliminated the western-southern routes from further consideration.

Impacts on Community: The density of human settlement in the areas west and south of Red Lake is much higher than areas further to the east. The least populated western-southern route had a higher percentage of private land, and more than twice the number of homes within a 3,000-foot potential route width, than the eastern routes (Table 2-1). The least impactful of the western and southern routes on communities also crossed through more than 2,646 acres of agricultural land, as compared to 79 to 90 acres for the eastern routes.

The portion of the route south of Red Lake is an area of particularly dense human settlement, and numerous lakes. In addition, the area is home to a number of wild rice lakes, which are seasonally flooded and provide transitional habitat to several avian species. All of the western-southern routes would have to cross this area south of Red Lake. One of the Applicant's goals when constructing any project is to have a positive impact on the affected communities. The Applicant concluded that the higher population density and negative reaction from residents near the western and southern routes would threaten that goal. The Applicant accordingly concluded that the western-southern routes do not satisfy its objective to positively impact communities. That failure was a second, independent reason to eliminate the western-southern routes from further consideration.

Availability of Western Border-crossing Options:

The proposed Project depends on the alignment of the permitted international border crossings in Manitoba and Minnesota. During the negotiations regarding the international border crossing, the Applicant and Manitoba Hydro agreed to eliminate the westernmost international border crossing area because it was less desirable than other international border crossing options for a number of reasons, including effects on human settlement and the environment. The elimination of the westernmost international border crossing necessarily eliminated the westernmost route alternatives, which were exclusively associated with that international border crossing.

Table 2-1 Comparison of Resources Types in the Western and Eastern Regions

Resource Type	Western Region	Eastern Region
Number of houses/section	1.76	0.5
Acres of farmland/section	---	---
All Agricultural Land ⁽¹⁾	442	65
Prime farmland ⁽²⁾	89	27
Prime farmland if drained ⁽²⁾	203	99
Farmland of statewide importance ⁽²⁾	157	54
Acres of forestland/section	113	395
Acres of wetlands/section	97	435
Acres of forested wetlands/section	43	394
Acres of public land/section	65	482
Acres of private land (does not include corporate land)/section	566	123
Acres of corporate land/section	0.3	29

Source: Minnesota Power2015, reference (8)

- (1) Acreages were calculated using data from Minnesota Department of Natural Resources (MnDNR) Gap Analysis Program (GAP) Level 2 Data for "Farm/Crop".
- (2) Acreages were calculated using data from U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) Soil Survey Geographic Database (SSURGO).

Limited Opportunities for Corridor Sharing: MN PUC’s routing criteria for high-voltage transmission lines favor routes that parallel existing high-voltage transmission lines (corridor sharing) to the greatest extent practicable. The Orange and Blue routes that the Applicant presented in its Presidential permit and Route Permit applications both parallel existing transmission lines along large sections of the route (Minnesota Power 2014, reference (1)). The potential western route alternatives, on the other hand, do not parallel any existing high-voltage transmission lines. While this factor did not require the elimination of the western route alternatives, it does make those route alternatives less desirable from the state’s regulatory perspective. The Applicant considers the limited opportunities for corridor sharing to be an additional reason for excluding the western routes from further analysis

2.5 Technical Description

2.5.1 Number of Circuits

The Applicant proposes to construct a single-circuit 500 kV alternating current (AC) overhead transmission line.

2.5.2 Operating Voltage and Frequency

The nominal three -phase operating voltage for the proposed Project will be 500 kV AC. The proposed Project will be operated at a frequency of 60 Hertz (Hz).

2.5.3 Conductor Specifications

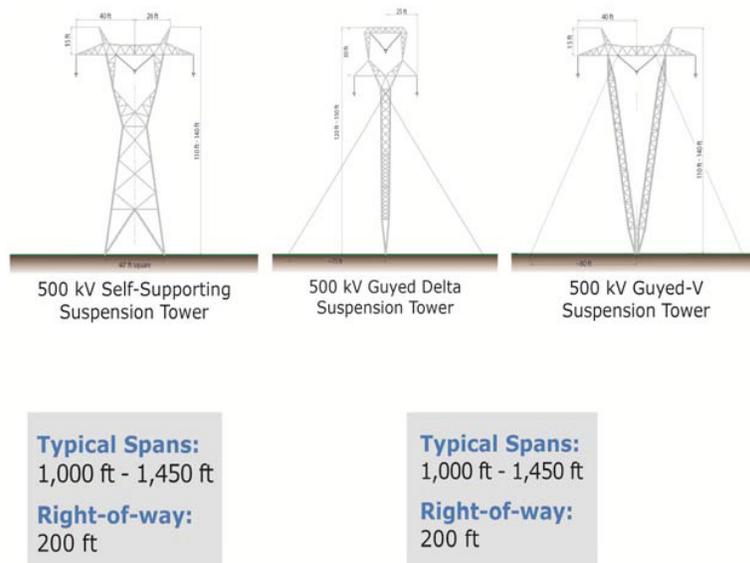
The Applicant anticipates using a 3-bundle 1192.5 thousand circular mil (kcmil) aluminum conductor steel reinforced (ACSR) “bunting” with 18 inch sub-spacing as the conductor for the proposed Project. This 3-conductor bundle is the same as that used on the U.S. portion of the existing Riel-Chisago 500 kV transmission line (and so will look the same). The Applicant will, however, perform a conductor optimization study before a final determination is made on conductor selection and bundle configuration.

2.5.4 Typical Supporting Structure

The Applicant is evaluating several structure types and configurations, including a self-supporting lattice structure, a lattice guyed-V structure, and a lattice guyed-delta structure (Figure 2-1). It is currently estimated that 4 to 5 structures will be needed per mile of transmission line. The type of structure in any given location of transmission line will depend on land type and land use.

The structures will typically range in height from 100 to 170 feet, depending on the structure type and the terrain. In some instances, such as where the proposed Project crosses an existing transmission line, taller structures may be required. The structures would be placed approximately 1,000 to 1,450 feet apart, with a maximum span of 1,700 feet. Where the transmission line crosses farmland, the Applicant would use self-supporting lattice structures to minimize interference with farm operations.

Figure 2-1 Structure Schematics



On cultivated land or in areas of intensive land use, the Applicant anticipates using self-supporting lattice structures. In other areas where guy wires will not significantly interfere with land use, the proposed Project may be installed on one of the guyed structure types. The area of permanent impact for guyed structures is anticipated to be 33 square feet per structure with a temporary construction disturbance footprint of approximately 0.92 acres per structure. Structure types are illustrated in Figure 2-1.

The self-supporting suspension towers (or structures) will be anchored to foundations at each leg of the structure. The guyed-delta and guyed-V structures will utilize a single foundation system at the center of the structure and a set of at least four guys and anchors per structure. The anchors used will vary depending on terrain.

The Applicant anticipates using either a single I-string or a V-string insulator assembly. The structures will support two overhead static ground wires to protect from lightning. In each case, one of the overhead static ground wires will have a fiber optic core to enable communications and system protection functions between the two endpoints.

2.5.5 Structure Spacing

The Applicant anticipates that the proposed Project typically would be located on all new ROW that is approximately 200 feet wide. A wider ROW (250 to 300 feet in width) may be required for longer spans, at angle and corner structures, for guyed structures, or where special design requirements are dictated by topography. Generally, structures will be typically be spaced approximately 1,000 to 1,450 feet apart with shorter or longer spans as necessary. Longer spans may be needed to cross areas such as waterbodies or watercourses, or in areas where special design requirements are dictated by topography. The maximum span is anticipated to be 1,700 feet with an average span of 1,250 feet.

The Applicant identified that spans would be adjusted such that structures, where practicable, would avoid open water and transportation corridors. To the greatest extent possible, waterways would be spanned in the same location as existing disturbances or ROWs; otherwise, the proposed Project would be designed to cross waterways perpendicularly to the extent practical to minimize visual effects of the proposed Project for recreational users of the waterways.

2.5.6 Conductor Spacing

Lateral spacing of phase conductor bundles would vary with the various types of structures and would range from approximately 25 to 40 feet.

2.5.7 Line to Ground and Conductor Side Clearances

The required clearances at the structure, horizontal distance between each energized phase, and the minimum required ground clearance will be determined based on electrical studies during detailed design of the proposed Project. All clearances would meet or exceed the recommended clearances in the National Electric Safety Code (NESC). Based on preliminary design criteria for the proposed Project, minimum ground clearance for the conductors is estimated to be 40 feet.

2.5.8 Wind and Ice Loading

Wind and ice loading for the proposed Project will incorporate three NESC loading cases required for this area of the U.S.; Rule 250B, Rule 250C, and Rule 250D. Rule 250B, the NESC heavy district loading case, specifies a wind velocity of 40 miles per hour (mph), 0.5 inch of ice, and a wire temperature of 0° Fahrenheit (F). This loading case requires an additional NESC constant of 0.3 pounds per foot for the sag and tension calculations. Additional NESC Rules include:

- NESC Rule 250C considers extreme wind loading. A wind velocity of 90 mph at 60° F is the weather condition that satisfies the NESC Rule 250C loading.
- NESC Rule 250D considers an extreme ice load with a concurrent wind load. For the study area, an ice thickness of one-half inch, a wind gust speed of 50 mph and a wire temperature of 15° F satisfies the conditions of NESC Rule 250D.
- NESC Rules 250C and 250D, as well as American Society of Civil Engineers (ASCE) Manual No. 74: "Guidelines for Electrical Transmission Line Structural Loading," provide default 50-year values for extreme ice and wind. The Applicant will conduct a weather study to identify additional reliability-based wind and ice load cases to be considered during detailed design of the proposed Project.

2.5.9 Requested Route Width

The Applicant's proposed routes vary from 650 to 3,000 feet wide in order to provide flexibility during

detailed design, in part to try to accommodate landowner's preferences once the route is selected by the MN PUC. See Section 1.3.1.4 for a summary of the applicable state regulatory definitions of ROW and route that allow flexibility in the Route Permit. The Applicant's requested route widths and anticipated alignments are shown on the detailed maps provided in Appendix A of the Applicant's Route Permit Application.⁵³

2.6 Associated Facilities

2.6.1 Blackberry 500 kV Substation

The proposed Project would terminate at a new 500 kV substation located on the same site as the Applicant's existing Blackberry 230/115 kV Substation, adjacent to and east of the existing substation, and will be designed to accommodate the new 500 kV transmission line, 500/230 kV transformation, existing 230 kV transmission lines, and all associated 500 kV and 230 kV equipment. Existing 230 kV and 115 kV transmission lines currently located on the property will also need to be rerouted. The Applicant has entered a purchase option agreement with the owner of the property adjacent to and east of the existing approximately 8.8-acre Blackberry 230/115 kV Substation. The proposed Blackberry 500 kV Substation will permanently impact approximately 17.8 acres.

2.6.2 500 kV Series Compensation Station

The proposed Project would require a 500 kV series compensation station to be located within or adjacent to the final approved route. The series compensation station will include the necessary 500 kV series capacitor banks and all associated 500 kV equipment. The 500 kV series compensation station will permanently impact approximately 60 acres.

The location of this facility would be determined by several factors that affect the design of the transmission line and the series capacitor equipment, including the voltage profile along the transmission line and the available fault current at the series capacitors. Since both of these factors are directly affected by the overall length of the transmission line between the existing Riel Substation in Manitoba and the proposed Blackberry 500 kV Substation in Minnesota, the final location of the 500 kV series compensation station is dependent on the final route determinations in both the U.S. and Canada.

The Applicant initiated electrical design optimization studies to identify the preferred location for the 500 kV series compensation station. Based on these studies, candidate sites in Minnesota include the overall midpoint of the line and at one-third of the overall transmission line distance from the Riel Substation to the Blackberry 500 kV Substation.

2.6.3 Regeneration Locations

The Applicant proposes to locate three regeneration stations within or adjacent to the final route approved by the MN PUC. The sites would be 75 feet by 75 feet and located on uplands.

2.6.4 Permanent Access Roads

The Applicant proposes to establish a permanent "2-track" trail on uplands within the permanent 200-foot right-of-way as a result of construction traffic. This "2-track" trail would be an unimproved road and it is assumed that there would be no grading or filling for this permanent access road.

2.6.5 Temporary Access Roads, Laydown Areas, Fly-in Sites, and Stringing Areas

The Applicant has indicated that it would be necessary to construct temporary access roads outside of the ROW and that they would work with local property owners to identify suitable access locations during final design. The Applicant would be required in state and federal approvals to coordinate with the applicable agencies to reduce construction impacts of these temporary access roads. A typical temporary access road width of 16 feet is anticipated.

The Applicant proposes to establish a main staging area for temporary storage of materials and equipment. Such an area would include sufficient space to lay down material and pre-assemble some structural components or hardware. Other staging areas located along the ROW would be limited to a structure site for laydown and framing prior to structure installation. The Applicant will identify specific staging areas during final design. Generally, the laydown areas will be approximately 20 to 40 acres, they will be located along suitable roadways approximately 40 to 50 miles apart, and will be within five miles of the final route approved by the MN PUC. The Applicant has indicated that upland areas with prior disturbance will be preferred for siting staging areas; however, there may be some areas where this is not feasible and other areas would be used. Staging areas would be in place for

⁵³ Available at: <http://mn.gov/commerce/energyfacilities//resource.html?id=33849>

at least one year and will be used to store equipment and materials and include the construction offices.

Similar to laydown areas, the Applicant proposes to establish fly-in sites that would be approximately 10 acres in size, located as near to the ROW as possible, and approximately 5 to 7 miles apart. Upland areas with prior disturbance would be preferred; however, there may be some areas where this is not feasible and other areas would be used. These sites would be in place for less than 1 year (likely 6 months) and will be used to assemble structures for sky crane construction. The Applicant would identify final fly-in sites during final design.

The Applicant proposes to establish temporary stringing sites within or adjacent to the final route approved by the MN PUC. The sites would be 200 feet by 600 feet with a two-mile spacing, normally located near mid-span on the centerline of the ROW. The rope machine, new conductor wire trailers, and tensioner would be located at the wire stringing set-up area. This phase of construction would occur after the structures have been erected, and fitted with stringing blocks (also called dollies or sheaves) and single -leader p-line ropes that reach the ground. Crewmembers would monitor the progress of stringing to ensure the sock does not get hung up in the dollies. One phase at a time, the conductor wire bundles would be pulled to the appropriate tension. Once all three phases have been tensioned, they would be clipped into place utilizing permanent suspension hardware.

If stringing and hard line set-up areas in wetlands are required when surface conditions are not stable, extensive use of timber matting may be required. The most effective means to minimize impacts on water areas during construction would be to span streams and rivers by placing structures above the normal high water level. Where waterways must be crossed by construction equipment, the Applicant would need to commit to using temporary clear span bridges in the applicable water crossing permit to minimize the impact on the waterway. For those waterways that cannot be crossed with construction equipment, workers might walk across or use boats during wire stringing operations to pull in the new conductors and shield wires, or in the winter drive equipment across the ice. In areas where construction occurs close to waterways, appropriate measures would need to be employed to minimize soil erosion and prevent sedimentation of the waterways. The Applicant would also be required to ensure that equipment fueling and lubricating occurs at a reasonable distance from the waterways.

2.6.6 Establishing the Final Alignment

After working with landowners and completing detailed engineering work, the Applicant would establish the final alignment for the project and structure placements. These plans (known as “plan and profiles”) must be provided to the MN PUC so that the MN PUC can confirm that the Applicant’s plans are consistent with the Route Permit and to ensure all permit conditions are met prior to construction of the project.

The Applicant indicated that final alignment and structure placement would be coordinated with the following entities to minimize human and environmental impacts:

Individual landowners: The Applicant indicated that during ROW acquisition, the placement of individual structures would be coordinated with property owners, to the extent practicable. Minor shifts to the anticipated alignment would be evaluated once a route is chosen, to minimize visual impacts for landowners.

Mining operators and mineral lessees: The Applicant has indicated they would work with existing mine operators and mineral lessees to identify the extent of current and planned mining operations and develop appropriate mitigation measures. These measures may include adjustments to structure placement or ROW alignment within the route.

Minnesota Department of Transportation (MnDOT): The proposed Project would be designed in accordance with NESC to minimize impacts on transportation. The NESC defines the basic clearance requirements between transmission lines and transportation structures (for example, roadways, and railways). Placement of public utilities on or near state ROW would be designed in accordance with the Utility Accommodation Section of the MnDOT Utility Accommodation and Coordination Manual.

Minnesota Department of Natural Resources (MnDNR) and USFWS: The Applicant has indicated that they would continue to work with the MnDNR to minimize impacts on sensitive forested areas within the state forests through structure placement and ROW alignment. Similarly the Applicant would work with the MnDNR and USFWS to site the transmission line to avoid bird concentration sites, nesting areas, migratory pathways, and geographic features that act as a funnel, and avoid habitats that are breeding grounds or feeding areas, to the extent practical. The Applicant would work with USFWS to determine structure configuration that is least

detrimental to wildlife. Applicant would work with USFWS to ensure that construction and on-going use of the transmission line avoids and minimizes impacts to fish and wildlife to the fullest extent practicable.

U.S. Army Corps of Engineers (USACE): The Applicant would avoid and minimize adverse impacts to wetlands and other aquatic resources during construction. This would be accomplished by spanning wetlands and aquatic resources, where practical, and implementing best management practices (BMPs). These avoidance and minimization measures would be incorporated into a Clean Water Act Section 404 permit and Section 401 certification issued by USACE and Minnesota Pollution Control Agency (MPCA), respectively, prior to construction. The applicant will continue to work with the USACE to develop a compensatory wetland mitigation plan that meets agency requirements for unavoidable wetland impacts.

2.7 Route Width, Right-of-Way, and Anticipated Alignment

The Applicant has requested in their permit applications to have route widths that vary from 650 feet up to 3,000 feet in some limited areas. The new 500 kV structures would require a 200-foot ROW, 100 feet on either side of the of the transmission line alignment. The anticipated alignment–centerline of the transmission line–would be located within the ROW.

2.8 Bulk Power System Information

2.8.1 Expected Power Transfer Capability

The proposed Project is designed to increase the total transfer capability between the U.S. and Manitoba by at least 750 MW. This information is required by DOE's Presidential permit regulations (10 Code of Federal Regulations (CFR). Section 205.322(b)(3)(i)). The Applicant will supplement this information after completion of additional MISO system impact studies.

2.8.2 System Power Flow

System power flow plots are schematic diagrams of the flow of electric power in an interconnected system. DOE regulations for a Presidential permit require system power flow plots for the Applicant's proposed service areas for heavy summer and light spring load periods, with and without the proposed international interconnection, for the year the proposed Project is scheduled to be placed in

service and for the fifth year thereafter (10 CFR. Section 205.322(b)(3)(ii)).

Initial power flow plots for the years 2020 and 2025 are included in Appendix K of the original Presidential permit application. Additional information required under the applicable DOE regulations is found in other sections of the Presidential permit application or will be developed later in accordance with DOE guidance. The Applicant will provide DOE any additional information required under 10 CFR. Section 205.322(b)(3)(v).

2.8.3 Weather Events

The Riel – Forbes 500 kV line (described in Section 2.2.2) is the largest of the four existing transmission lines that connect Manitoba and the United States. The Orange Route parallels this existing 500 kV transmission line for 59.9 miles, while the Blue Route parallels this existing 500 kV transmission line for 36.2 miles.

The main impact of locating the Project adjacent to the existing 500 kV transmission line is the perception that the physical proximity of the two 500 kV transmission lines would increase the likelihood of an unexpected simultaneous outage of both lines. In practice, according to the Applicant, unexpected transmission line outages are rare, and simultaneous unexpected outages of parallel transmission lines not sharing a common structure are even rarer (Minnesota Power 2014, reference (1)). Unexpected transmission line outages occur for a number of reasons. In this case, the primary concerns are with extreme weather events and equipment failures.

The Applicant would address potential simultaneous outages of the proposed Project and the existing Riel-Forbes 500 kV transmission line due to weather events by developing a weather study to define and incorporate the appropriate design considerations based on actual weather data. Based on the weather study, the design criteria for the proposed Project may be adjusted to increase the robustness of the design for those lengths where the proposed Project parallels the existing 500 kV transmission line.

Where design criteria cannot fully address potential simultaneous outages due to weather events, as is the case with tornadoes, the Applicant would consider further mitigation as appropriate to enhance restorability. This could include more frequent use of anti-cascade towers, maintaining an increased supply of emergency spare towers, or even locating a permanent storage facility for emergency

spares on or near the location where the proposed Project parallels the existing 500 kV transmission line.

The Applicant would address potential simultaneous outages of the proposed Project and the existing 500 kV transmission line due to lightning events by installing shield wires and single pole tripping, a protective relay scheme that allows power to continue being transferred over the line even if one of the three phases is struck by lightning. Since the majority of lightning events only affect one phase of a transmission line, single pole tripping should alleviate any concerns with simultaneous outages due to lightning.

The Applicant would address potential simultaneous outages of the proposed Project and the existing 500 kV transmission line due to equipment failures by maintaining appropriate separation distances between the proposed Project and the existing 500 kV transmission line.

The Applicant would evaluate the steady state and dynamic performance of the regional transmission system after a simultaneous outage of the two 500 kV transmission lines for both north and south flow conditions in the electrical design optimization studies for the proposed Project. These studies should identify any potential electrical problems with this event and if there are any reasonable electrical design considerations that will improve the performance of the system during this event.

Once the proposed Project is in service, the reliability impacts in the United States of a simultaneous outage of the proposed Project and the existing 500 kV transmission line will be addressed by modifying the existing special protection system associated with the four current Manitoba to United States transmission tie lines to include the proposed Project and associated facilities. In the event of an unexpected simultaneous outage of the proposed Project and the existing 500 kV transmission line, the modified special protection system will be set up to preserve the integrity of the system based on the operating studies for the proposed Project.

2.8.4 Interference Reduction Data

Direct and indirect impacts of the proposed Project on radio, television, and cellular telephone signals are addressed in detail under Electrical Interference in Section 5.2.1.5. This information is required under applicable DOE regulations (10 CFR, Section 205.322(b)(3)(iii)).

Radio and television interference is generated by corona⁵⁴ occurring on the conductors. The Applicant would select conductor size and bundle configuration to minimize corona levels, which will in turn minimize radio and television interference.

This transmission line will use extra high voltage hardware, appropriate construction techniques, and a transmission line configuration that yields a low level of corona, which will minimize the onset of gap discharges, which in turn will minimize television interference. The proposed Blackberry 500 kV Substation will also be designed to minimize corona.

If television or radio interference is caused by the operation of the proposed Project in areas where good reception was available prior to construction of the proposed Project, the Applicant will inspect and repair 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 necessary.

If interference from corona discharges does occur for an AM radio station within a station's primary coverage area with good reception before the proposed Project was built, satisfactory reception can be obtained by appropriate modification of the receiving antenna system.

A two-way mobile radio located immediately adjacent to and behind a large metallic structure (such as a steel transmission line structure) may experience interference because of the signal blocking effects of the structure. Moving either mobile unit by less than 50 feet so that the metallic structure is no longer immediately between the two units should restore communications.

If necessary, the Applicant will work with tower operators to resolve any issues directly related to the proposed Project.

2.8.5 Relay Protection

The transmission line would be equipped with protective devices to safeguard the public if an accident occurs, such as a structure or conductor falling to the ground. The protective devices are circuit breakers and relays located where the transmission line connects to the substation. The protective equipment is designed to de-energize the transmission line should such an event occur.

The proposed Project's protective relaying systems will use microprocessor-based devices that conform

⁵⁴ Corona is defined as small electrical discharges which ionize surrounding air molecules

to the requirements of the Institute for Electrical and Electronics Engineers, North American Electric Reliability Corporation (NERC), and the Midwest Reliability Organization (10 CFR. Section 205.322(b) (3)(iv)). Specific protection schemes, equipment, and functional devices will be determined during the proposed Project's detailed design phase.

2.9 Land Acquisition

2.9.1 Transmission Line Right-of-Way

The Applicant would need to acquire easement rights so the 200-foot-wide ROW can cross privately owned land as well as federal land that requires ROW agreements. The evaluation and acquisition process includes examining titles, contacting owners, surveying, preparing documents, and purchasing the property and easements. Each of these activities 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, an ROW agent or other persons engaged by the utility would complete a public records search of all land involved, to determine the legal description of the property and the owner(s) of record, and to gather information regarding easements, liens, restrictions, encumbrances, and other conditions.

After all private and public owners are identified, an ROW representative would contact each property owner or the property owner's representative. The ROW agent would explain the need for the transmission facilities and how the proposed Project may affect their land. The ROW agent would also ask the landowner if they have any specific construction concerns. The Applicant has indicated that construction activities would be limited to the ROW, and permanent and temporary access roads, unless access permission is obtained from landowners. Fences, gates, and similar improvements that are removed or damaged would be repaired or replaced.

The next step in the acquisition process is to evaluate the specific parcel. For this work, the ROW agent would request permission from the owner for survey crews to enter the property to conduct preliminary survey work. The ROW agent may also ask to take soil borings to assess the soil conditions and determine appropriate foundation design. The soil is analyzed by an experienced geotechnical testing laboratory. Design surveys are conducted to locate the ROW as well as natural features, man-made

features, and associated elevations for use during the detailed engineering process.

During the evaluation process, the location of the proposed transmission line may be staked with permission of the property owner. This means that the survey crew would locate each structure on the ground and place a surveyor's stake to mark the structures' anticipated locations. The ROW agent can then show the landowner where the structure(s) would be located on the property. The ROW agent may also delineate the boundaries of the easement area required for operating the transmission line safely.

Prior to acquiring easements, the Applicant (and landowner potentially) would collect appraised land value data for similar properties in the area as described below. Based on how the easement or purchase will affect the market value of each parcel, a fair-market-value offer will be developed. The ROW agent would contact the property owner to present the offer and discuss the amount of just compensation for the rights to build, operate, and maintain the transmission facilities within the easement area. The offer would include an amount to cover reasonable access to the area. The agent would also provide maps of the transmission line easement or site, as well as maps showing the landowner's parcel.

The landowner would be allowed time to consider the offer and to present any material that the owner believes is relevant to determining the property's value and the value of the easement. In nearly all cases, utilities are able to work with landowners to address their concerns, and an agreement is reached for the utility's purchase of land rights in the form of an easement. When a negotiated settlement cannot be reached, the landowner may choose to have an independent third party determine the value of the rights taken. Such valuation is made through the utility's exercise of the right of eminent domain, pursuant to Minnesota Statutes, chapter 117. The process of exercising the right of eminent domain is called condemnation. State and federal land is not, however, subject to eminent domain. The Applicant would have to obtain permits or licenses to cross these federal and state owned land as described in Section 1.2.3 (federal interest land) and Section 1.3.3 (state land).

Before commencing a condemnation proceeding, the ROW agent must obtain at least one appraisal for the property on which the proposed easement is to be acquired and a copy of that appraisal must be provided to the property owner in accordance with Minnesota Statutes, section 117.036, subdivision 2(a). The property owner may also obtain another

property appraisal and the company must reimburse the property owner for the cost of the appraisal according to the limits set forth in Minnesota Statutes, section 117.036, subdivision 2(b). The property owner may be reimbursed for reasonable appraisal costs up to \$1,500 for single-family and two-family residential properties, \$1,500 for property with a value of \$10,000 or less, and \$5,000 for other types of properties.

To start the formal condemnation process, a utility would file a petition in the district court where the property is located and would serve the petition on all owners of the property. If the court grants the petition, it would appoint a three-person condemnation commission that will determine the compensation for the easement. Once appointed, the commissioners would schedule a viewing of the property over and across which the transmission line easement is to be located.

Next, the condemnation commission would schedule a valuation hearing where the utility and landowners can testify as to the fair market value of the easement or fee. The condemnation commission would then make an award as to the value of the easement acquired and file it with the court. Each party has 40 days from the filing of the award to appeal to the district court for a jury trial. In the event of an appeal, the jury will hear land-value evidence and render a verdict. At any point in this process, the case can be dismissed if the parties reach a settlement.

As part of the ROW acquisition process, the ROW agent would discuss the construction schedule and construction requirements with the owner of each parcel. To ensure safe construction of the transmission line, fences, crops, or livestock may need special consideration. Fences, for instance, may need to be moved, temporary or permanent gates may need to be installed; crops may need to be harvested early; and livestock may need to be moved. In each case the ROW agent and construction personnel would coordinate these activities with the landowner.

2.9.2 Minnesota PPSA “Buy the Farm” Provision

The Minnesota Power Plant Siting Act provides land owners the option of requiring the utility to condemn a fee interest in land contiguous to the proposed HVTL easement. Known as the “Buy the Farm” provision, it reads in part as follows:

Minnesota Statutes section 216E.12, subdivision 4. **Contiguous land.** “(a) When private real property

that is an agricultural or nonagricultural homestead, nonhomestead agricultural land, rental residential property, and both commercial and noncommercial seasonal residential recreational property, as those terms are defined in section 273.13 is proposed to be acquired for the construction of a site or route for a high-voltage transmission line with a capacity of 200 kilovolts or more by eminent domain proceedings, the owner shall have the option to require the utility to condemn a fee interest in any amount of contiguous, commercially viable land which the owner wholly owns in undivided fee and elects in writing to transfer to the utility within 60 days after receipt of the notice of the objects of the petition filed pursuant to section 117.055. Commercial viability shall be determined without regard to the presence of the utility route or site. Within 60 days after receipt by the utility of an owner’s election to exercise this option, the utility shall provide written notice to the owner of any objection the utility has to the owner’s election, and if no objection is made within that time, any objection shall be deemed waived.”

2.9.3 Blackberry 500 kV Substation

Land for the proposed Blackberry 500 kV Substation has been secured adjacent to and east of the Applicant’s existing Blackberry 230/115 kV Substation. The Applicant has entered a purchase option agreement with the owner of the property. The purchase agreement would be executed upon receiving the necessary regulatory permits.

2.9.4 500 kV Series Compensation Station

Additional property would also be required for the proposed Project’s 500 kV series compensation station. Based on electrical design optimization studies and route selection, the Applicant has identified a candidate site for the compensation station that is located at the approximate midpoint of the Minnesota portion of the transmission line.

The Applicant may then seek to obtain purchase option agreements with the owners of the identified properties along the route selected by the MN PUC. Once the route has been determined, the Applicant would execute the appropriate purchase agreement.

2.9.5 Regeneration Site Locations

Additional property would also be required for the proposed Project’s regeneration sites. Based on electrical design optimization studies and route selection, the Applicant has identified seven candidate sites for the regeneration sites that are

located along both the Proposed Blue Route and Proposed Orange Route.

The Applicant may then seek to obtain purchase option agreements with the owners of the identified properties along the route selected by the MN PUC. Once the route has been determined, the Applicant will execute the appropriate purchase agreement.

2.9.6 Permanent Access Roads

The Applicant anticipates that a permanent, unimproved “2-track” access trail would be established on uplands within the ROW as a result of construction traffic. This “2-track” trail would be unimproved with no grading or filling.

2.9.7 Temporary Access Roads, Laydown Areas, Fly-in Sites, and Stringing Areas

Preliminary site selection is underway by the Applicant, however the Applicant would not determine locations for the temporary access roads, laydown areas, fly-in sites, or stringing areas until the route has been chosen and permitted by the MN PUC. The fly-in sites would accommodate the use of helicopters (sky cranes) for personnel transportation, structure and conductor installation, and transport of materials such as insulator assemblies, foundation materials, anchors, mats, or other equipment.

2.10 Preconstruction Activities

Preconstruction activities include preparation and approval of the certificate of need and the route permit applications, completing the required environmental review and surveys, coordinating and obtaining all other necessary permits and approvals, performing the studies, surveys, and engineering necessary for the design of all transmission line and substation facilities, and acquiring ROW easements.

2.11 Construction Procedures

The Applicant has indicated that they would retain an environmental inspector during project construction, responsible for understanding all of the conditions of the proposed Project’s environmental permits and ensuring that contractors abide by these conditions. These Applicant proposed measures are potential MN PUC Route Permit conditions.

The Applicant has indicated that construction crews would follow local, state, and federal regulations with regard to construction noise, dust, and timing. Construction crews would comply with local,

state, and NESC standards regarding installation of facilities and standard construction practices. Established Applicant and industry safety procedures would be followed during and after construction of the proposed Project, including clear signage during all construction activities.

2.11.1 Transmission Line ROW

2.11.1.1 Landowners

Once access to the land has been granted and all necessary approvals have been obtained, the Applicant would coordinate with landowners to prepare the ROW for construction.

2.11.1.2 Coordination with Local Utilities

The Applicant would also coordinate with local utilities to identify and locate underground utility lines to minimize conflicts. As construction progresses, information would be provided to local emergency services to inform personnel of upcoming activity and impacts of the work as well as to plan for emergency situations on the construction site, should they occur. The Applicant would coordinate and provide the necessary requirements for any short term road or lane closure with the appropriate authority, including emergency services. Prior to construction, the Gopher State One-Call utility locating service will be utilized to identify buried utilities that must be avoided during construction, including pipelines and any associated distribution lines.

The Applicant would also coordinate the appropriate construction measures to protect buried pipelines or electric lines where they must be crossed by heavy equipment. If any disruptions to the electrical system are required during construction, the Applicant or the contractor will contact the appropriate utility or electric cooperative to schedule planned disruptions.

2.11.1.3 Coordination with Transportation Authorities

Preparation for construction begins with developing access points from existing roads. The Applicant would work with state and local officials to coordinate and minimize any impacts during construction and operation of the proposed Project. The Route Permit will direct the Applicant to comply with Minnesota MnDOT and all applicable road authorities’ management standards and policies during construction. The Route Permit also will direct the Applicant to provide written notice of construction to MnDOT and applicable city, township, and county road authorities. Under the Route Permit, the Applicant would be required to

restore the ROW, temporary work space, access roads, abandoned ROW, and any other lands affected by construction. This could include the replacement of living snow fences affected by construction activities.

Installation of additional temporary access points would be subject to review and approval of highway officials. Construction staff will implement traffic control measures in accordance with the MnDOT Manual on Uniform Traffic Control Devices. Stringing of new overhead conductors over highways may require installation of temporary wooden pole guard structures or other measures to safeguard the public and construction forces during the stringing process.

The Applicant has indicated that construction activities and timing would be announced through their proposed Project website⁵⁵ in an effort to minimize conflicts with local recreational activities.

2.11.1.4 Vegetation Clearing

The Applicant would have to clear all woody vegetation and brush within the 200-foot-wide ROW requested for the transmission line to ensure that facilities can be safely and efficiently constructed, operated, and maintained. A reasonably level temporary access path is necessary so construction equipment can pass safely. At structure locations, a stable working surface free of tripping hazards is necessary for installing foundations and guy anchors and for assembling and erecting structures.

Vegetation would be cut at or slightly above the ground surface. Rootstock would be left in place to stabilize existing soils and to regenerate vegetation after construction. With the approval of the landowner or land manager, stumps of tall-growing species would be treated with an approved herbicide to discourage re-growth.

Surveys will be conducted prior to vegetation removal to avoid impacts on nesting birds and to avoid active nest sites of sensitive species. Detailed survey procedures and monitoring processes would be negotiated with the USFWS and MnDNR as appropriate to minimize and avoid impacts on resident and migratory wildlife. For example, the appropriate construction windows would be incorporated into the construction schedule to minimize impacts on species such as bald eagle and goshawk in areas where these species are found to be present.

The Applicant proposed the following mitigation measures regarding forest clearing to minimize impacts to birds and bats:

- Surveys would be conducted prior to vegetation removal to avoid impacts on nesting birds and to avoid active nest sites of sensitive species.
- Appropriate construction windows would be incorporated into the construction schedule to minimize impacts on species such as bald eagle and goshawk in areas where these species are found to be present.
- The Applicant would work with USFWS and MnDNR to identify potential locations for line marking, such as areas of high avian use, nest sites, feeding areas, and migratory corridors. The Applicant will incorporate industry best practices, which are consistent with the APLIC's 2012 guidelines.
- The Applicant would select a transmission line alignment during detailed design to avoid bird concentration sites, nesting areas, migratory pathways, and geographic features that act as a funnel, and avoiding habitats that act as breeding grounds or feeding areas to the extent practical.

With regard to rare and unique species, USFWS first preference is to only allow the ROW to be cleared or mowed in the fall or winter before the breeding season. If this is not possible, under limited circumstances the Applicant would have a qualified biologist conduct surveys for active nesting birds and bats prior to construction. If active nesting locations are identified during the surveys, the Applicant proposes to avoid nest sites during the breeding season and to identify construction restraints that would avoid disturbance to nesting birds.

The Applicant would conduct surveys for sensitive plants during appropriate periods of the growing season to properly identify their presence and/or absence along the selected ROW before clearing begins. If sensitive plants or communities are identified during surveys, individual avoidance and minimization measures would be evaluated and submitted to the appropriate regulatory agencies.

The Applicant would conduct surveys for native prairie areas and other sensitive plant communities such as calcareous fens along the selected ROW. These areas can be first refined through a desktop analysis. If sensitive resources are encountered, construction plans that minimize the impacts, such as shifting structure locations or implementing construction techniques that avoid or minimize

⁵⁵ Available at: <http://greatnortherntransmissionline.com/>

impacts on these resources, would be developed and submitted to the appropriate regulatory agencies.

To minimize the potential for tire and chassis damage to construction equipment, and to maintain a safe, level, temporary access path during construction, incidental stumps would be removed.

Merchantable timber would be cut to standard log lengths and stacked along the ROW. To the extent practical, the Applicant will work with the landowner to determine a mutually agreeable means of disposing of the cleared material, such as chipping, burning, or stacking for landowner use or sale. Vegetation clearing debris (that is, un-merchantable trees, brush, and slash) may be cut and scattered, placed in windrow piles, chipped, or burned, depending on location.

Finally, the Applicant proposes the following mitigation measures to reduce the spread of non-native plant species during construction:

- The Applicant would retain an environmental inspector during Project construction. Working on behalf of the Applicant, the environmental inspector would be responsible for understanding all of the conditions of the Project's environmental permits and to ensure that the contractors abide by these conditions.
- Regular, frequent cleaning of construction equipment and vehicles.
- Minimization of ground disturbance to the greatest degree practicable; and rapid revegetation of disturbed areas with native or appropriate non-native, seed mixes.
- The environmental inspector would conduct a field survey of the ROW prior to construction to identify areas that currently contain noxious weeds. Weed surveys during construction would identify infestations of the ROW and staging sites.
- New infestations within the ROW would be addressed and eradicated as soon as practicable in conjunction with property owners input.

Also, construction vehicles, including the undercarriage, would be inspected for weed seed and dirt prior to construction start particularly when traveling from an area identified as contaminated by noxious weeds to an uncontaminated area. The introduction and establishment of noxious weeds would be minimized by prompt revegetation of disturbed areas using regional genotype native

species where appropriate or by seed based on landowner agreements. No Minnesota Department of Agriculture (MDA) or MnDNR prohibited noxious weed seeds will be allowed in any revegetation seed mix. Seed mix composition will be coordinated with MnDNR on all state lands. Seed mixes used for the proposed Project will be certified as weed free. Only clean straw mulch will be used; meadow hay would not be allowed as mulch.

2.11.1.5 Soil Management

The Applicant has indicated that to the extent practical, soil disturbance and excavation activities in steep slope areas would be avoided. Where disturbance and excavation cannot be avoided entirely, the Applicant has indicated it will be minimized by using BMPs such as matting, ice roads, and low ground pressure equipment to the extent practical to minimize impacts during construction. Sediment and erosion control plans will be developed that specify the types of BMPs necessary. Depending on the site, BMPs may include installation of silt fence, straw bales, or ditch blocks, and/or covering bare soils with mulch, plastic sheeting, or fiber rolls to protect drainage ways and streams from sediment runoff. Erosion control practices will be inspected during construction, especially during significant precipitation events. Environmentally sensitive areas or areas susceptible to soil erosion would require special construction techniques. These techniques may include using low ground pressure equipment, matting, terracing, water bars, bale checks, rock checks, or temporary mulching and seeding of disturbed areas exposed during long pauses in construction activity.

The Applicant has indicated that construction of the proposed Project would occur in wetlands and wet soils during frozen conditions to the extent practical to minimize soil compaction. Construction mats would be used to help protect wet soils where encountered during construction. Regular, frequent cleaning of construction mats on the ROW would be performed as appropriate to avoid the introduction and minimize the spread of invasive species.

Permanent soil erosion control measures may include permanent seeding, mulching, erosion control mats, or other measures depending on site conditions. Temporary silt fences, sedimentation ponds, and other measures may be used to prevent sediment from running off into wetlands or other surface waters.

2.11.1.6 Spill Management

Construction equipment would be inspected frequently to ensure hydraulic systems and oil pans

are in good condition and free of leaks. Portable spill containment kits would be required for each piece of construction equipment with the potential to discharge a significant amount of oil into the environment. Operators would be present at the nozzle at all times when refueling is in progress.

To minimize the potential for contamination of groundwater, Spill Prevention Control and Countermeasure (SPCC) plans will be developed and maintained during the construction and operation of the proposed Project. Oil products and hazardous materials will be stored inside appropriate containment, and any spills of oil or hazardous materials will be mitigated immediately in accordance with the procedures in the SPCC plan. In the event of a spill, the source of the spill would be identified and contained as soon as it is discovered. The spill and contaminated soils would be collected, treated, and disposed of in accordance with all applicable federal, state, and local requirements.

If a significant spill were to occur to surface waters, methods for containing and recovering released material such as floating booms and skimmer pumps would be used. Noticeably contaminated soils would be excavated, placed on, and covered by plastic sheeting in bermed areas. An emergency response contractor would be secured, if necessary, to further contain and clean up a severe spill. Equipment would not be refueled in wetlands. In addition, no petroleum products, herbicides or pesticides or hazardous chemicals of any kind should be mixed or poured or otherwise handled in wetland areas.

2.11.1.7 Cultural Resource Management

In the event that protected species or archaeological and historic architectural sites are encountered during construction activities, project management personnel would consult with regulatory authorities regarding appropriate construction procedures and mitigation measures, which would be determined through applicable regulatory procedures. Any cultural resource issues that might arise, would be addressed by using agreed-upon methods as outlined in a Programmatic Agreement (PA). The National Historic Preservation Act (NHPA) Section 106 process, which is summarized in applicable sections of Chapter 5, will be undertaken to identify and avoid resources of potential concern. This effort includes identifying and avoiding eagle nesting areas, which can be considered important cultural resources to tribes.

2.11.1.8 Structure Construction

Construction materials would be hauled either directly to structure sites from the local highway or

railroad network, or brought first to material staging areas and then to the structure sites.

The transmission line components, including the structures, conductor, and hardware, are normally brought to the temporary staging areas on flatbed trucks. These materials are stored until needed and then loaded on flatbed trailers or special structure trailers for delivery to the structure site where they are unloaded for installation.

Where reinforced concrete foundations are required, large rubber-tired or track-mounted auger equipment is used to excavate a circular hole of the appropriate diameter and depth. In upland areas, excavated material would be spread evenly around the structure base to promote site drainage. Reinforcing steel and anchor bolts are set in position. Ready-mixed concrete is then placed in the excavation.

In wetland areas, a telescoping temporary steel caisson would be placed in the foundation hole to stabilize the soil walls. Water pumped from the excavation would be either 1) appropriately filtered prior to discharge at the site, 2) placed in tanker trucks or empty concrete trucks and hauled to a specially designated upland disposal area, or 3) brought back to the concrete batch plant for discharge. Concrete truck wash-water would be discharged only in specially designated upland disposal areas or at the concrete batch plant.

After the concrete is poured, the steel caisson is removed. In some situations, a permanent caisson may be required to stabilize the excavation. During drilling, a minimal amount of granular material (from an outside source) may be placed in the area between the caissons and the matting (if required at that location) to provide safe footing for construction personnel.

The Applicant and its contractors would remove construction waste and scrap on a regular schedule or at the end of each construction phase to minimize short-term visual impacts. Regular, frequent cleaning of construction equipment and vehicles on the ROW would occur. Restoration of cleared ROWs, storage areas, and access roads would minimize the extent of disturbed areas and limit the potential for dust generation.

When the site is later restored, the granular material would be leveled or removed to reinstate the original ground contours for re-vegetation of native species. Once the foundation concrete has been placed, excess excavated materials would be transported by truck to a suitable upland site for disposal.

After allowing adequate curing time, the baseplate structures are bolted to the concrete foundations.

In some cases driven-piling foundations may be required, as well as temporary and permanent guy anchors, large rubber-tired or track-mounted pile-driving equipment would be used to install the foundation. Additional fixtures or a concrete pile cap may also be attached to the piling foundation as necessary for structure setting. Piling foundations generally result in little or no generation of spoils or dewatering requirements.

Once the structures have been completed and appropriate stringing equipment has been installed, wires can be strung. The wire-stringing process would begin in a set-up area prepared to accommodate the stringing equipment and materials, normally located near mid-span on the centerline of the ROW.

Using stringing blocks, pulley ropes and other equipment, and with careful monitoring by the construction crew, the wires are finally strung and clipped into place. If set-up areas in wetlands have unstable surface conditions, timber matting may need to be used. The Presidential permit and Route Permit applications provide a more detailed description of the wire-stringing process (Minnesota Power 2014, reference (1)).

2.11.1.9 Management of Water Resource Impacts

The most effective means of minimizing impacts on water areas during construction is to span streams and rivers by placing structures above the normal high water level, restrict vehicular activity within riparian corridors, and minimize use of heavy equipment when clearing riparian corridors. The Applicant has indicated that structure spans would be adjusted such that structures, where practicable, would avoid open water and stockpiled material would be contained away from stream banks and lake shorelines. Where construction equipment must cross waterways, the Applicant would seek the appropriate permits and use temporary clear span bridges to minimize adverse effects. Turbidity control methods would be implemented prior to discharging wastewater from concrete batching or other construction operations to streams or other surface waters.

For those waterways that construction equipment cannot cross, workers might walk across or use boats during wire stringing operations, or in the winter drive equipment across the ice. In areas where construction occurs close to waterways, appropriate

measures would be employed to minimize soil erosion and prevent sedimentation of the waterways. The Applicant would ensure that equipment is only fueled and lubricated at a reasonable distance from waterways, depending on terrain.

Structures would be located outside of floodplains to the extent practicable. The Applicant would work with the jurisdictional agencies to determine the best ways to minimize impacts and create appropriate mitigation measures (Section 1.3.1).

Temporary impacts during construction may occur if dewatering is necessary to install the transmission structures or if pumping wells are installed to supply water for concrete batch plant operations. If dewatering or pumping is necessary, water appropriations permits would be obtained from MnDNR. If the dewatered groundwater contains substantial quantities of suspended sediments, then the water would be filtered through silt fence or bio-rolls prior to discharge.

The Applicant expects to avoid constructing the transmission line over existing wells. If crossing over wells cannot be avoided, the Applicant would work with existing landowners to develop appropriate mitigation measures.

2.11.1.10 Restoration/Re-vegetation

When the site is later restored, the granular material would be leveled or removed to reinstate the original ground contours for re-vegetation. Where rutting occurs, the Applicant would repair the surface before restoring ground vegetation. Soil compaction in cultivated areas would be treated and restored through tillage operations, for example using a subsoiler.⁵⁶

All areas of ground disturbance not permanently altered would be prepared for restoration and reseeded with an appropriate seed mix recommended by the appropriate agency's management or according to landowner requirements. The Applicant has indicated that they would continue to coordinate with MnDNR to minimize and avoid impacts on plant communities on state lands through adjustments to the anticipated ROW, permit conditions, and mitigation. Where forested areas are cleared, appropriate herbaceous native seed mixes from sources as close as possible to the impacted area would be used to re-vegetate, as rapidly as possible, to prevent encroachment by non-native and noxious weed species. Where possible, reliance on natural re-

⁵⁶ A subsoiler is a tillage tool that would loosen and break up soil at depths about twice that of a common farming tiller or rototiller.

vegetation would be encouraged (particularly in wetland areas).

As described above regarding vegetation clearing procedures, regular, frequent cleaning of construction equipment and vehicles on the ROW would be performed as appropriate to minimize spread of invasive species. In addition, spread of invasive species would be limited through the minimization of ground disturbance to the greatest degree practicable and rapid re-vegetation of disturbed areas with native or appropriate non-native, seed mixes. The environmental inspector would conduct a field survey of the ROW prior to construction to identify areas that currently contain noxious weeds. Weed surveys during construction would identify infestations of the ROW and staging sites. New infestations within the ROW would be addressed and eradicated as soon as practicable in conjunction with property owners input. Construction vehicles, including the under carriage, would be inspected for weed seed and dirt prior to construction start particularly when traveling from an area identified as contaminated by noxious weeds to an uncontaminated area. Only clean straw mulch would be used; meadow hay would not be allowed as a mulch material because of its potential to contain seeds of invasive species.

2.11.2 500 kV Substation

The site of the proposed 500 kV substation is located to the east of the existing Blackberry 230/115 kV Substation near Grand Rapids. The new substation facilities would be constructed in compliance with the applicable requirements of NESC, Occupational Safety and Health Administration (OSHA), and state and local regulations. Designs would be completed by professional engineers who are licensed in Minnesota and have relevant experience. Contractors would be committed to safe working practices.

The final designs would consider local conditions and access considerations, and where warranted, would include safety provisions beyond the minimum requirements established in the various applicable safety codes. The designs would also strive to facilitate future maintenance.

Standard construction and mitigation practices developed from experience with past projects as well as industry-specific BMPs would be employed. They would be based on the specific construction design, prohibitions, maintenance guidelines, inspection procedures, and other activities involved in constructing the substation facilities, and they would take into account environmentally sensitive areas.

Once construction has been completed, the Applicant would restore the remainder of the site by removing and disposing of debris, removing all temporary structures (including staging areas), and employing appropriate erosion control measures.

If areas outside the substation site are disturbed by construction activities, they would be reseeded with vegetation similar to that which was removed, within certain height restrictions so they won't interfere with the substation or the transmission lines entering the substation.

2.11.3 500 kV Series Compensation Station

The proposed 500 kV series compensation station would be constructed in compliance with the applicable requirements of NESC, OSHA, and state and local regulations. Designs would be completed by professional engineers who are licensed in Minnesota and have relevant experience. Contractors would be committed to safe working practices.

The final designs would consider local conditions and access considerations, and where warranted, would include safety provisions beyond the minimum requirements established in the various applicable safety codes. The designs would also strive to facilitate future maintenance.

Standard construction and mitigation practices developed from experience with past projects as well as industry-specific BMPs would be employed. They would be based on the specific construction design, prohibitions, maintenance guidelines, inspection procedures, and other activities involved in constructing the proposed 500 kV series compensation station, and they would take into account environmentally sensitive areas.

Once construction has been completed, the Applicant would restore the remainder of the site by removing and disposing of debris, removing all temporary structures (including staging areas), and employing appropriate erosion control measures.

If areas outside the proposed 500 kV series compensation station site is disturbed by construction activities, they would be reseeded with vegetation similar to that which was removed, within certain height restrictions so they won't interfere with the proposed 500 kV series compensation station.

2.11.4 Regeneration Site Locations

The proposed regeneration sites would be constructed in compliance with the applicable

requirements of NESC, OSHA, and state and local regulations. Designs would be completed by professional engineers who are licensed in Minnesota and have relevant experience. Contractors would be committed to safe working practices.

The final designs would consider local conditions and access considerations, and where warranted, would include safety provisions beyond the minimum requirements established in the various applicable safety codes. The designs would also strive to facilitate future maintenance.

Standard construction and mitigation practices developed from experience with past projects as well as industry-specific BMPs would be employed. They would be based on the specific construction design, prohibitions, maintenance guidelines, inspection procedures, and other activities involved in constructing the proposed regeneration sites, and they would take into account environmentally sensitive areas.

Once construction has been completed, the Applicant would restore the remainder of the sites by removing and disposing of debris, removing all temporary structures (including staging areas), and employing appropriate erosion control measures.

If areas outside the proposed regeneration sites are disturbed by construction activities, they would be reseeded with vegetation similar to that which was removed, within certain height restrictions so they won't interfere with the proposed regeneration sites.

2.11.5 Permanent Access Roads

The Applicant anticipates that a permanent, unimproved "2-track" trail would be established on uplands within the ROW as a result of construction traffic. This "2-track" trail would be unimproved with no grading or filling.

2.11.6 Temporary Access Roads, Laydown Areas, Fly-in Sites, and Stringing Areas

To the extent practicable, laydown areas, fly-in sites, and stringing areas would be located and arranged in a manner to preserve trees and vegetation and restored to preconstruction conditions.

Temporary access roads outside of the ROW would be required. The Applicant would work with local property owners to identify suitable access locations. Temporary roads and other temporarily impacted areas would be restored as appropriate once construction is completed.

2.12 Maintenance and Operation

2.12.1 Transmission Line

A transmission line must be inspected, maintained, and repaired over the entire life of the facility. The 500 kV transmission lines are generally inspected annually by foot, all-terrain vehicle, truck, or snowmobile, or by air. Inspections are limited to the ROW and to those areas where obstruction or terrain may require off-ROW access. The proposed transmission line would be expected to be in operation in perpetuity,

If inspectors find any problems, the Applicant would make an effort to notify the landowner before making the repairs. If damages are incurred during maintenance or repairs, the landowner would be compensated appropriately. The structures for the proposed Project would be new, so very little maintenance would be expected for many years.

Vegetation in the ROW that could interfere with operations must be removed. In most cases, the ROW would need to remain free of trees throughout construction and operation of the proposed Project; however, the Applicant has indicated that bushy shrubs and low-growing vegetation could be allowed to regenerate in portions of the ROW to reduce, though not eliminate, the visual impacts. Planting of visual screening would be considered on a case-by-case basis.

Vegetation maintenance for 500 kV transmission lines is typically on a 2- to 5-year cycle. Vegetation may be cleared using a combination of mechanical and hand clearing, and herbicides may be applied where allowed and approved by the landowner. Prior to maintaining vegetation in a particular area, the Applicant would make an effort to notify affected landowners. Vegetation clearing could be scheduled to avoid bird nesting periods, with the ongoing vegetation clearing schedule included as part of state or federal permits.

In addition, the Applicant would work with the USFWS and MnDNR to identify potential locations for line marking, such as areas of high avian use, nest sites, feeding areas, and migratory corridors. The Applicant would incorporate industry best practices, which are consistent with Avian Powerline Interaction Committee's (APLIC's) 2012 guidelines.

2.12.2 500 kV Substation

Substation facilities must be regularly inspected, maintained, and repaired over the life of the facilities,

Table 2-2 Applicant Proposed Measures to Minimize Environmental Impacts

Proposed Project Phase		Applicant-Proposed Measure	Resource Impacts Addressed
Routing / Design	General Design	Incorporation of safety measures into design: Design in accordance with local, state and NESC safety standards (clearances, material strengths, ROW widths, minimization of transportation impacts) Protective devices including circuit breakers and relays located where the transmission line connects to the substation Signage, fencing and limited access at substation	Human Settlement
		Design considerations to address simultaneous outages of the proposed Project and the existing 500 kV line	Public Services & Utility Systems
		Design to minimize impact area: Minimization of area and coordination of location with landowners for access road Siting Blackberry 500 kV Substation facilities	Land Use, forestry
		Design to minimize visible impacts at specific sites (e.g., travel ways, recreation sites, Big Bog State Recreation Area, and bodies of water with access and residences)	Aesthetics
		Coordination with the USFWS and MnDNR to minimize avian impacts: Identification of potential locations for line marking, such as areas of high avian use, nest sites, feeding areas, and migratory corridors Incorporation of industry best practices, consistent with APLIC's 2012 guidelines.	Wildlife
		Coordination with owners of private airstrips and with aerial applicators to determine methods to improve visibility, such as installing markers on the transmission line.	Transportation
	Applicant Routing	Paralleling existing ROWs to the extent practical	Aesthetics, recreation and tourism, wildlife
		Avoidance of/maximizing distance from residences in routing to the extent practical	Aesthetics
		Perpendicular crossing of Water of the Dancing Sky Scenic Highway (Minnesota Highway 11) parallel to existing 500 kV line	Aesthetics
	Final Alignment	Shifts in alignment to avoid construction over existing wells, aesthetic impacts, floodplains, wetlands and bird concentration sites to the extent practical and avoidance of cultural resources in accordance with the Programmatic Agreement	Water Resources, Aesthetics, Wetlands, Wildlife, Rare and Unique Species and Communities, Archaeological and Historic Resources
		Coordination with regulatory agencies to avoid and minimize effects on forest resources (including sensitive forested areas and HCVPs) on federal, state, and county-owned properties, plant communities on state lands	Forestry, Rare and Unique Species and Communities, Land Use
		Placement near MnDOT ROW in accordance with MnDOT's Accommodation Policy	Transportation
		Coordination with owners of private airstrips and with aerial applicators	Transportation
		Coordination with existing mining operators and mineral lessees to identify the extent of current and planned mining operations	Mining
	Final Structure Placement	Adjustment of span and pole placement to avoid waterways (perpendicularly), wetlands, sensitive resources, and transportation corridors to the extent practical and to avoid of cultural resources in accordance with the Programmatic Agreement	Aesthetics, Water Resources, wildlife, recreation, Rare and Unique Species and Communities, Transportation, Archaeological and Historic Resources
			Human settlement, Land Use
	ROW Acquisition		Property or easement acquisition will be conducted in accordance with applicable state and federal regulations.
Coordination with landowners through the ROW acquisition process to address unauthorized access concerns.			Recreation and Tourism
Permitting		Agency Coordination: Development of PA with DOE and consulting parties Development of AIMP with MDA Coordination with railroad authorities Coordination with MnDOT, FAA, and MnDOT Office of Aeronautics	Archaeological and Historic Resources, Agricultural Production, Transportation

Proposed Project Phase	Applicant Proposed Measure	Resource Impacts Addressed
Construction	Construction in accordance with local, state and NESC safety standards (clearances, material strengths, ROW widths, construction practices including signage)	Human Settlement (Public Health and Safety)
	Coordination with local public service, utility and transportation authorities: Lane closure coordination with local emergency services Identification/protection of buried utilities Scheduling planned disruptions Installation of temporary access points Safeguards during stringing process Construction near railways	
	Preconstruction surveys for rare and unique natural resources: Identification and avoidance of nest sites during breeding season and implementation of restraints to avoid disturbance to nesting birds Identification of sensitive plants and coordination with regulatory agencies to develop individual avoidance and minimization measures Identification of native prairie and other sensitive communities such as calcareous fens along the selected ROW and coordination with regulatory agencies to develop individual avoidance and minimization measures	Rare and Unique Species and Communities
	Minimization of construction disturbance to the extent practical: Avoidance or soil disturbance and excavation in steep slope areas Coordination with MnDNR to minimize impacts on sensitive forested areas Limiting construction activities to ROW unless landowner permission is granted Minimization of ground disturbance Spanning wetlands and drainage systems where practical Accessing wetland via shortest practical route	Soils, Water Resources, Vegetation, Land Use, Wetlands
	Development/implementation of construction BMPs: Agricultural impact mitigation plans (in consultation with MDA) Development of SWPPP required by the NPDES permitting process specifying BMPs (e.g., silt fence, straw bales, or ditch blocks, and/or covering bare soils with mulch, plastic sheeting, or fiber rolls, containment of stockpiled material away from stream banks and lake shorelines, use of turbidity control methods, silt fence or bio-roll filter prior to wastewater discharge to surface waters, spreading of topsoil and seeding in a timely manner, restriction of vehicular activity within riparian corridors) Regular inspections of soil and erosion control BMPs particularly during significant precipitation events BMPs to minimize soil disturbance and compaction (matting, ice roads, low ground pressure equipment, construction during frozen conditions on wet soils) BPMs to minimize impacts to wild rice	Soils, Agricultural Production, Water Resources, Wetlands, Cultural Values (wild rice related)
	Development/implementation of SPCC and related BMPs Refueling at sites away from wetlands and waters Storage of oil products and hazardous materials inside appropriate containment Immediate mitigation of spill in accordance with the procedures in the SPCC plan	Water Resources, Wetlands
	Minimization of opportunity for noxious weed infestation/establishment Weed surveys Prompt eradication of infestations Inspection of construction vehicles	Noxious Weeds and Exotic Organisms
	Adherence to PA for cultural resource management	Archaeological and Historic Resources, Cultural Values
	Announcement of construction activities and timing via the Applicant's project website to minimize conflicts with local recreational activities.	Cultural Values, Recreation and Tourism
	Regular, frequent cleaning of construction equipment and vehicles on the ROW	Air quality, Noxious Weeds
Removal of construction waste and scrap on a regular schedule or at the end of each construction phase	Aesthetics	
Restoration	Restoration of rutted or compacted soil	Soils
	Prompt revegetation of all areas of ground disturbance not permanently altered (including temporary roads and staging areas: Soil preparation including repairing ruts and restoration of compacted soil Reseeding with an appropriate seed mix recommended by the appropriate agency's management or according to landowner requirements Restoration of temporarily impacted wetlands to pre-construction conditions to the extent practical Restoration of MnDNR PWI wetlands according to provisions in Land and Water Crossing permits Use of clean straw mulch	Soils, Agricultural Production, Vegetation, Cultural Values, Noxious Weeds and Exotic Organisms, Water Resources, Wetlands
	Repair of Fences, gates, and similar improvements that are removed or damaged	Land Use
	Regeneration of bushy shrubs and low-growing vegetation could be allowed to regenerate in portions of the ROW to reduce, though not eliminate, the visual impacts. Planting of visual screening will be considered on a case-by-case basis	Aesthetics
	Coordination with landowner on disposal method for cleared material (chipping, burning, or stacking)	Forestry
Operation and maintenance	Restoration of television or radio reception to pre-project conditions	Radio, Television, and Cellular Telephone

(1) The Applicant proposed measures, along with industry BMPs, are potential MN PUC Route Permit conditions.

and vegetation that might interfere with the safe and reliable operation of the facilities must be removed.

In order to minimize potential safety impacts, the substation facilities would have appropriate signage, would be fenced, and access would be limited to authorized personnel.

2.12.3 500 kV Series Compensation Station

The 500 kV series compensation station site must be regularly inspected, maintained, and repaired over the life of the facility, and vegetation that might interfere with the safe and reliable operation of the facility must be removed.

In order to minimize potential safety impacts, the 500 kV series compensation station would have appropriate signage, would be fenced, and access would be limited to authorized personnel.

2.12.4 Regeneration Sites

Regeneration sites must be regularly inspected, maintained, and repaired over the life of the facilities, and vegetation that might interfere with the safe and reliable operation of the facilities must be removed.

In order to minimize potential safety impacts, the Regeneration sites would have appropriate signage, would be fenced, and access would be limited to authorized personnel.

2.12.5 Permanent Access Roads

The Applicant has committed to using the minimum area required for permanent access roads. Permit conditions and procedures for maintenance along permanent access roads to minimize impacts would be similar to those required for the transmission line ROW.

2.13 Summary of Applicant Proposed Measures to Minimize Environmental Impacts

Table 2-2 provides a summary of the Applicant proposed measures intended to minimize potential environmental impacts.

2.14 Estimated Costs

The Applicant has continued to refine its cost estimates since they filed their original certificate of need application in October 2013. Based on preliminary engineering considerations, the Applicant currently estimates that the construction of the proposed Project on the route alternatives or any combination of proposed segment options, including substation facilities, would cost between \$495.5 million and \$647.7 million (2013 dollars).

If the MN PUC selects other routes, these cost estimates may change. The major components of these preliminary estimates are shown in Table 2-3.

2.15 Project Schedule

The Applicant requires an in-service date of June 1, 2020, as agreed upon in the contract between the Applicant and Manitoba Hydro. Currently, the Presidential permit and Route Permit approval process (including federal and state environmental review) would be completed by early 2016. Depending on the timing of other permits, construction is estimated to begin in fall 2016, as shown in Table 2-4.

Table 2-3 Proposed Project Cost Estimates

Proposed Project Components	Low End (in millions)	High End (in millions)
500 kV Transmission Line	\$425.6	\$570.8
Blackberry 500 kV Substation	\$41.0	\$45.1
500 kV Series Compensation Station	\$24.7	\$27.2
Existing 230 kV Transmission System Modifications	\$4.2	\$4.6
Proposed Project Total	\$495.5	\$647.7

Source: Minnesota Power 2015, reference (3)

Table 2-4 Proposed Project Schedule

Year	Month	Activity
2013	December	Certificate of Need Completeness Hearing
2015	February	Certificate of Need Environmental Report Scoping Meetings
	April	File Route Permit Application
	April	File Presidential Permit Application
	June	Route Permit/Presidential Permit Scoping Meetings
	June	Certificate of Need Environmental Report Released
	October	Certificate of Need Public Hearings
2015	April	Certificate of Need Decision
	June	Draft EIS Published
	June	Draft EIS Comment Meetings
	October	Final EIS Published
	November	State Final EIS Hearing
2016	January	Presidential Permit Issued
	February	Route Permit Issued
	March	Construction Permitting Starts
	October	Construction Begins
2020	June	Project In Service

3.0 No Action Alternative

Federal National Environmental Policy Act (NEPA) implementing regulations require an analysis of the No Action alternative as baseline for analyzing and comparing potential environmental impacts from U.S. Department of Energy's (DOE) proposed Federal action.⁵⁷

In general, if the proposed Project was not permitted, the environmental impacts associated with the proposed Project would not occur. According to the Applicant, however, denial of the federal Presidential Permit or the state Route Permit for the proposed Project would result in a number of negative consequences.

First, not constructing the proposed Project would inhibit the Applicant's ability to connect Manitoba Hydro energy to Minnesota Power consumers and force the Applicant to obtain other energy and capacity purchases to meet the region's long term energy needs. Manitoba Hydro's approved development plan includes construction of the 695 megawatt (MW) Keeyask Generating Station – construction of which began in July 2014. If the proposed Project did not receive a Presidential Permit, the Applicant would not be able to take delivery under the Minnesota Public Utilities Commission (MN PUC) approved 250 MW power purchase agreement (PPA) and the pending 133 MW Renewable Optimization Agreement. This in turn could prevent the Applicant from filling its customers' future energy needs.

Second, even if the Applicant could obtain energy through alternative means, not constructing the proposed Project would leave the existing 500 kV transmission tie line from Manitoba to Forbes as the second largest contingency in the entire Midcontinent Independent System Operator (MISO) footprint (Section 2.2.2). Development of a second 500 kV transmission tie line would reduce loading on the existing transmission line and improve the performance of the transmission system during this contingency. Therefore, not building the proposed Project would result in less-than-optimal transmission reliability.

Finally, taking no action on the proposed Project would negatively affect future North Dakota wind generation options because there would not be enough transmission capacity, and wind farms would continue to be required to shut down their turbines when the wind energy produced exceeds the transmission capacity. According to the MISO Manitoba Hydro Wind Synergy Study, a new 500 kV interconnection with Manitoba would provide "significant benefits" to the entire MISO

footprint, including substantial reductions in wind curtailments and better utilization of both wind and hydro resources, meaning increased efficiency of the energy supply system as a whole. Over a 20-year timeframe, these benefits were valued at approximately \$1.6 billion in 2012 dollars for the northern MISO region.⁵⁸

Under the Minnesota Power Plant Siting Act (PPSA), the determination of need, including size, type, timing, and other considerations are statutorily prohibited⁵⁹ and "need" is not to be evaluated in the Environmental Impact Statement (EIS).⁶⁰ Instead, the result of not meeting the underlying need is assessed as part of the state certificate of need process, which is summarized in Section 1.3.2.

⁵⁷ 40 Code of Federal Regulations (CFR) 1502.14(d)

⁵⁸ Ex. 19 in CN docket, Hoberg Direct, (Midcontinent Independent System Operator (MISO) Hydro Wind Synergy Study)

⁵⁹ Minnesota Statutes, section 216E.02, subdivision 2

⁶⁰ Minnesota Statutes, section 216E.03, subdivision 5

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4.0 Route and Alignment Alternatives Proposed during Scoping

4.1 Federal and State Alternative Review

U.S. Department of Energy (DOE) and Minnesota Department of Commerce – Energy Environmental Review and Analysis (DOC-EERA) conducted the joint scoping process as described in Section 1.4. This chapter describes the alternatives—which include the proposed Project routes and variations—proposed during the public scoping process selected for detailed study in this Environmental Impact Statement (EIS). A discussion of all the alternatives suggested and/or developed through the public scoping process and considered by DOE and DOC-EERA for purposes of environmental review is provided in Appendix C.⁶¹

4.1.1 Federal Action Alternatives Reviewed Under this EIS

As described in its Notice of Intent (NOI), DOE uses the scoping process “both to help define the environmental issues to be analyzed and to identify the range of reasonable alternatives” (79 Federal Register 36497; see also 40 Code of Federal Regulations (CFR) 1501). The scope of this EIS includes the range of alternatives, including no action (Chapter 3), reasonable alternatives, including DOE’s preferred alternative, and impacts to be considered by DOE and cooperating agencies in the federal environmental review of the proposed Project.

DOE’s proposed federal action is the granting of the Presidential permit for the international border crossing. DOE’s Presidential permit decision is solely for the international border crossing, while the proposed construction, operation, maintenance, and connection of the portion of the transmission line within the United States is a “connected action” to DOE’s proposed action.

DOE’s preferred alternative is to grant a Presidential permit to Minnesota Power’s proposed international border crossing at latitude 49 00 00.00 N and longitude 95 54 50.49 W, roughly 2.9 miles east of Highway 89 in Roseau County, Minnesota.

During the scoping process, commenters proposed five alternative international border crossings. DOE

evaluated the five alternative international border crossings and determined that four of them, should be considered for detailed analysis in this EIS. These alternatives include the Border Crossing Pine Creek Variation, Border Crossing Hwy 310 Variation, Border Crossing 230kV Variation, and the Border Crossing 500kV Variation.

The fifth international border crossing alternative commenters proposed during scoping was the International Boundary Alternative Route Segment. DOE evaluated this international border crossing alternative and determined that it would not be carried forward for more detailed analysis in the EIS. DOE eliminated this alternative because it requires the proposed transmission line to cross the Pine Creek Peatland, which is a Minnesota Department of Natural Resources (MnDNR) Scientific and Natural Area (SNA) protected under state regulation with regard to transmission line crossings.⁶²

In addition to the proposed federal action and border crossing alternatives, the proposed construction, operation, maintenance, and connection of the portion of the transmission line within the United States is analyzed in the EIS because it is a “connected action”; an action closely related to the DOE’s international border crossing decision. See 40 CFR 1508.25(a)(1). The Applicant’s proposed route, the Applicant’s alternative routes, the 22 alternative route segments, and nine alignment modifications that were proposed by agencies and the public during scoping were analyzed by DOE in coordination with the DOC-EERA, and were jointly determined to be within the scope of this EIS, and will therefore be studied in detail as described below. More importantly, the analysis of these alternatives related to the construction, operation, maintenance, and connection of the proposed transmission line in this joint federal-state EIS is necessary because the EIS also supports the proposed actions of DOE’s federal cooperating agencies (Section 1.4.2) and the

61 The full text of the Scoping Summary Report is available at: <http://www.greatnortherneis.org> (<http://www.greatnortherneis.org/Files/Scoping%20Summary%20Report%20NOV2014%20v2.pdf>) and on e-Dockets (eDockets Numbers: 201411-104621-01 to 10, 104622-01 to 09, 104623-01 to 10, 104624-01 to 08, 104625-01 to 07, and 104626-01 to 03) at: <http://mn.gov/commerce/energyfacilities/Docket.html?id=33847#edocketFiles>

62 State regulations prohibit crossing the Pine Creek Peatland Scientific and Natural Area (SNA) unless no feasible and prudent alternative exists. Minnesota Rules, part 7850.4300, subpart 2. There are existing potential feasible and prudent alternatives for this crossing; therefore, DOE rejected this alternative.

Minnesota Public Utility Commission's (MN PUC) Route Permit decision.⁶³

The DOE's Scoping Summary Report (Appendix C) provides details on the alternative route segments and alignment modifications proposed during scoping.⁶⁴ Only one of the five alternative border crossing alternatives suggested during scoping, the International Boundary Alternative Route Segment, was determined by DOE to not be a reasonable alternative for purposes of this EIS. This border crossing alternative was eliminated because it would have crossed a State of Minnesota SNA – an area through which transmission infrastructure is prohibited by Minnesota Rules, part 7850.4300. During the scoping process, 11 additional alternative route segments were proposed in addition to the 22 alternative route segments previously discussed. But DOE, in cooperation with the DOC-EERA and the federal cooperating agencies, eliminated them from further consideration based on the rationale provided in the DOC-EERA comments to the MN PUC (including, but not limited to, considerations related to technical, legal, and economic feasibility of an alternative route segment or whether an alternative route would mitigate a potential impact from the proposed Project).⁶⁵

4.1.2 State Alternatives Reviewed Under this EIS

The MN PUC route permit regulations allow anyone to suggest alternative routes during the scoping process for evaluation in the EIS. The DOC-EERA then recommends which of the alternative routes, if any, to study in detail in the EIS. The alternatives selected for detailed study and the routes proposed by the Applicant must be evaluated in the EIS. There were 33 alternative route segments proposed by the public during scoping (including five new

border crossings) and nine alignment modifications. Following DOC-EERA evaluation⁶⁶ and MN PUC's consideration, the DOC issued its Scoping Decision on January 8, 2015.⁶⁷ The Scoping Decision specifies that the EIS will evaluate the Applicant's proposed border crossing, route(s) and associated facilities, four new border crossings, 22 new alternative route segments, and nine new alignment modifications (defined below).

4.2 Definitions of Key Terms

The key terms used in this section as well as in the following chapters of the EIS are defined below.

Sections – The proposed Project is divided into three geographic sections: West Section, Central Section, and East Section. Within each section, multiple variation areas were developed to address local issues (Table 4-1). The EIS evaluates the issues within each section, progressing from west to east across the project area.

Variation Areas – The variation areas are smaller geographic areas that allow evaluation and comparison of local issues, such as wildlife management areas or colocation of transmission lines, across alternatives. Each variation area includes the Applicant's proposed routes and local route alternatives or "variations." The EIS evaluates the local issues within each variation area, progressing from west to east across each section.

Variations – The variations are specific combinations of segments within a variation area designed to avoid specific local issues. These variations were developed from alternative route segments identified during the scoping process, as described in Chapter 1. The EIS evaluates the potential environmental impacts and presents the results for the variation(s) and the proposed route(s) within each variation area.

Hops – The connector segments, or hops, connect the end of one variation to the beginning of another variation. These hops generally connect variations from west to east from one variation area to a different variation area. The exception is one hop that connects the end of a variation from east to west in order to allow additional flexibility for a complete route alternative. The EIS uses the hops to develop complete route alternatives.

⁶³ Section 1506.2 of National Environmental Policy Act (NEPA) strongly encourages relevant federal, state, and local agencies to cooperate fully with each other. In such cases the Council on Environmental Quality's (CEQ's) Memorandum to Agencies, Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations (46 FR 18026; March 23, 1991), Question 23A states: "The EIS must contain a complete discussion of scope and purpose of the proposal, alternatives and impacts so that they [EIS] discussion is adequate to meet the needs of local, state, and federal decision makers." DOE's NEPA implementing regulations at 10 CFR part 1021.341(b) also direct DOE programs to, in consultation with other agencies, incorporate any relevant information and requirements in coordinated environmental reviews to the extent possible.

⁶⁴ Available in electronic format at: <http://www.greatnortherneis.org/Files/Scoping%20Summary%20Report%20NOV2014%20v2.pdf>

⁶⁵ Available at: [http://mn.gov/commerce/energyfacilities/documents/33847/EERA%20Packet%20-%20cltr-C-R-Route%20Alternatives%20\(12-5-14\).pdf](http://mn.gov/commerce/energyfacilities/documents/33847/EERA%20Packet%20-%20cltr-C-R-Route%20Alternatives%20(12-5-14).pdf)

⁶⁶ Available at [http://mn.gov/commerce/energyfacilities/documents/33847/EERA%20Packet%20-%20cltr-C-R-Route%20Alternatives%20\(12-5-14\).pdf](http://mn.gov/commerce/energyfacilities/documents/33847/EERA%20Packet%20-%20cltr-C-R-Route%20Alternatives%20(12-5-14).pdf)

⁶⁷ Available at [http://mn.gov/commerce/energyfacilities/documents/33847/Scoping%20Decision-SIGNED%20\(1-8-15\).pdf](http://mn.gov/commerce/energyfacilities/documents/33847/Scoping%20Decision-SIGNED%20(1-8-15).pdf)

Table 4-1 Sections and Corresponding Variation Areas

Sections	Variation Areas
West Section	Border Crossing Variation Area
	Roseau Lake WMA Variation Area
	Cedar Bend WMA Variation Area
	Beltrami North Variation Area
	Beltrami North Central Variation Area
Central Section	Pine Island Variation Area
	Beltrami South Central Variation Area
	Beltrami South Variation Area
	North Black River Variation Area
	C2 Segment Option Variation Area
	J2 Segment Option Variation Area
	Northome Variation Area
	Cutfoot Variation Area
East Section	Effie Variation Area
	East Bear Lake Variation Area
	Balsam Variation Area
	Dead Man's Pond Variation Area
	Blackberry Variation Area

Alignment Modifications – Alignment modifications are minor adjustments of the transmission line alignment (centerline and associated right-of-way (ROW)) within the proposed routes. During the scoping process, commenters developed and proposed these alignment modifications. The purpose for each alignment modification is to provide a potential alternative for analysis that avoids a specific issue raised by commenters (e.g., sensitive lands, residences, airstrips, etc.). The EIS evaluates issues identified during the scoping process and presents the results for the alignment modification and the comparable segment of the Applicant's proposed route alternative.

4.3 Presentation of Alternatives in the EIS

The West Section, Central Section, and East Section route variations and alignment modifications are discussed in Sections 4.3, 4.4, and 4.5, respectively (Map 4-1). These sections provide tables that include the naming convention used in this EIS as well as the corresponding name used in the DOE Scoping Summary Report and DOC Scoping Decision. Chapter 5 and Chapter 6 provide detailed results of the potential environmental impacts analysis.

4.3.1 West Section

There are five variation areas within the West Section: Border Crossing, Roseau Lake WMA, Cedar Bend

WMA, Beltrami North, and Beltrami North Central (Table 4-2, Map 4-2). In addition, there are five connector segments, or hops, that connect variations between the Cedar Bend WMA, Beltrami North, and Beltrami North Central variation areas. The variation areas are described in the following sections.

4.3.1.1 Border Crossing Variation Area

The Border Crossing Variation Area is located in the northwestern portion of the West Section (Map 4-2). The primary issues identified by commenters in this variation area included the location of the border crossing, crossing the large peatland complexes, and the need for the transmission line to avoid the SNAs. The Border Crossing Variation Area is bounded by the U.S. – Canada International Border to the north, overlapped by the Roseau Lake WMA Variation Area to the south, and overlapped by the Cedar Bend WMA Variation Area to the southeast. Table 4-2 and Map 4-3 provide details for the Border Crossing Variation Area.

International Border Crossings

There is one proposed international border crossing and four variations within the Border Crossing Variation Area as identified in Table 4-3. These alternatives include the Border Crossing Pine Creek Variation, Border Crossing Hwy 310 Variation, Border Crossing 230kV Variation, and the Border Crossing 500kV Variation (Map 4-3). DOE is considering issuance of a Presidential permit for only the

Table 4-2 Proposed Routes and Variations in the West Section

Variation Area	Name in the EIS	Name(s) in the Scoping Decision Document	Length (mi)
Border Crossing	Proposed Border Crossing-Blue/Orange Route	Blue/Orange Shared	25.0
	Border Crossing Pine Creek Variation	Pine Creek Border Crossing Alternative Route Segment	25.7
	Border Crossing Hwy 310 Variation	Hwy 310 Border Crossing Alternative Route Segment	18.6
	Border Crossing 500kV Variation	500kV Border Crossing Alternative Route Segment	10.1
	Border Crossing 230kV Variation	230kV Border Crossing Alternative Route Segment	8.2
Roseau Lake WMA	Proposed Blue/Orange Route	Blue/Orange Shared Route	30.7
	Roseau Lake WMA Variation 1	Roseau Lake WMA Alternative Route Segment 1	44.1
	Roseau Lake WMA Variation 2	Roseau Lake WMA Alternative Route Segment 2	37.5
Cedar Bend WMA	Proposed Blue/Orange Route	Blue/Orange Route	24.7
	Cedar Bend WMA Variation	Cedar Bend WMA Alternative Route Segment	19.6
Beltrami North	Proposed Blue/Orange Route	Blue/Orange Route	16.5
	Beltrami North Variation 1	Beltrami WMA Alternative Route Segment 1 North	15.8
	Beltrami North Variation 2	Beltrami WMA Alternative Route Segment 2	19.7
Beltrami North Central	Proposed Blue/Orange Route	Blue/Orange Route	11.6
	Beltrami North Central Variation 1	Beltrami WMA Alternative Route Segment 4 & 5	13.7
	Beltrami North Central Variation 2	Beltrami WMA Alternative Route Segment 3	12.6
	Beltrami North Central Variation 3	Beltrami WMA Alternative Route Segment 1 South & 5	12.2
	Beltrami North Central Variation 4	Beltrami WMA Alternative Route Segment 1 South	13.5
	Beltrami North Central Variation 5	Beltrami WMA Alternative Route Segment 4 & 1 South	15.0

Table 4-3 Proposed International Border Crossings and Variations in the West Section

Variation Area	Name in the EIS	Location of Proposed International Border Crossing	
		Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)
Border Crossing	Proposed Border Crossing-Blue/Orange Route	49° 00' 00.00" N	95° 55' 35.79" W
	Border Crossing Pine Creek Variation	49° 00' 00.00" N	95° 54' 50.49" W
	Border Crossing Hwy 310 Variation	49° 00' 00.00" N	95° 46' 8.82" W
	Border Crossing 500kV Variation	49° 00' 00.00" N	95° 32' 23.96" W
	Border Crossing 230kV Variation	49° 00' 00.00" N	95° 30' 26.18" W

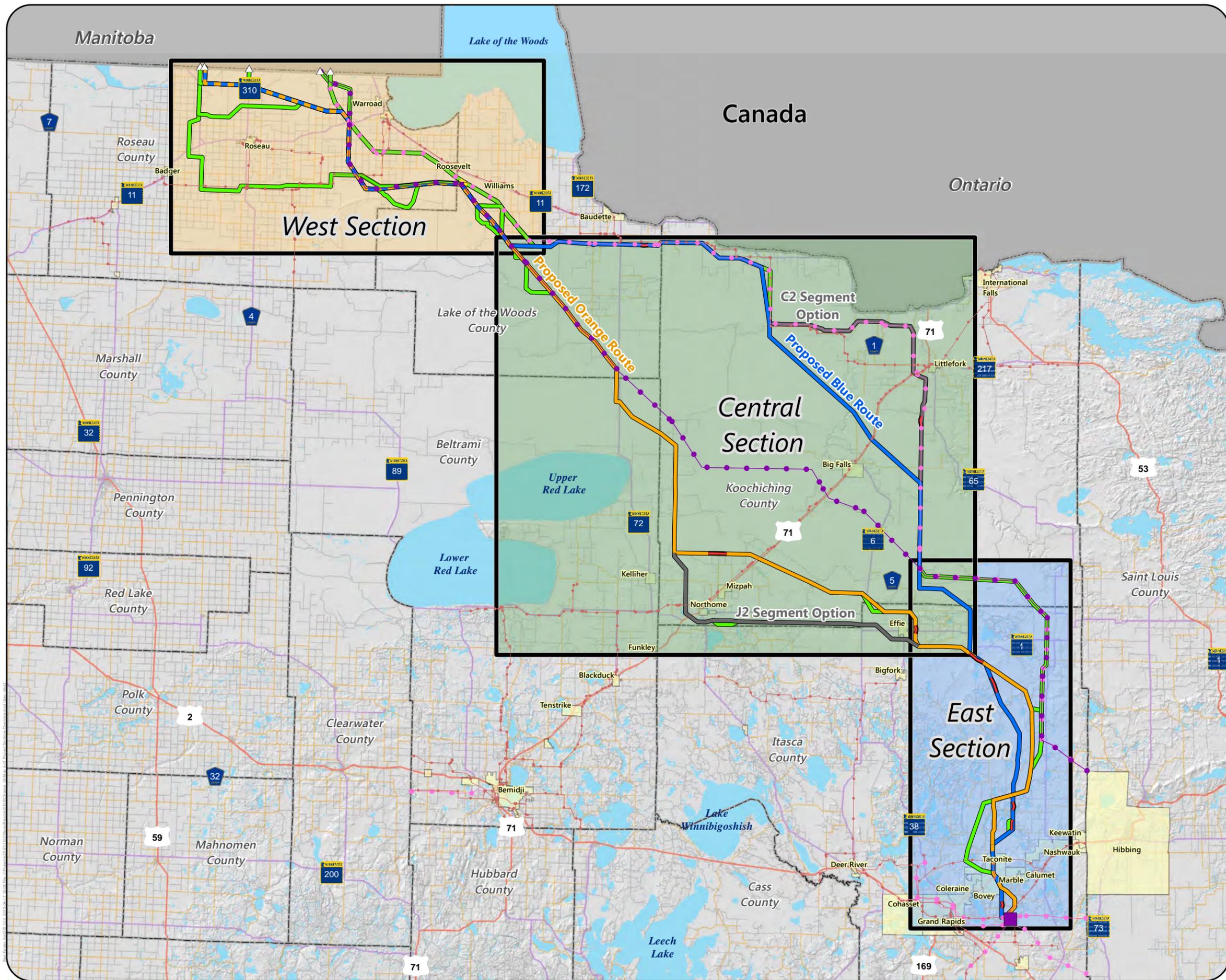
international border crossing as proposed by the Applicant, at latitude 49 00 00.00 N and longitude 95 54 50.49 W, however all alternative international border crossings are analyzed discussed in this EIS.

Variations

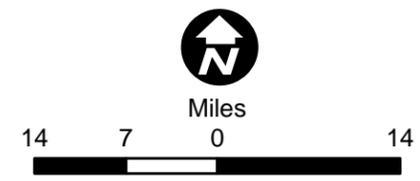
There are five route alternatives within the Border Crossing Variation Area: the Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, Border Crossing Hwy 310 Variation, Border Crossing 230kV Variation, and the Border Crossing 500kV Variation (Table 4-2, Map 4-3). The four variations begin at different international border crossing locations than the Proposed Border Crossing-Blue/Orange Route. Each variation in this variation area shares a portion of its alignment

with the Proposed Border Crossing-Blue/Orange Route in this variation area. The Proposed Border Crossing-Blue/Orange Route and the variations have a common endpoint near Minnesota Highway 11 in the southeastern portion of the Border Crossing Variation Area.

As shown in Table 4-2, the Proposed Border Crossing-Blue/Orange Route and the four variations in the Border Crossing Variation Area have different lengths because they start at different locations along the Canadian border but end at a common location in this variation area. The Border Crossing Pine Creek Variation begins furthest west on the border and is longest, while the Border Crossing 230kV Variation begins furthest east on the border, and is the shortest.

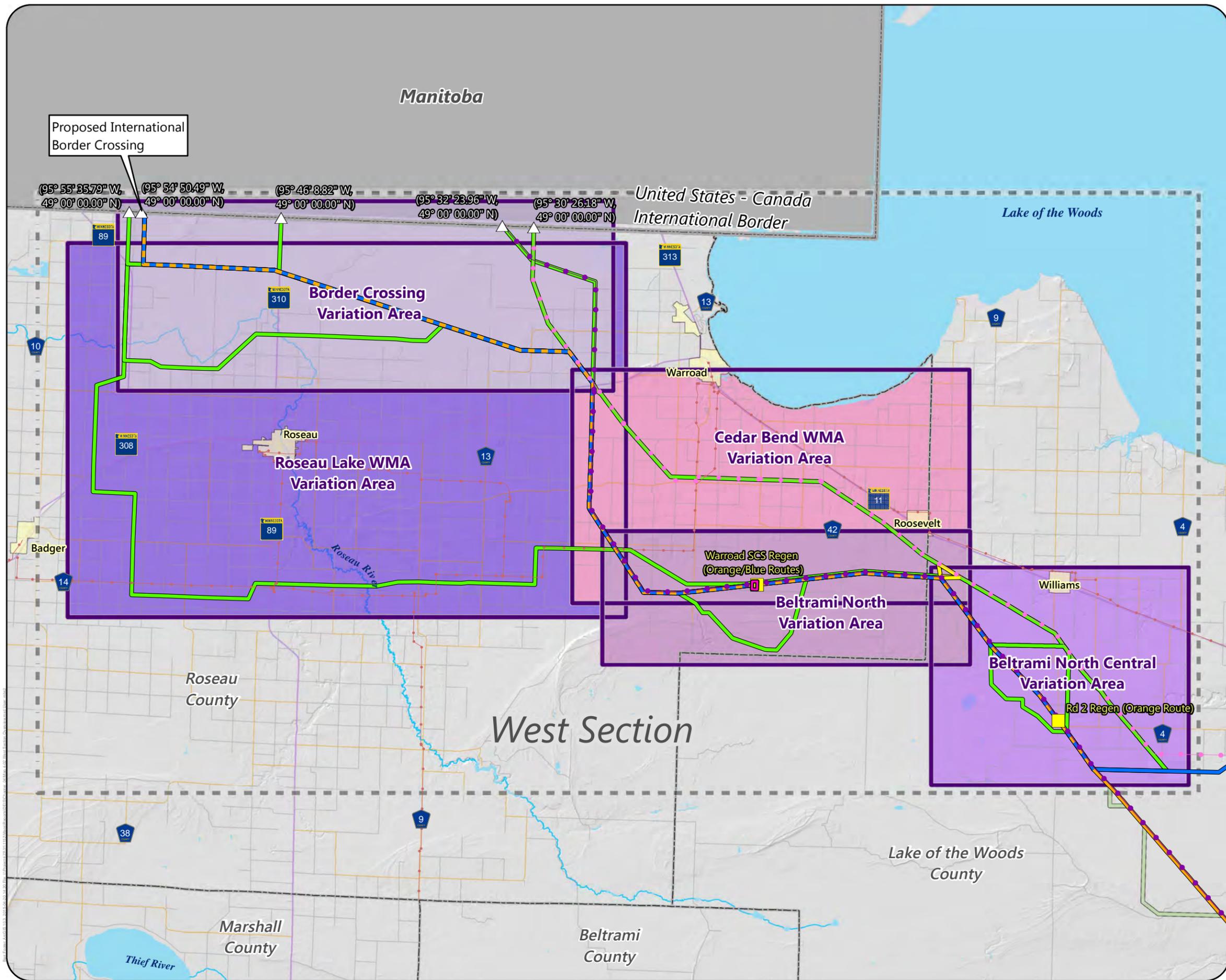


- △ Border Crossing Point
- Proposed Blackberry Substation Location
- Proposed Routes**
 - Blue/Orange Route
 - Blue Route
 - Orange Route
 - Segment Option
- Alternatives**
 - Route Variation
 - Route Variation Hop
 - Alignment Modification
- Existing Transmission Lines**
 - 69 or 115 kV
 - 230 kV
 - 500 kV
- Streets and Highways**
 - US Highway
 - State Trunk Highway
 - County State Aid Highway
 - Local Road
- Project Section
- Municipal Boundary
- County Boundary
- International Boundary



Map 4-1
PROJECT SECTIONS OVERVIEW
 Great Northern Transmission Line
 Draft Environmental Impact Statement





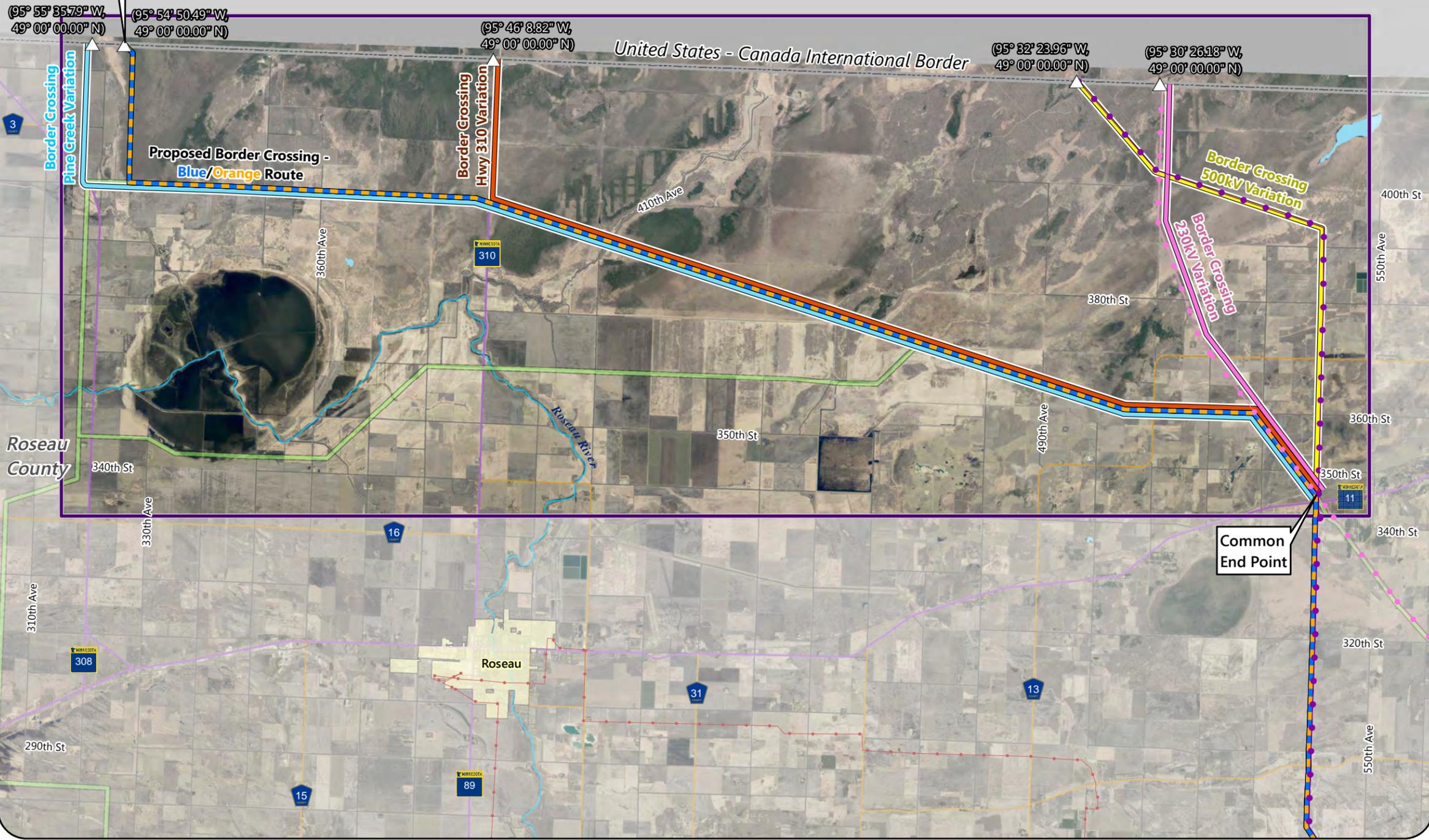
- △ Border Crossing Point
- Proposed Regeneration Site
- Proposed Routes**
 - Blue/Orange Route
 - Blue Route
 - Orange Route
- Alternatives**
 - Route Variation
 - Route Variation Hop
 - Proposed Series Compensation Station
- Existing Transmission Lines**
 - 69 or 115 kV
 - 230 kV
 - 500 kV
- Streets and Highways**
 - State Trunk Highway
 - County State Aid Highway
 - Local Road
- Boundaries**
 - Variation Area
 - Project Section
 - Municipal Boundary
 - County Boundary
 - International Boundary



Manitoba

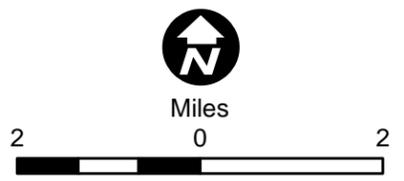
- △ Border Crossing Point
- Proposed Routes**
- Blue/Orange Route
- Alternatives**
- Border Crossing 230kV Variation
- Border Crossing 500kV Variation
- Border Crossing Hwy 310 Variation
- Border Crossing Pine Creek Variation
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Streets and Highways**
- State Trunk Highway
- County State Aid Highway
- Local Road
- Variation Area
- Municipal Boundary
- International Boundary

Proposed International Border Crossing



Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



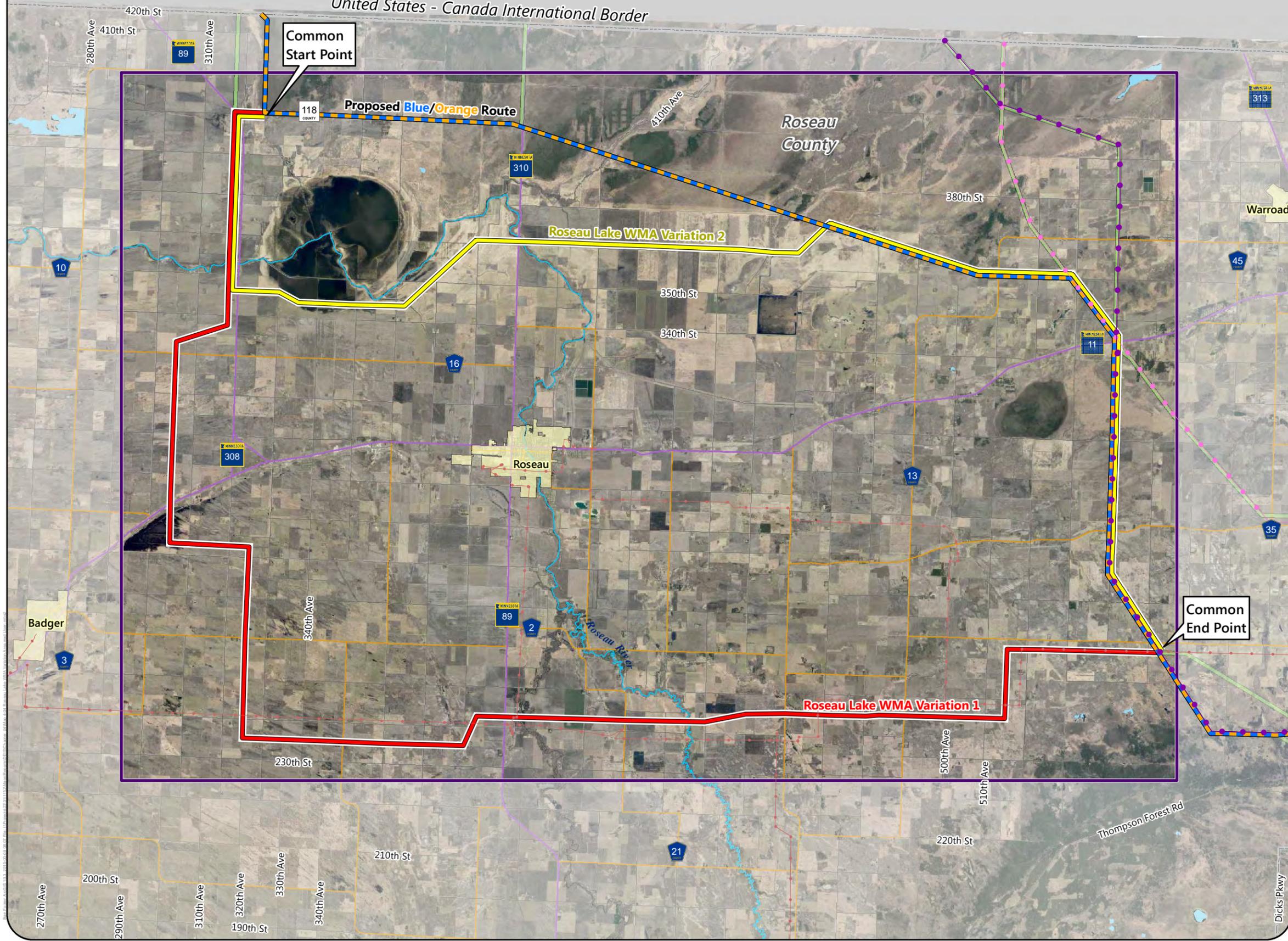
Map 4-3

BORDER CROSSING VARIATION AREA
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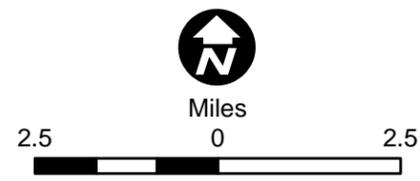
United States - Canada International Border



- Proposed Routes**
- Blue/Orange Route
- Alternatives**
- Roseau Lake WMA Variation 1
 - Roseau Lake WMA Variation 2
- Existing Transmission Lines**
- 69 or 115 kV
 - 230 kV
 - 500 kV
- Streets and Highways**
- State Trunk Highway
 - County State Aid Highway
 - Local Road
- Variation Area**
- Variation Area
- Municipal Boundary**
- Municipal Boundary
- International Boundary**
- International Boundary

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



Map 4-4

ROSEAU LAKE WMA VARIATION AREA
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4.3.1.2 Roseau Lake WMA Variation Area

The Roseau Lake WMA Variation Area is located in the northwestern portion of the West Section (Map 4-2). The primary issue identified in this variation area is a need for the proposed transmission line to avoid the Roseau Lake Wildlife Management Area (WMA). The Roseau Lake WMA Variation Area is overlapped by the Border Crossing Variation Area to the north, the Cedar Bend WMA Variation Area to the east, and the Beltrami North Variation Area to the southeast (Map 4-2). Table 4-2 and Map 4-4 provide details for the Roseau Lake WMA Variation Area.

Variations

There are three route alternatives within the Roseau Lake WMA Variation Area: the Proposed Blue/Orange Route, Roseau Lake WMA Variation 1, and Roseau Lake WMA Variation 2 (Table 4-2, Map 4-4). The Proposed Blue/Orange Route and the two variations have a common start point where the Proposed Blue/Orange Route turns east at County Road 118 in the northwestern portion of the Roseau Lake WMA Variation Area. Variation 2 shares a portion of its alignment with the Proposed Blue/Orange Route in this variation area. The Proposed Blue/Orange Route and the two variations have a common endpoint located southeast of where the Proposed Blue/Orange Route crosses CSAH 2 in the southeastern portion of the Roseau Lake WMA Variation Area. Roseau Lake WMA variations 1 and 2 are longer than the Proposed Blue/Orange Route by 14 and 7 miles, respectively (Table 4-2).

4.3.1.3 Cedar Bend WMA Variation Area

The Cedar Bend WMA Variation Area is located in the central portion of the West Section (Map 4-2). The primary issue identified in this variation area is a need for the proposed transmission line to avoid U.S. Fish and Wildlife Service (USFWS) land and the Cedar Bend WMA. The Cedar Bend WMA Variation Area is overlapped by the Border Crossing Variation Area to the northwest, the Roseau Lake WMA Variation Area to the west, the Beltrami North Variation Area to the south, and the Beltrami North Central Variation Area to the southeast (Map 4-2). Table 4-2 and Map 4-5 provide details for the Cedar Bend WMA Variation Area.

Variations

There are two route alternatives within the Cedar Bend WMA Variation Area: the Proposed Blue/Orange Route and Cedar Bend WMA Variation (Table 4-2, Map 4-5). The Proposed Blue/Orange Route and Cedar Bend WMA Variation have a common start point just north of the intersection of the Proposed Blue/Orange Route with Minnesota

11, in the northwestern portion of the Cedar Bend WMA Variation Area. The Cedar Bend WMA Variation does not share any portion of its alignment with the Proposed Blue/Orange Route in this variation area. The Proposed Blue/Orange Route and Cedar Bend WMA Variation have a common endpoint located in the area where the existing 500 kilovolt (kV) and 230 kV transmission lines are closest to each other in the southeastern portion of the Cedar Bend WMA Variation Area. The Cedar Bend WMA Variation is about 5 miles longer than the Proposed Blue/Orange Route (Table 4-2).

Hops

There are three connecting segments, or hops, located in the southeastern portion of this variation area: Hop 1, Hop 2, and Hop 3 (Map 4-5). These hops provide a connection for the Proposed Blue/Orange Route and Variation in the Cedar Bend WMA Variation Area to the variations in the Beltrami North and Beltrami North Central variation areas.

The Proposed Blue/Orange Route could use the Hop 3 to connect to Beltrami North variation 3 or 4 in the Beltrami North Central Variation Area (Map 4-5). Hop 3 begins where the Proposed Blue/Orange Route turns south to follow the existing 500 kV transmission line, crosses the existing 500 kV transmission line, and connects to the north end of either Beltrami North variation 3 or 4 in the Beltrami North Central Variation Area, which parallel the west side of the existing 230 kV transmission line.

The Cedar Bend WMA Variation could use Hop 1 to connect to the Proposed Blue/Orange Route in the Cedar Bend WMA Variation Area (Map 4-5). Hop 1 begins where the Cedar Bend WMA Variation is just north of where the Proposed Blue/Orange Route turns south to follow the existing 500 kV transmission line. Hop 1 crosses the existing 500 kV transmission line, and connects to the Proposed Blue/Orange Route, which parallels the west side of the existing 500 kV transmission line.

The Cedar Bend WMA Variation could alternatively use the Hop 2 to connect to Beltrami North Central variation 3 or 4 in the Beltrami North Central Variation Area (Map 4-5). Hop 2 begins where the Cedar Bend WMA Variation is just north of where the Proposed Blue/Orange Route turns south to follow the existing 500 kV transmission line, continues south along the west side of the existing 230 kV transmission line, and connects to the north end of either Beltrami North Central Variation 3 or 4 in the Beltrami North Central Variation Area, which continue to parallel the west side of the existing 230 kV transmission line.

4.3.1.4 Beltrami North Variation Area

The Beltrami North Variation Area is located in the central portion of the West Section (Map 4-2). The primary issue identified in this variation area is a need by USFWS to consider avoidance of USFWS land.⁶⁸ The Beltrami North Variation Area is overlapped by the Roseau Lake WMA Variation Area to the west, the Cedar Bend WMA Variation Area to the north, and the Beltrami North Central Variation Area to the east (Map 4-2). Table 4-2 and Map 4-6 provide details for the Beltrami North Variation Area.

Variations

There are three route alternatives within the Beltrami North Variation Area: the Proposed Blue/Orange Route, Beltrami North Variation 1, and Beltrami North Variation 2 (Table 4-2, Map 4-6). The Proposed Blue/Orange Route and these two variations have a common start point just south of where the Proposed Blue/Orange Route intersects CSAH 2 in the northwestern portion of the Beltrami North Variation Area. The Beltrami North Variation 1 and Beltrami North Variation 2 variation both share a portion of its alignment with the Proposed Blue/Orange Route in this variation area. The Proposed Blue/Orange Route and the two variations have a common endpoint in the area where the existing 500 kV and 230 kV transmission lines are closest to each other in the eastern portion of the Beltrami North Variation Area. Beltrami North Variation 1 is less than a mile shorter than the Proposed Blue/Orange Route, while Beltrami North Variation 2 is over 3 miles longer than the Proposed Blue/Orange Route (Table 4-1).

Hops

There are two connecting segments, or hops, located in the eastern portion of this variation area: Hop 3 and Hop 4 (Map 4-6). These hops provide a connection for the Proposed Blue/Orange Route and Beltrami North Variation 1 in the Beltrami North Variation Area to the Beltrami North Central Variations 3 and 4 in the Beltrami North Central Variation Area.

The Proposed Blue/Orange Route could use the Hop 3 to connect to Beltrami North Central Variations 3 or 4 in the Beltrami North Central Variation Area

(Map 4-5). Hop 3 begins where the Proposed Blue/Orange Route turns south to follow the existing 500 kV transmission line, crosses the existing 500 kV transmission line, and connects to the north end of either Beltrami North Central Variations 3 or 4 in the Beltrami North Central Variation Area, which parallel the west side of the existing 230 kV transmission line.

The Beltrami North Variation 1 could use the Hop 4 to connect to Beltrami North Central Variations 3 or 4 in the Beltrami North Central Variation Area (Map 4-5). Hop 4 begins at the east end of the Beltrami North Variation and connects to the north end of either Beltrami North Central variations 3 or 4 in the Beltrami North Central Variation Area, which parallel the west side of the existing 230 kV transmission line. Hop 4 would not require crossing over the existing transmission lines.

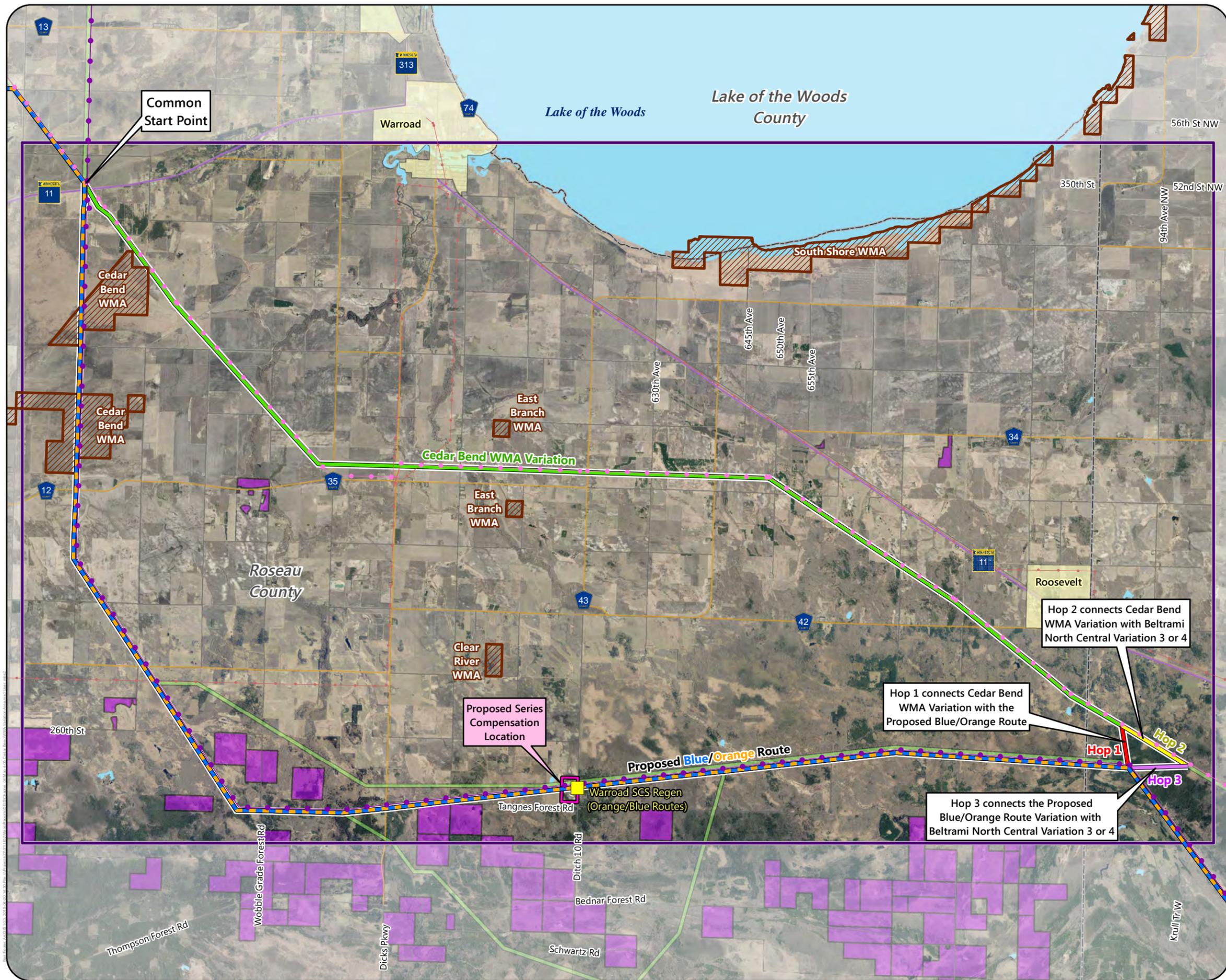
4.3.1.5 Beltrami North Central Variation Area

The Beltrami North Central Variation Area is located in the southeastern portion of the West Section (Map 4-2). The primary issue identified in this variation area is a need by USFWS to consider avoidance of USFWS lands. The Beltrami North Central Variation Area is overlapped by the Cedar Bend WMA and Beltrami North variation areas to the northwest (Map 4-2). Table 4-2 and Map 4-7 provide details for the Beltrami North Central Variation Area.

Variations

There are six route alternatives within this variation area: the Proposed Blue/Orange Route, Beltrami North Central Variation 1, Beltrami North Central Variation 2, Beltrami North Central Variation 3, Beltrami North Central Variation 4, and Beltrami North Central Variation 5 (Table 4-2, Map 4-7). The Proposed Blue/Orange Route and these variations have a common start point where the existing 500 kV transmission line turns southeast east of Township Road 465 in the northwestern portion of the Beltrami North Central Variation Area. All variations, except Beltrami North Central Variation 3, share a portion of its alignment with the Proposed Blue/Orange Route in this variation area. The Proposed Blue/Orange Route and three of the variations have a common endpoint in the area where the Proposed Blue/Orange Route splits in the southeastern portion of the Beltrami North Central Variation Area; Beltrami North Central variations 4 and 5 have a common endpoint where they intersect the Proposed Blue Route near 53rd Avenue Southwest in the southeastern portion of the Beltrami North Central Variation Area. All variations are longer than the Proposed Blue/Orange Route (Table 4-2).

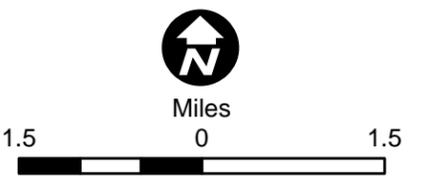
⁶⁸ USFWS letter to DOC-EERA that finalizes their route alternative recommendations for the proposed Project. FWS Tails # 03E19000-2013-CPA-0045. November 26, 2014. The letter states that this review is requested by the USFWS because all "ROW requests on Service lands can only be considered after all other alternatives are full examined, as well as the potential impacts to refuge lands. In order for this analysis to be complete, all alternatives must be analyzed and available to the Service for review."



- Proposed Regeneration Site
- Proposed Routes**
- Blue/Orange Route
- Alternatives**
- Cedar Bend WMA Variation
- Hop 1
- Hop 2
- Hop 3
- Proposed Series Compensation Station
- Wildlife Management Area
- USFWS Interest Land
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Streets and Highways**
- State Trunk Highway
- County State Aid Highway
- Local Road
- Variation Area
- Municipal Boundary
- County Boundary

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

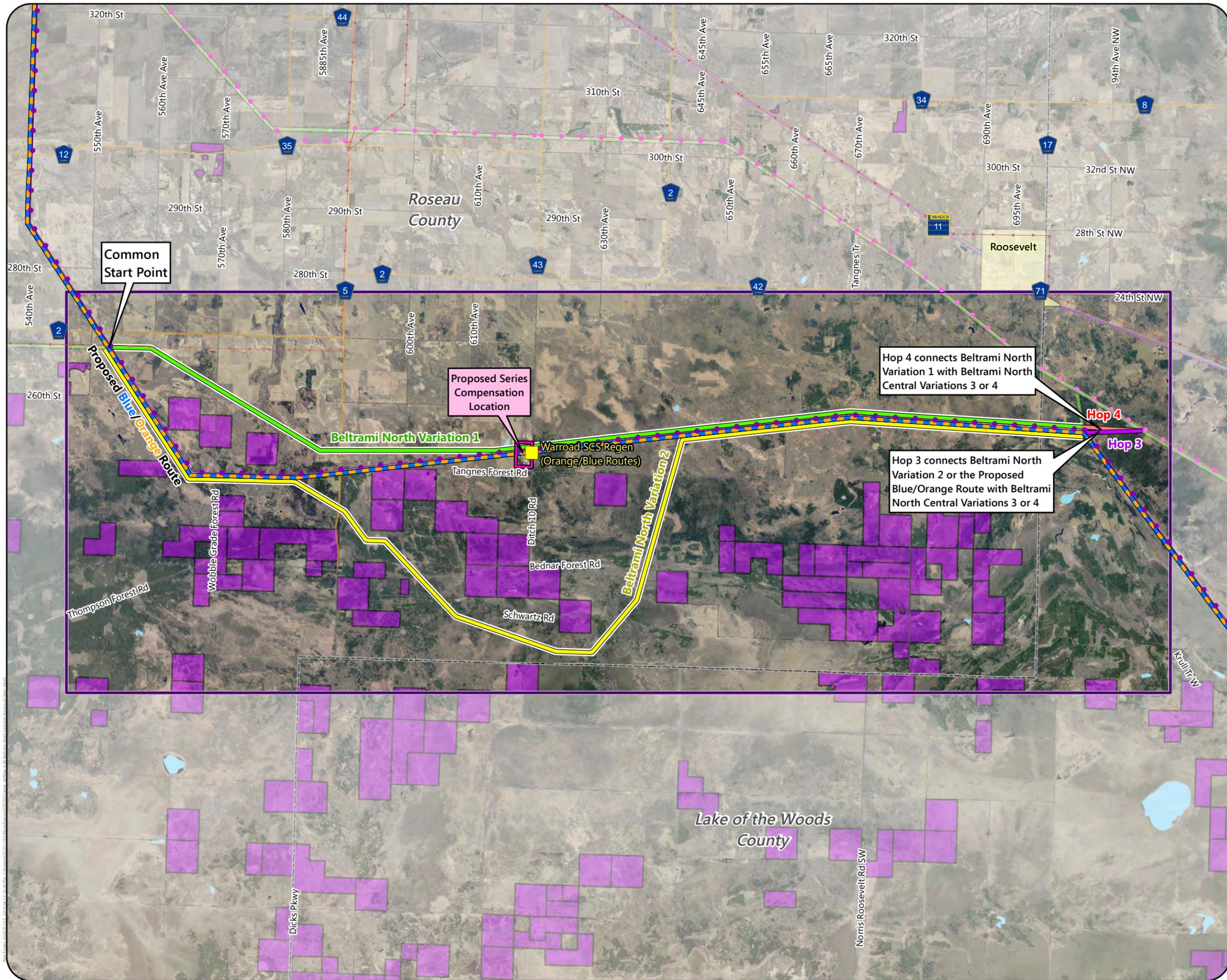
The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



Map 4-5

CEDAR BEND WMA VARIATION AREA
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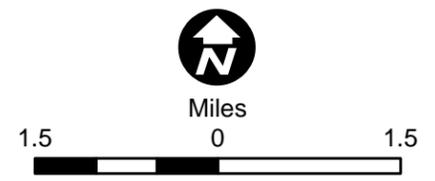




- Proposed Regeneration Site
- Proposed Routes**
- Blue/Orange Route
- Alternatives**
- Beltrami North Variation 1
- Beltrami North Variation 2
- Hop 3
- Hop 4
- Proposed Series Compensation Station
- USFWS Interest Land
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Streets and Highways**
- State Trunk Highway
- County State Aid Highway
- Local Road
- Variation Area
- Municipal Boundary
- County Boundary

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.

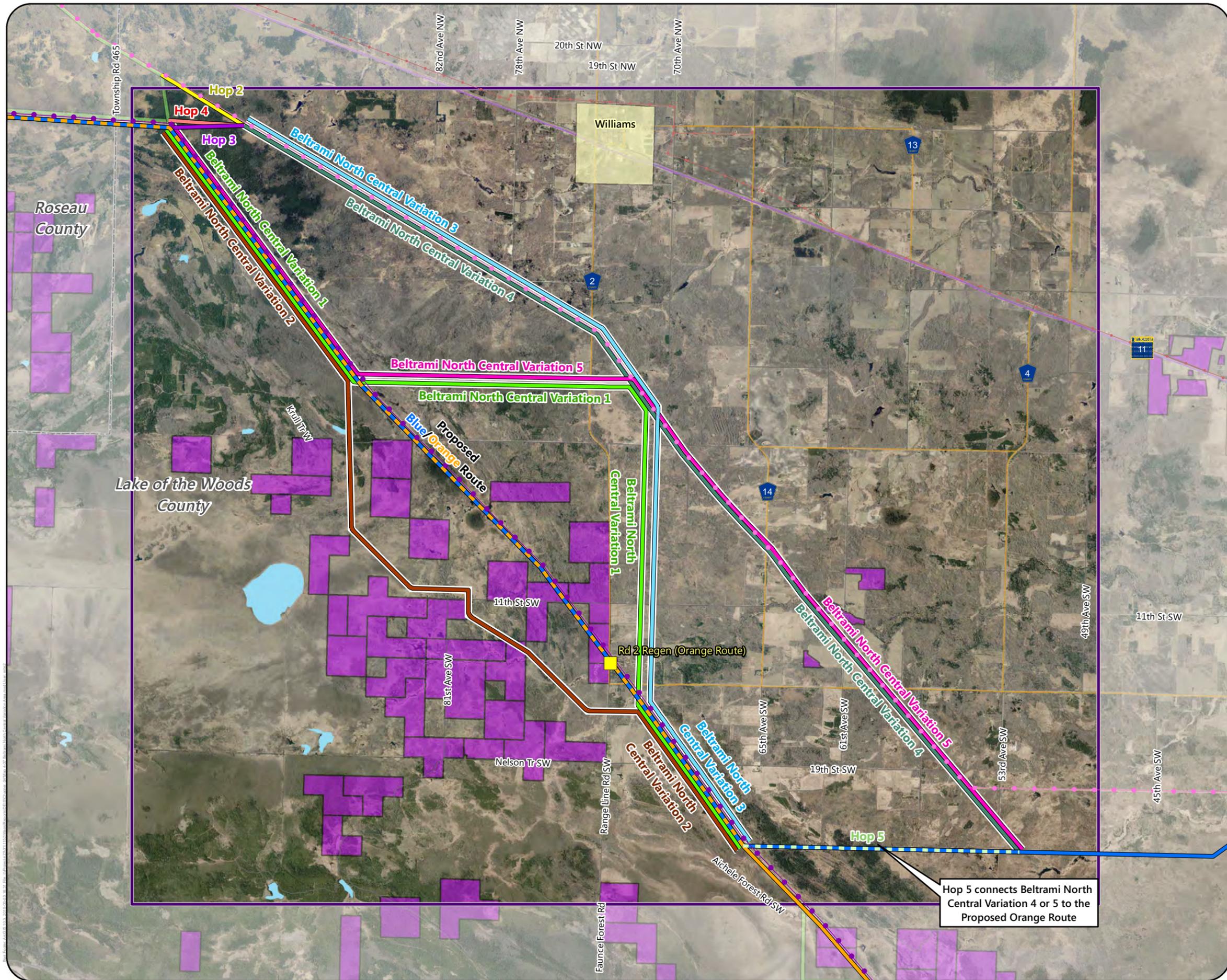


Map 4-6

BELTRAMI NORTH VARIATION AREA

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- Proposed Regeneration Site
- Proposed Routes**
- Blue/Orange Route
- Blue Route
- Orange Route
- Alternatives**
- Beltrami North Central Variation 1
- Beltrami North Central Variation 2
- Beltrami North Central Variation 3
- Beltrami North Central Variation 4
- Beltrami North Central Variation 5
- Hop 2
- Hop 3
- Hop 4
- Hop 5
- USFWS Interest Land
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Streets and Highways**
- State Trunk Highway
- County State Aid Highway
- Local Road
- Variation Area
- Municipal Boundary
- County Boundary

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.

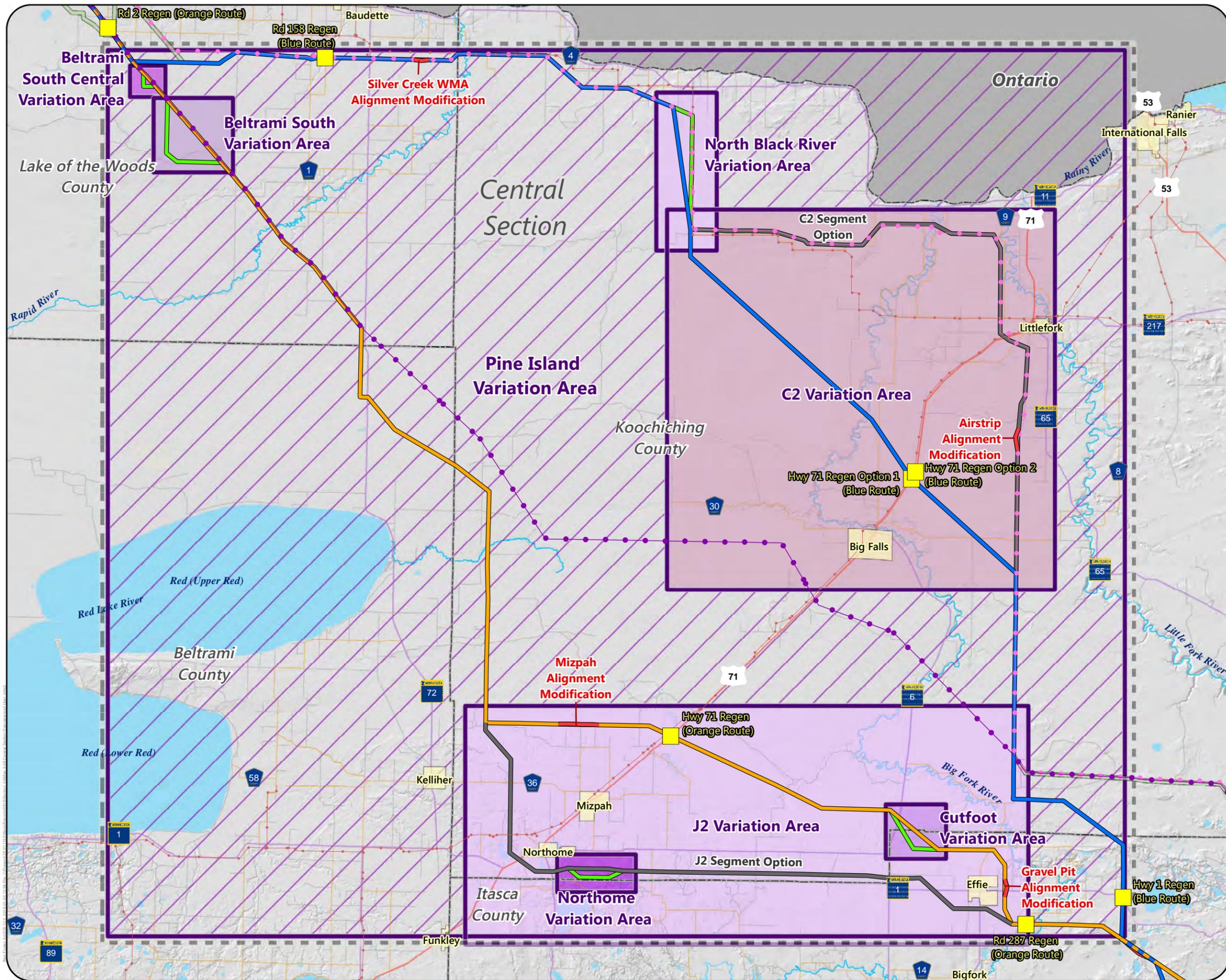


Map 4-7

BELTRAMI NORTH CENTRAL VARIATION AREA
Great Northern Transmission Line
Draft Environmental Impact Statement



Hop 5 connects Beltrami North Central Variation 4 or 5 to the Proposed Orange Route



- Proposed Regeneration Site
- Proposed Routes**
- Blue/Orange Route
- Blue Route
- Orange Route
- Segment Option
- Alternatives**
- Route Variation
- Alignment Modification
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Streets and Highways**
- US Highway
- State Trunk Highway
- County State Aid Highway
- Local Road
- Variation Area
- Project Section
- Municipal Boundary
- County Boundary



Map 4-8

CENTRAL SECTION OVERVIEW
 Great Northern Transmission Line
 Draft Environmental Impact Statement



Hop

There is one connecting segment, or hop, located in the southwestern portion of the Beltrami North Central Variation Area: Hop 5 (Map 4-7). Hop 5 provides a connection from the south end of Beltrami North Central variations 4 and 5 west to the Proposed Orange Route. This hop requires crossing over the existing 500 kV transmission line to rejoin the Proposed Orange Route.

4.3.2 Central Section

There are eight variation areas within the Central Section: Pine Island, Beltrami South Central, Beltrami South, North Black River, C2, J2, Northome, and Cutfoot (Table 4-4, Map 4-8). In addition, there are four alignment modifications (minor adjustments of the transmission line alignment centerline and associated ROW) within the proposed routes: Silver Creek WMA, Airstrip, Mizpah, and Gravel Pit (Table 4-4, Map 4-8). The variation areas are described in the following sections.

4.3.2.1 Pine Island Variation Area

The Pine Island Variation Area encompasses the entire Central Section (Map 4-8). The primary issues identified by commenters in this variation area include the presence of large peatland complexes, sharing of transmission line corridors, and a need for the proposed transmission line to avoid SNAs. The Pine Island Variation Area includes the Beltrami South Central, Beltrami South, North Black River, C2, J2, Northome, and Cutfoot variation areas (Map 4-8). Table 4-4 and Map 4-9 provide details for the Pine Island Variation Area.

Variations

There are two route alternatives within the Pine Island Variation Area: the Proposed Blue Route and the Proposed Orange Route (Table 4-4, Map 4-9). The proposed routes have a common start point where the Proposed Blue and Proposed Orange routes split east of Aichele Forest Road in the northwestern portion of the Pine Island Variation Area. The proposed routes do not share any portion of their alignments in this variation area.

Table 4-4 Proposed Routes, Variations, and Alignment Modifications in the Central Section

Variation Area	Variation Names in the EIS	Name(s) in the Scoping Decision Document	Length (mi)
Pine Island	Proposed Blue Route	Blue Route	109.8
	Proposed Orange Route	Orange Route	105.4
	Silver Creek WMA Alignment Modification	Silver Creek WMA Alignment Modification	1.0
	Proposed Blue Route	Blue Route	1.0
Beltrami South Central	Proposed Orange Route	Orange Route	1.2
	Beltrami South Central Variation	Beltrami WMA Alternative Route Segment 7	1.7
Beltrami South	Proposed Orange Route	Orange Route	5.6
	Beltrami South Variation	Beltrami WMA Alternative Route Segment 8	7.5
North Black River	Proposed Blue Route	Blue Route	8.4
	North Black River Variation	North Black River Alternative Route Segment	9.2
C2 Segment Option	Proposed Blue Route	Blue Route	32.8
	C2 Segment Option Variation	C2 Proposed Alternative	46.0
	Airstrip Alignment Modification	Airstrip Alignment Modification	1.5
	C2 Segment Option Variation	C2 Proposed Alternative	1.5
J2 Segment Option	Proposed Orange Route	Orange Route	42.2
	J2 Segment Option Variation	J2 Proposed Alternative	45.2
	Mizpah Alignment Modification	Mizpah Alignment Modification	2.8
	Proposed Orange Route	Orange Route	2.8
	Gravel Pit Alignment Modification	Gravel Pit Alignment Modification	1.2
Northome	Proposed Orange Route	Orange Route	1.2
	J2 Segment Option Variation	J2 Proposed Alternative	3.7
	Northome Variation	Northome Alternative Route Segment	4.0
Cutfoot	Proposed Orange Route	Orange Route	4.2
	Cutfoot Variation	Cutfoot Alternative Route Segment	4.8

The proposed routes have a common endpoint in the southeast corner of the Pine Island Variation Area, just west of Bass Lake Campground, in the southeastern portion of the Pine Island Variation Area. The Proposed Blue Route is longer than the Proposed Orange Route.

Alignment Modification

The Silver Creek WMA Alignment Modification is located along the Proposed Blue Route in the north-central portion of the Pine Island Variation Area (Map 4-9). This alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-4). The alignment modification shifts the ROW south from private, state forest, and federal lands onto state lands in order to avoid the USFWS land and the Silver Creek WMA. Section 6.5.2.1 provides additional information on the Silver Creek Alignment Modification.

4.3.2.2 Beltrami South Central Variation Area

The Beltrami South Central Variation Area is located in the northwestern portion of the Central Section (Map 4-8). The primary issue identified in this variation area is a need by USFWS to consider avoidance of USFWS land. The Beltrami South Central Variation Area is within the Pine Island Variation Area and bordered by the Beltrami South Variation Area to the southeast (Map 4-8). Table 4-4 and Map 4-10 provide details for the Beltrami South Central Variation Area.

Variations

There are two route alternatives within the Beltrami South Central Variation Area: the Proposed Orange Route and the Beltrami South Central Variation (Table 4-4, Map 4-10). The Proposed Orange Route and Beltrami South Central Variation have a common start point where the 500 kV corridor crosses Aichele Forest Road in the northwestern portion of the Beltrami South Central Variation Area. The Proposed Orange Route and Beltrami South Central Variation do not share their alignments in this variation area. The Proposed Orange Route and Beltrami South Central Variation have a common endpoint located approximately 1.25 miles to the southeast of their common start point, in the southeastern portion of the Beltrami South Central Variation Area. The Beltrami South Central Variation is less than one-half mile longer than the Proposed Orange Route (Table 4-4).

4.3.2.3 Beltrami South Variation Area

The Beltrami South Variation Area is located in the northwestern portion of the Central Section (Map 4-8). The primary issue identified in this

variation area is a need by USFWS to consider avoidance of USFWS land. The Beltrami South Variation Area is within the Pine Island Variation Area and bordered by the Beltrami South Central Variation Area to the northwest (Map 4-8). Table 4-4 and Map 4-10 provide details for the Beltrami South Variation Area.

Variations

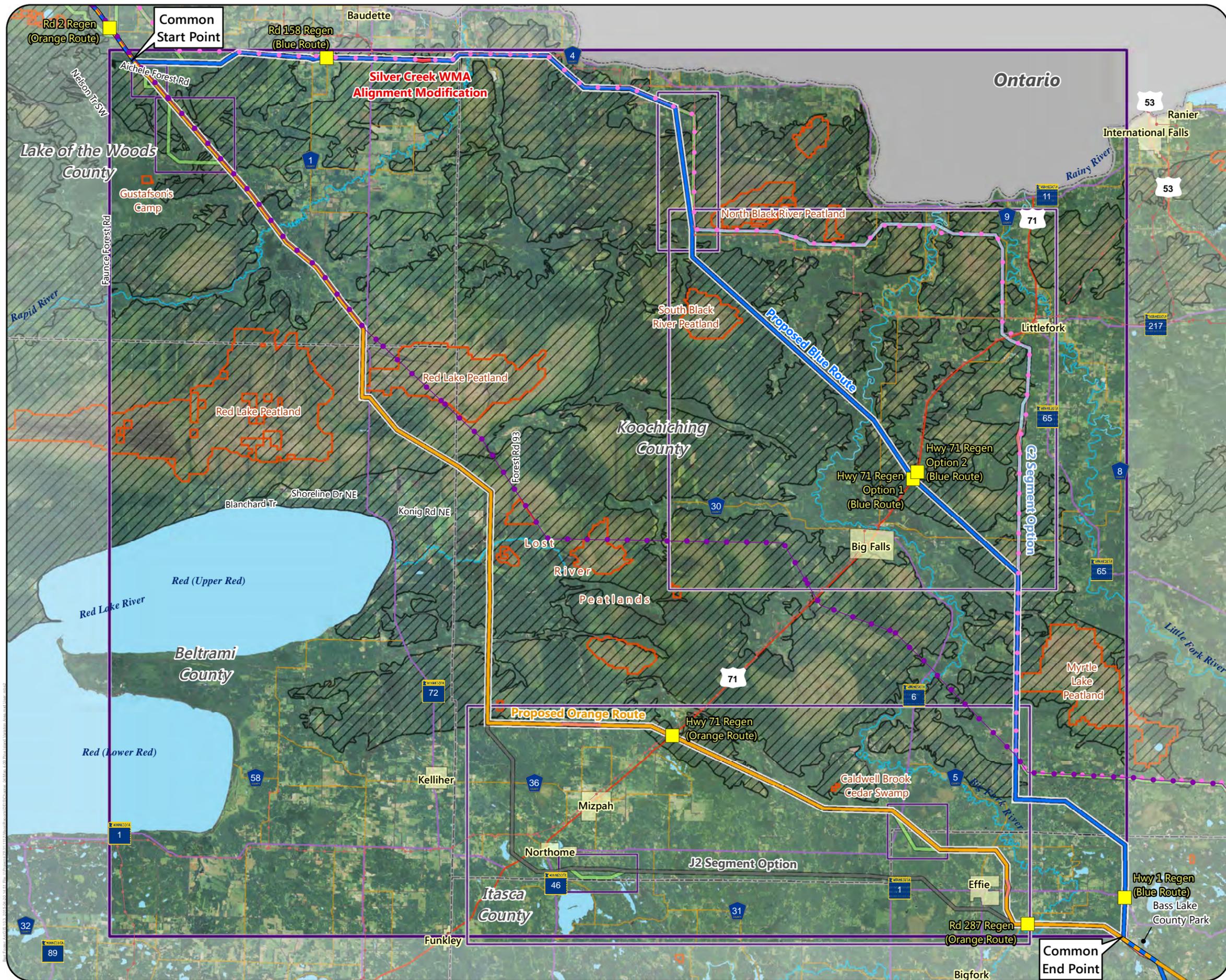
There are two route alternatives within the Beltrami South Variation Area: the Proposed Orange Route and the Beltrami South Variation (Table 4-4, Map 4-10). The Proposed Orange Route and Beltrami South Variation have a common start point located approximately 2.5 miles southeast of where the 500 kV corridor crosses Aichele Forest Road in the northwestern portion of the Beltrami South Variation Area. The Proposed Orange Route and Beltrami South Variation do not share their alignments in this variation area. The Proposed Orange Route and Beltrami South Variation have a common endpoint located approximately 1.25 miles to the southeast of Stony Corners Trail in the southeastern portion of the Beltrami South Variation Area. The Beltrami South Variation is about 2 miles longer than the Proposed Orange Route (Table 4-4).

4.3.2.4 North Black River Variation Area

The North Black River Variation Area is located in the north-central portion of the Central Section (Map 4-8). The primary issues identified by the commenters in this variation area were the avoidance of non-ferrous mineral reserves and whether to share the existing 230 kV transmission line corridor or to develop an alternative that requires a new corridor. The North Black River Variation Area is within the Pine Island Variation Area and bordered by the C2 Variation Area to the south (Map 4-8). Table 4-4 and Map 4-11 provide details for the North Black River Variation Area.

Variations

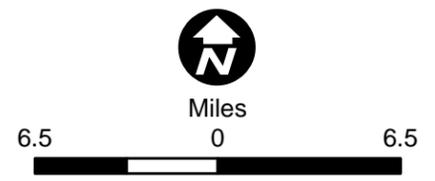
There are two route alternatives within the North Black River Variation Area: the Proposed Blue Route and the North Black River Variation (Table 4-4, Map 4-11). The Proposed Blue Route and North Black River Variation have a common start point located just west of Town Road 118 in the northern portion of the North Black River Variation Area. The Proposed Blue Route and North Black River Variation do not share their alignments in this variation area. The Proposed Blue Route and North Black River Variation have a common endpoint located north of the intersection of Sandsmark Trail and CSAH 32 in the southern portion of the North Black River Variation Area. The North Black River Variation is about one mile longer than the Proposed Blue Route (Table 4-4).



- Proposed Regeneration Site
- Proposed Routes**
- Blue/Orange Route
- Blue Route
- Orange Route
- C2 Segment Option
- J2 Segment Option
- Alternatives**
- Silver Creek WMA Alignment Modification
- Scientific and Natural Area (SNA)
- Peatland Complex
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Streets and Highways**
- US Highway
- State Trunk Highway
- County State Aid Highway
- Local Road
- Variation Area
- Municipal Boundary
- County Boundary
- International Boundary

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

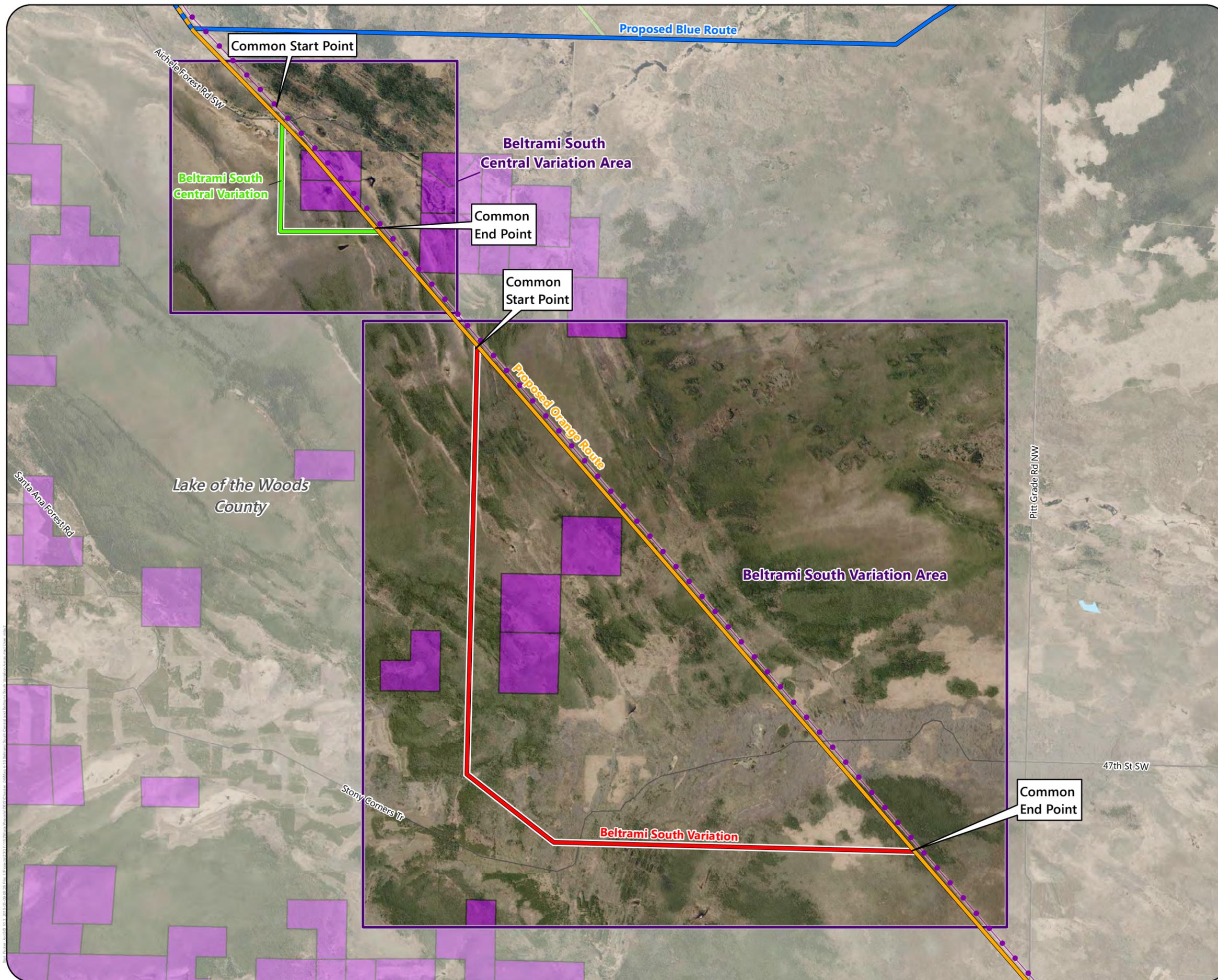
The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



Map 4-9

PINE ISLAND VARIATION AREA
Great Northern Transmission Line
Draft Environmental Impact Statement

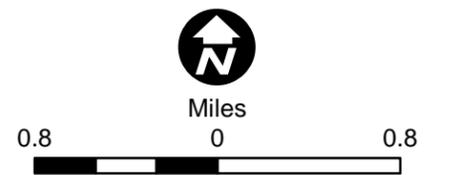




- Proposed Routes**
-  Blue/Orange Route
 -  Blue Route
 -  Orange Route
- Alternatives**
-  Beltrami South Central Variation
 -  Beltrami South Variation
- USFWS Interest Land**
-  USFWS Interest Land
- Existing Transmission Lines**
-  500 kV
- Streets and Highways**
-  Local Road
 -  Variation Area

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



Map 4-10

BELTRAMI SOUTH CENTRAL AND BELTRAMI SOUTH VARIATION AREAS
Great Northern Transmission Line
Draft Environmental Impact Statement

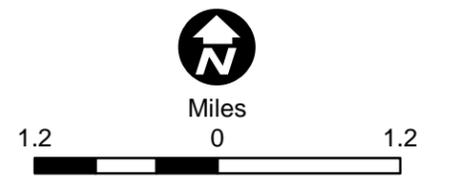




- Proposed Routes**
- Blue Route
 - C2 Segment Option
- Alternatives**
- North Black River Variation
- Existing Transmission Lines**
- 69 or 115 kV
 - 230 kV
- Streets and Highways**
- State Trunk Highway
 - County State Aid Highway
 - Local Road
 - Variation Area
 - International Boundary

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

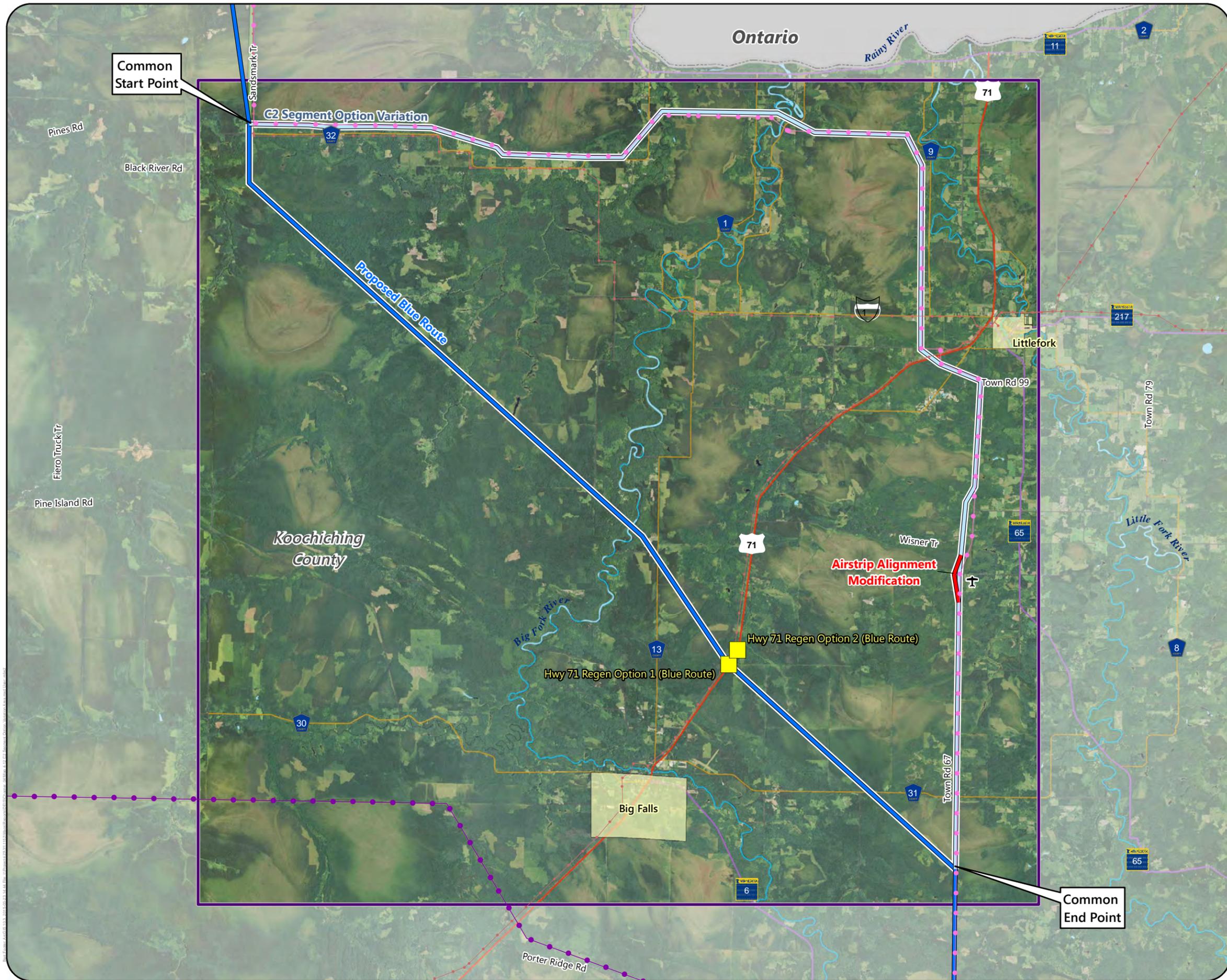
The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



Map 4-11

NORTH BLACK RIVER VARIATION AREA
Great Northern Transmission Line
Draft Environmental Impact Statement





- Proposed Regeneration Location
- Proposed Routes**
- Blue Route
- Alternatives**
- C2 Segment Option Variation
- Airstrip Alignment Modification
- Airstrip
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Streets and Highways**
- US Highway
- State Trunk Highway
- County State Aid Highway
- Local Road
- Variation Area
- Municipal Boundary
- International Boundary

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



Map 4-12
C2 SEGMENT OPTION VARIATION AREA
Great Northern Transmission Line
Draft Environmental Impact Statement



4.3.2.5 C2 Segment Option Variation Area

The C2 Segment Option Variation Area is located in the northeastern portion of the Central Section (Map 4-8). The primary issue identified by commenters in this variation area are whether to share the existing 230 kV transmission line corridor or to develop variations that require new corridors. The C2 Segment Option Variation Area is within the Pine Island Variation Area and bordered by the North Black River Variation Area to the northwest (Map 4-8). Table 4-4 and Map 4-12 provide details for the C2 Segment Option Variation Area.

Variations

There are two route alternatives within the C2 Segment Option Variation Area: the Proposed Blue Route and the C2 Segment Option Variation (Table 4-4, Map 4-12). The Proposed Blue Route and C2 Segment Option Variation have a common start point located north of the intersection of Sandsmark Trail and CSAH 32 in the northwestern portion of the C2 Segment Option Variation Area. The Proposed Blue Route and C2 Segment Option Variation do not share their alignments in this variation area. The Proposed Blue Route and C2 Segment Option Variation have a common endpoint located approximately two miles south of the intersection of Town Road 67 and CSAH 31 in the southeastern portion of the C2 Segment Option Variation Area. The C2 Segment Option Variation is about 13 miles longer than the Proposed Blue Route (Table 4-4).

Alignment Modification

The Airstrip Alignment Modification is located along the C2 Segment Option Variation in the eastern portion of the C2 Segment Option Variation Area (Map 4-12). The alignment modification is the same length as the comparable segment of the C2 Segment Option Variation (Table 4-4). The modification shifts the alignment west to allow additional space to use the runway at a private airstrip. The land ownership remains a mix of private, corporate, and state lands. Section 6.5.2.2 provides additional information on the Airstrip Alignment Modification.

4.3.2.6 J2 Segment Option Variation Area

The J2 Segment Option Variation Area is located in the southern portion of the Central Section (Map 4-8). The primary issue identified by commenters in this variation area is the presence of large peatland complexes. The J2 Segment Option Variation Area is within the Pine Island Variation Area (Map 4-8). Table 4-4 and Map 4-13 provide details for the J2 Segment Option Variation Area.

Variations

There are two route alternatives within this variation area: the Proposed Orange Route and the J2 Segment Option Variation (Table 4-4, Map 4-13). The Proposed Orange Route and J2 Segment Option Variation have a common start point located north of Flowing Well Trail and east of Forest Road 54 in the northwestern portion of the J2 Segment Option Variation Area. The Proposed Orange Route and J2 Segment Option Variation do not share their alignments in this variation area. The Proposed Orange Route and J2 Segment Option Variation have a common endpoint located southeast of Effie near County Road 288 in the southeastern portion of the J2 Segment Option Variation Area. The J2 Segment Option Variation is about 3 miles longer than the Proposed Orange Route (Table 4-4).

Alignment Modifications

The Mizpah Alignment Modification is located along the Proposed Orange Route in the northwestern portion of the J2 Segment Option Variation Area (Map 4-13). This alignment modification is the same length as the comparable segment of Proposed Orange Route (Table 4-4). The alignment modification shifts the ROW north from the private and state lands onto only state land. Section 6.5.2.3 provides additional information on the Mizpah Alignment Modification.

The Gravel Pit Alignment Modification is located along the Proposed Orange Route in the southeastern portion of the J2 Segment Option Variation Area (Map 4-13). The alignment modification is the same length as the comparable segment of the Proposed Orange Route (Table 4-4). The modification shifts the alignment east from the Proposed Orange Route to avoid private land with a gravel pit. The land ownership changes from private, corporate, and state lands to a mix of corporate and state lands. Section 6.5.2.4 provides additional information on the Gravel Pit Alignment Modification.

4.3.2.7 Northhome Variation Area

The Northhome Variation Area is located in the south-central portion of the Central Section (Map 4-8). The primary issue identified in this variation area is a need by USFWS to consider avoidance of USFWS land. The Northhome Variation Area is within the Pine Island and J2 variation areas (Map 4-8). Table 4-4 and Map 4-13 provide details for the Northhome Variation Area.

Variations

There are two route alternatives within the Northome Variation Area: the J2 Segment Option Variation and the Northome Variation (Table 4-4, Map 4-13). The J2 Segment Option Variation and Northome Variation have a common start point located just north of the intersection of Stone Road and CSAH 24 in the western portion of the Northome Variation Area. The J2 Segment Option Variation and Northome Variation do not share their alignments in this variation area. The J2 Segment Option Variation and Northome Variation have a common endpoint located north of Little Constance Lake in the eastern portion of the Northome Variation Area. The Northome Variation is about one-half mile longer than the comparable segment of the J2 Segment Option Variation (Table 4-4).

4.3.2.8 Cutfoot Variation Area

The Cutfoot Variation Area is located in the southeastern portion of the Central Section (Map 4-8). The primary issue identified by commenters in this variation area is a desire by commenters to avoid private land with old cedar stands. The Cutfoot Variation Area is within the Pine Island and J2 variation areas (Map 4-8). Table 4-4 and Map 4-13 provide details for the Cutfoot Variation Area.

Variations

There are two route alternatives within this variation area: the Proposed Orange Route and the Cutfoot Variation (Table 4-4, Map 4-13). The Proposed Orange Route and Cutfoot Variation have a common start point located west of Minnesota Highway 6 in the northwestern portion of the Cutfoot Variation Area. The Proposed Orange Route and Cutfoot Variation do not share their alignments in this variation area. The Proposed Orange Route and Cutfoot Variation have a common endpoint located south of Cutfoot Sioux Trail in the southeastern portion of the Cutfoot Variation Area. The Cutfoot Variation is about one-half mile longer than the Proposed Orange Route (Table 4-4).

4.3.3 East Section

There are five variation areas within the East Section: Effie, East Bear Lake, Balsam, Dead Man's Pond, and Blackberry (Map 4-14, Table 4-5). In addition, there are five alignment modifications: Bass Lake, Wilson Lake, Grass Lake, Dead Man's Pond, and Trout Lake (Map 4-14, Table 4-5). The variation areas are described in the following sections.

4.3.3.1 Effie Variation Area

The Effie Variation Area is located in the northern portion of the East Section (Map 4-14). The primary issues identified by commenters in this variation area are whether to share the existing 230 kV or 500 kV transmission line corridors or to develop variations that require new corridors. The Effie Variation Area includes the East Bear Lake Variation Area. The Balsam Variation Area overlaps the Effie Variation Area to the south (Map 4-15). Table 4-5 and Map 4-15 provide details for the Effie Variation Area.

Variations

There are three route alternatives within the Effie Variation Area: the Proposed Blue Route, Proposed Orange Route, and the Effie Variation (Table 4-5, Map 4-15). The proposed Blue Route and Effie Variation have a common start point where the existing 500 kV and 230 kV transmission line corridors converge near Lofgrin Truck Trail in the northwestern portion of the Effie Variation Area. The Proposed Orange Route begins in the west-central portion of the Effie Variation Area. The Proposed Blue and Orange routes share one portion of their alignment in the central portion of this variation area. The Proposed Orange Route and Effie Variation share one portion of their alignment in this variation area. The Proposed Blue and Orange routes and the Effie Variation have a common endpoint located southeast of Wolf Lake in the southern portion of the Effie Variation Area. The Effie Variation is 8 miles longer than the Proposed Blue Route and about 5 miles longer than the Proposed Orange Route; the Proposed Orange Route is about 3 miles longer than the Proposed Blue Route (Table 4-5).

Alignment Modifications

The Bass Lake Alignment Modification is located along the Proposed Blue/Orange Route in the central portion of the Effie Variation Area (Map 4-15). The alignment modification is slightly longer than the comparable segment of the Proposed Blue/Orange Route in the Effie Variation Area (Table 4-5). The alignment modification shifts the ROW southwest to avoid the Bass Lake County Park and Campground (Itasca County) and the George Washington State Forest campground on Larson Lake. The alignment modification modifies the proportion of land ownership to a mix of slightly less corporate land and slightly more state land. Section 6.5.3.1 provides additional information on the Bass Lake Alignment Modification.

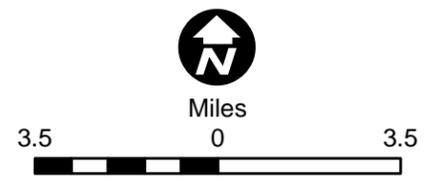
The Wilson Lake Alignment Modification is located along the Proposed Blue Route in the central portion of the Effie Variation Area (Map 4-15). The alignment



- Proposed Regeneration Site
- Proposed Routes**
- Blue Route
- Orange Route
- Alternatives**
- J2 Segment Option Variation
- Northhome Variation
- Cutfoot Variation
- Alignment Modification
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Streets and Highways**
- US Highway
- State Trunk Highway
- County State Aid Highway
- Local Road
- Variation Area
- Municipal Boundary
- County Boundary

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

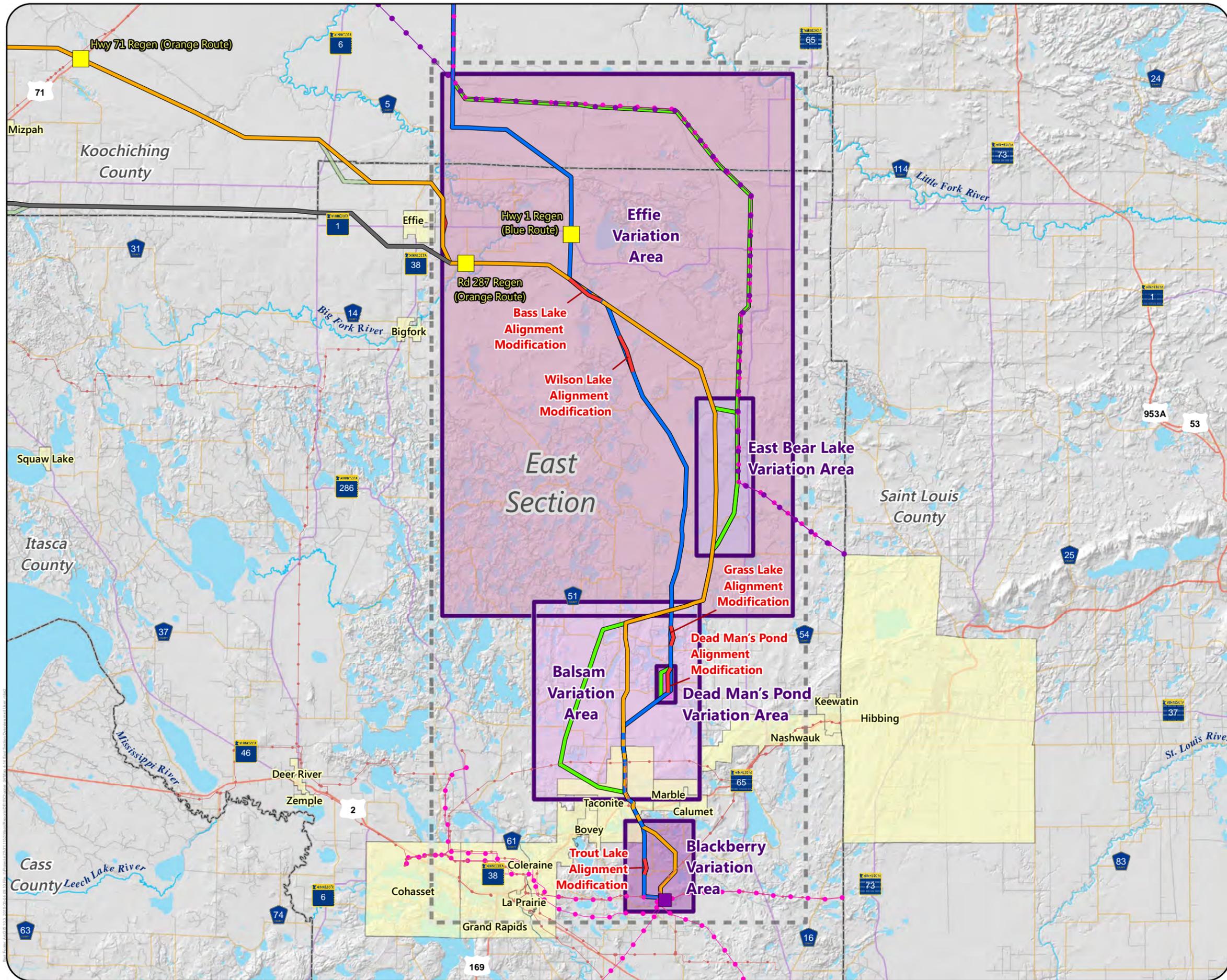
The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



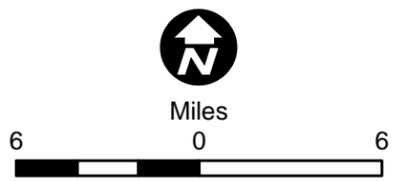
Map 4-13

J2 SEGMENT OPTION, NORTHHOME AND CUTFOOT VARIATION AREAS
Great Northern Transmission Line
Draft Environmental Impact Statement





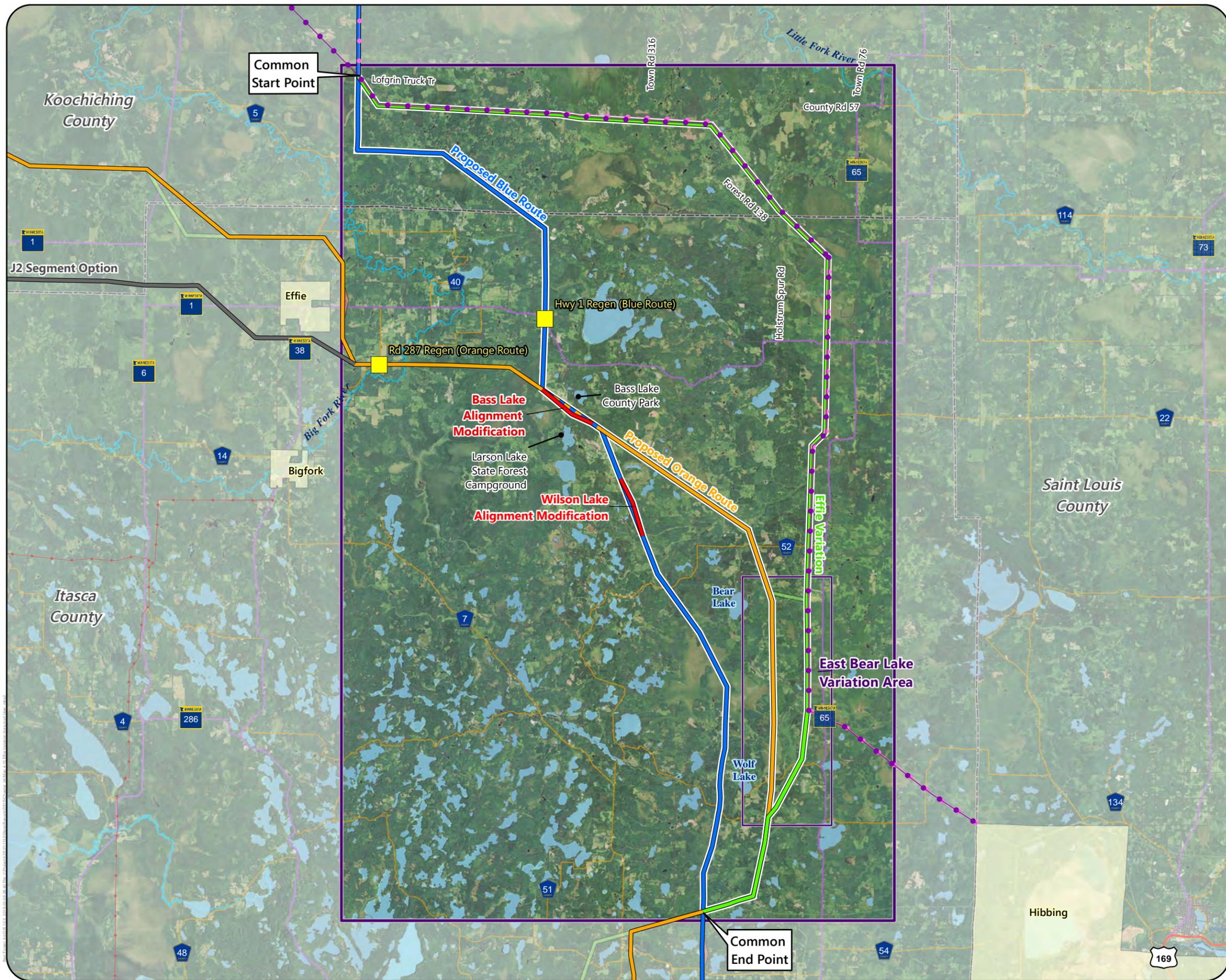
- Proposed Regeneration Site
- Proposed Blackberry Substation Location
- Proposed Routes**
 - Blue/Orange Route
 - Blue Route
 - Orange Route
 - Segment Option
- Alternatives**
 - Route Variation
 - Alignment Modification
- Existing Transmission Lines**
 - 69 or 115 kV
 - 230 kV
 - 500 kV
- Streets and Highways**
 - US Highway
 - State Trunk Highway
 - County State Aid Highway
 - Local Road
- Variation Area
- Project Section
- Municipal Boundary
- County Boundary



Map 4-14

EAST SECTION OVERVIEW
 Great Northern Transmission Line
 Draft Environmental Impact Statement

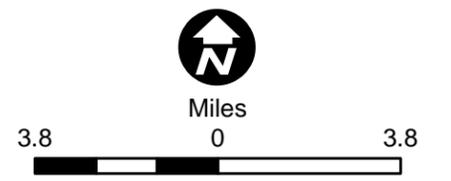




- Proposed Regeneration Site
- Proposed Routes**
- Blue/Orange Route
- Blue Route
- Orange Route
- J2 Segment Option
- Alternatives**
- Effie Variation
- Alignment Modification
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Streets and Highways**
- US Highway
- State Trunk Highway
- County State Aid Highway
- Local Road
- Variation Area
- Municipal Boundary
- County Boundary

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



Map 4-15

EFFIE VARIATION AREA
Great Northern Transmission Line
Draft Environmental Impact Statement





- Proposed Routes**
-  Blue Route
 -  Orange Route
- Alternatives**
-  East Bear Lake Variation
- Existing Transmission Lines**
-  230 kV
 -  500 kV
- Streets and Highways**
-  State Trunk Highway
 -  County State Aid Highway
 -  Local Road
 -  Variation Area

Note:
Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



Map 4-16

EAST BEAR LAKE VARIATION AREA

Great Northern Transmission Line
Draft Environmental Impact Statement



Table 4-5 Proposed Routes, Variations, and Alignment Modifications in the East Section

Variation Area	Variation Names in the EIS	Name(s) in the Scoping Decision Document	Length (mi)
Effie	Proposed Blue Route	Blue & Blue/Orange Routes	41.1
	Proposed Orange Route	Blue, Blue/Orange, & Orange Routes	44.6
	Effie Variation	Effie Alternative Route Segment	49.8
	Bass Lake Alignment Modification	Bass Lake Alignment Modification	2.5
	Proposed Blue/Orange Route	Blue/Orange Route	2.4
	Wilson Lake Alignment Modification	Wilson Lake Alignment Modification	2.4
	Proposed Blue Route	Blue Route	2.4
East Bear Lake	Proposed Orange Route	Orange Route	8.9
	East Bear Lake Variation	East Bear Lake Alternative Route Segment	10.5
Balsam	Proposed Blue Route	Blue & Blue/Orange Routes	12.9
	Proposed Orange Route	Orange & Blue/Orange	13.7
	Balsam Variation	Balsam Alternative Route Segment 1	17.8
	Grass Lake Alignment Modification	Grass Lake Alignment Modification	1.3
	Proposed Blue Route	Blue Route	1.3
Dead Man's Pond	Proposed Blue Route	Blue Route	2.2
	Dead Man's Pond Variation	Dead Man's Pond Alternative Route Segment	2.3
	Dead Man's Pond Alignment Modification	Dead Man's Pond Alignment Modification	1.6
	Proposed Blue Route	Blue Route	1.6
Blackberry	Proposed Blue Route	Blue Route	5.4
	Proposed Orange Route	Orange Route	6.1
	Trout Lake Alignment Modification	Trout Lake Alignment Modification	1.0
	Proposed Orange Route	Orange Route	1.0

modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-5). The modification shifts the alignment east to avoid corporate land; land ownership changes from corporate and state lands to mostly state lands. Section 6.5.3.2 provides additional information on the Wilson Lake Alignment Modification.

4.3.3.2 East Bear Lake Variation Area

The East Bear Lake Variation Area is located in the east-central portion of the East Section (Map 4-14). The primary issue identified by commenters in this variation area is the presence of the Bear-Wolf Peatland. The East Bear Lake Variation Area is within the Effie Variation Area (Map 4-15). Table 4-5 and Map 4-16 provide details for the East Bear Lake Variation Area.

Variations

There are two route alternatives within the East Bear Lake Variation Area: the Proposed Orange Route and the East Bear Lake Variation (Table 4-5, Map 4-16). The Proposed Orange Route and East Bear Lake Variation have a common start point located just north of Bear Lake Forest Road E in the northwestern

portion of the East Bear Lake Variation Area. The Proposed Orange Route and East Bear Lake Variation do not share their alignments in this variation area. The Proposed Orange Route and East Bear Lake Variation have a common endpoint located southeast of Wolf Lake in the southern portion of the East Bear Lake Variation Area. The East Bear Lake Variation is over one mile longer than the Proposed Orange Route (Table 4-5)

4.3.3.3 Balsam Variation Area

The Balsam Variation Area is located in the central portion of the East Section (Map 4-14). The primary issue identified by commenters in this variation area is concern over potential impacts from the proposed transmission line on the town of Balsam. The Balsam Variation Area is overlapped by the Effie Variation Area to the north (Map 4-15). Table 4-5 and Map 4-17 provide details for the Balsam Variation Area.

Variations

There are three route alternatives within the Balsam Variation Area: the Proposed Blue Route, Proposed Orange Route, and the Balsam Variation (Table 4-5, Map 4-17). The proposed routes and

Balsam Variation have a common start point along the existing 230 kV transmission line corridor approximately one mile north of County Road 539 in the northeastern portion of the Balsam Variation Area. The Proposed Blue and Orange routes share one portion of their alignment in this variation area. The Proposed Orange Route and the Balsam Variation share one portion of their alignment in this variation area. The proposed routes and Balsam Variation have a common endpoint located near Diamond Lake Road in the southern portion of the Balsam Variation Area. The Balsam Variation is 5 miles longer than the Proposed Blue Route and about 4 miles longer than the Proposed Orange Route; the Proposed Orange Route is about one mile longer than the Proposed Blue Route (Table 4-5).

Alignment Modification

The Grass Lake Alignment Modification is located along the Proposed Blue Route in the northeastern portion of the Balsam Variation Area (Map 4-17). The alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-5). The alignment modification shifts the ROW east to avoid crossing Grass Lake, a MnDNR Public Waters Inventory (PWI) lake and a wild rice waterbody. The land ownership changes from private, corporate, and state forest lands to just corporate and state forest lands. Section 6.5.3.3 provides additional information on the Grass Lake Alignment Modification.

4.3.3.4 Dead Man's Pond Variation Area

The Dead Man's Pond Variation Area is located in the south-central portion of the East Section (Map 4-14). The primary issue identified by commenters in this variation area is the use of corporate and state fee lands instead of private land. The Dead Man's Pond Variation Area is located within the Balsam Variation Area (Map 4-15). Table 4-5 and Map 4-17 provide details for the Dead Man's Pond Variation Area.

Variations

There are two route alternatives within the Dead Man's Pond Variation Area: the Proposed Blue Route and the Dead Man's Pond Variation (Table 4-5, Map 4-17). The Proposed Blue Route and Dead Man's Pond Variation have a common start point just north of where the Proposed Blue Route crosses CSAH 8 in the northeastern portion of the Dead Man's Pond Variation Area. The Proposed Blue Route and Dead Man's Pond Variation do not share their alignments in this variation area. The Proposed Blue Route and Dead Man's Pond Variation have a common endpoint located approximately 0.5 miles south of CSAH 57 in the southwestern portion of the

Dead Man's Pond Variation Area. The Dead Man's Pond Variation is slightly longer than the Proposed Blue Route (Table 4-5).

Alignment Modification

The Dead Man's Pond Alignment Modification is located along the Proposed Blue Route in the south-central portion of the Dead Man's Pond Variation Area (Map 4-17). The alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-5). The modification shifts the alignment west and away from one residence; however, the shift is to private land that requires crossing a MnDNR PWI waterbody. Section 6.5.3.4 provides additional information on the Dead Man's Pond Alignment Modification.

4.3.3.5 Blackberry Variation Area

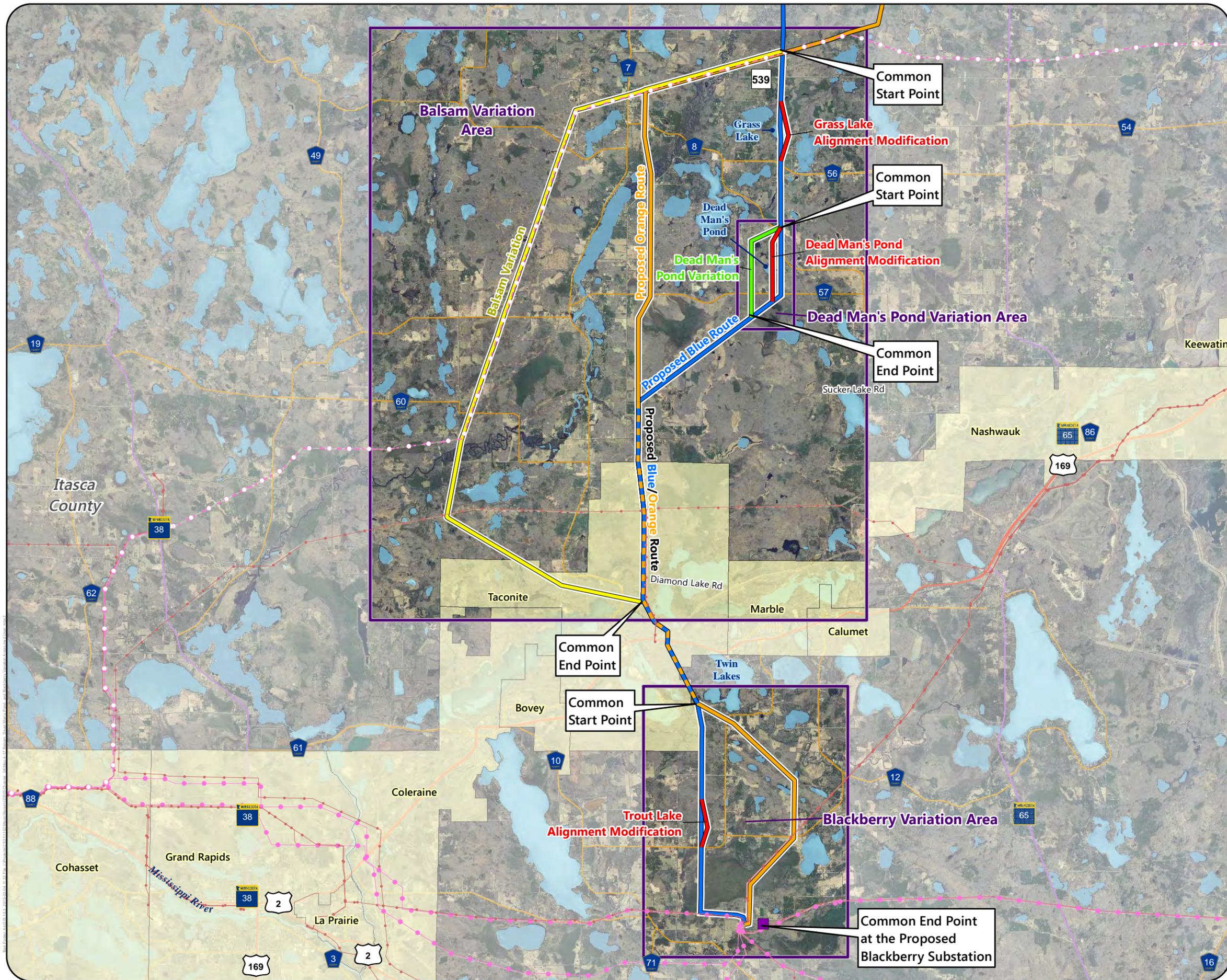
The Blackberry Variation Area is located in the southern portion of the East Section (Map 4-14). The primary issues identified by commenters in this variation area are the presence of the Mesabi Iron Range (with associated mining) and existing Blackberry Substation. The Blackberry Variation Area is located south of the Balsam Variation Area (Map 4-15). Table 4-5 and Map 4-17 provide details for the Blackberry Variation Area.

Variations

There are two route alternatives within the Blackberry Variation Area: the Proposed Blue Route and the Proposed Orange Route (Table 4-5, Map 4-17). These proposed routes have a common start point located west of Twin Lakes where the Proposed Blue/Orange Route diverges in the northwestern portion of the Blackberry Variation Area. The Proposed Blue and Orange routes do not share their alignments in this variation area. The proposed routes have a common endpoint located at the proposed Blackberry Substation in the southern portion of the Blackberry Variation Area. The Proposed Orange Route is less than one mile longer than the Proposed Blue Route (Table 4-5).

Alignment Modification

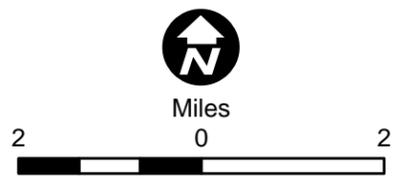
The Trout Lake Alignment Modification is located along the Proposed Blue Route in the western portion of the Blackberry Variation Area along the Proposed Blue Route (Map 4-17). This alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-5). The alignment modification shifts the alignment east from a mix of private and corporate lands to all corporate lands. Section 6.5.3.5 provides additional information on the Trout Lake Alignment Modification.



- Proposed Blackberry Substation Location
- Proposed Routes**
 - Blue/Orange Route
 - Blue Route
 - Orange Route
- Alternatives**
 - Balsam Variation
 - Dead Man's Pond Variation
 - Alignment Modification
- ⋯ Abandoned 230 kV Transmission Line Corridor
- Existing Transmission Lines**
 - 69 or 115 kV
 - 230 kV
- Streets and Highways**
 - US Highway
 - State Trunk Highway
 - County State Aid Highway
 - Local Road
- ▭ Variation Area
- ⊕ Municipal Boundary

Note:
 Anticipated alignments are shown offset for display purposes only. Please refer to more detailed maps for precise alignment placement.

The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



Map 4-17

BALSAM, DEAD MAN'S POND, AND BLACKBERRY VARIATION AREAS
 Great Northern Transmission Line
 Draft Environmental Impact Statement



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