



# Minnesota Department of Transportation

395 John Ireland Boulevard Mail Stop 678  
Saint Paul, MN 55155

Phone: 651-366-4635  
stacy.kotch@state.mn.us

August 10, 2015

William Cole Storm, Environmental Review Manager  
Minnesota Department of Commerce  
85 7th Place East, Suite 500  
St. Paul, Minnesota, 55101

Re: Great Northern Transmission Line Project and Associated Facilities  
PUC Docket Nos. ET015/TL-14-21  
DOE/EIS 0499

Dear Mr. Cole,

On June 19, 2015, the Minnesota Department of Commerce (DOC) issued a Notice of Availability of Draft Environmental Impact Statement and request for public comments on the Draft Environmental Impact Statement (DEIS) relating to the route permit application by Minnesota Power for the Great Northern Transmission Line Project and Associated Facilities in Beltrami, Itasca, Koochiching, Lake of the Woods, and Roseau Counties Minnesota. The Minnesota Department of Transportation (MnDOT) has reviewed the DEIS regarding the proposed transmission line project and submits the following comments in response to the Notice.

Both the Blue, Orange, Blue/Orange routes and route segment options evaluated in the DEIS have a number of locations that either cross or run parallel to highways that are part of the state trunk highway system and the National Highway System. As previously stated in MnDOT's Scoping Letter dated August 14, 2014, MnDOT's policy seeks to permit utilities to occupy portions of the highway rights of way where such occupation would not put the safety of the traveling public or highway workers at risk or unduly impair the public's investment in the transportation system. The enclosed comments also provide input on specific impacts associated with the proposed project discussed in the DEIS.

MnDOT appreciates the opportunity to comment and commends the Applicants and the DOC for their communication efforts throughout this process. MnDOT wishes to participate in the development of the EIS so that it will contain a thorough evaluation of the effects various route proposals may have on the state transportation system. MnDOT's fundamental interest is to ensure that the EIS identifies and quantifies, to the extent possible, any impacts the proposed high voltage transmission line (HVTL) may have on the safety of the transportation system, the effectiveness of the operations or maintenance of the state trunk highway system, and any additional costs that may be imposed on the state trunk highway fund as a result of the location of the proposed HVTL.

MnDOT has adopted a formal policy and procedures for accommodation of utilities on the highway rights-of-way ("Utility Accommodation Policy"). A copy of MnDOT's policy can be found at <http://www.dot.state.mn.us/policy/operations/op002.html>.

An Equal Opportunity Employer



MnDOT's approach to the high voltage transmission lines ("HVTL") involved in the Applicants' proposal is to work to accommodate these HVTLs within or as near as feasible to the trunk highway rights of way, based on an evaluation of the specific locations to ensure that appropriate clearance is maintained to preserve the safety of the traveling public and highway workers and the effective operation of the highway system now and in the foreseeable future. MnDOT's Utility Accommodation Policy seeks to guide the balance between accommodation of utility operations in the highway rights of way and preserving the safe and efficient operation of the transportation system.

The provisions of the Utility Accommodation Policy are based on the framework of several interrelated state and federal laws that led to its creation. These comments will outline the legal and regulatory structure under which the Policy was adopted, and will then discuss the types of circumstances and concerns that must be considered when applying the Utility Accommodation Policy to a specific situation as MnDOT works to accommodate a utility in a highway right of way while preserving the safe and efficient operation of the highway. The comments will provide as much specific information as is possible at this time on locations where the HVTL routes proposed by Applicants in this application either cross or run parallel to the trunk highway system. Finally, these comments will discuss a few specific portions of the DEIS.

#### I. Legal Framework Applicable to MnDOT's Utility Accommodation Policy

MnDOT's policy regarding accommodation of utilities is governed by both federal and state statutes and regulations. These comments will first describe the primary federal laws and then the state laws

##### A. Applicable Federal Laws

Certain highways in Minnesota are part of the National Highway System, which is established under 23 U.S.C. §103. The National Highway System and the Dwight D Eisenhower National System of Interstate and Defense Highways (Interstate System) are together known as the Federal-aid System. 23 U.S.C. §103(a). See also 23 CFR Part 470. In addition to the highways on the National Highway System, other highways also receive federal funding. Together, the highways in the National Highway System, the Interstate System, plus the other highways that receive federal funding are known as "Federal-aid highways." 23 CFR §470.103. Any of the highways in Minnesota that are potentially impacted by the Great Northern Transmission Line route proposal could be Federal-aid highways.

Congress articulated the transportation policy of the United States in 23 U.S.C. §101(b). Among other things, Congress noted that "it is in the national interest to preserve and enhance the surface transportation system to meet the needs of the United States for the 21st Century," that "the current urban and long distance personal travel and freight movement demands have surpassed the original forecasts and travel demand patterns are expected to continue to change," and that "special emphasis should be devoted to providing safe and efficient access for the type and size of commercial and military vehicles that access designated National Highway System intermodal freight terminals." 23 U.S.C. §101(b)(3)(A), (B) and (E).

Federal law requires that "The real property interest acquired for all Federal-aid projects . . . shall be adequate for the construction, operation, and maintenance of the resulting facility and for the protection of both the facility and the traveling public." 23 C.F.R. §710.201(e). In

An Equal Opportunity Employer



addition, all real property that is part of the Federal-aid highway system must be devoted exclusively to highway purposes unless an alternative use is permitted by federal regulation or the Federal Highway Administration ("FHWA"). This basic proposition is stated in 23 C.F.R. §710.403, which provides:

"(a) The [State Transportation Department] must assure that all real property within the boundaries of a federally-aided facility is devoted exclusively to the purposes of that facility and is preserved free of all other public or private alternative uses, unless such alternative uses are permitted by Federal regulation or the FHWA. An alternative use must be consistent with the continued operation, maintenance, and safety of the facility, and such use shall not result in the exposure of the facility's users or others to hazards."

Similarly, 23 C.F.R §1.23 restricts use of the highway right of way unless otherwise permitted. This section provides:

"(a) Interest to be acquired. The State shall acquire rights-of-way of such nature and extent as are adequate for the construction, operation and maintenance of a project.

(b) Use for highway purposes. Except as provided under paragraph (c) of this section, all real property, including air space, within the right of way boundaries of a project shall be devoted exclusively to public highway purposes. No project shall be accepted as complete until this requirement has been satisfied. The State highway department shall be responsible for preserving such right of way free of all public and private installations, facilities or encroachments, except (1) those approved under paragraph (c) of this section; (2) those which the Administrator approves as constituting a part of a highway or as necessary for its operation, use or maintenance for public highway purposes and (3) informational sites established and maintained in accordance with Sec. 1.35 of the regulations in this part.

(c) Other use or occupancy. Subject to 23 U.S.C. 111, the temporary or permanent occupancy or use of right of way, including air space, for nonhighway purposes and the reservation of subsurface mineral rights within the boundaries of the rights of way of Federal-aid highways, may be approved by the Administrator, if he determines that such occupancy, use or reservation is in the public interest and will not impair the highway or interfere with the free and safe flow of traffic thereon."

(Emphasis added.)

Federal law recognizes accommodating the placement of utility facilities as a permissible exception to the general mandate that all of a highway right of way, including the air space above the right of way, must be used solely for highway purposes. Section 109(l) of Title 23 of the U. S. Code provides:

"(1) In determining whether any right of way on any Federal-aid highway should be used for accommodating any utility facility, the Secretary shall—

- (A) first ascertain the effect such use will have on highway and traffic safety, since in no case shall any use be authorized or otherwise permitted, under this or any other provision of law, which would adversely affect safety;
- (B) evaluate the direct and indirect environmental and economic effects of any loss of productive agricultural land or any impairment of the productivity of any

An Equal Opportunity Employer



agricultural land which would result from the disapproval of the use of such right of way for the accommodation of such utility facility; and  
 (C) consider such environmental and economic effects together with any interference with or impairment of the use of the highway in such right of way which would result from the use of such right of way for the accommodation of such utility facility.<sup>44</sup>

The U.S. DOT has implemented this statutory directive by adopting the rules relating to accommodation of utilities found at 23 C.F.R. Part 645, Subpart B. These regulations require that each state transportation department submit its policies for accommodating utilities within highway rights of way to the FHWA. 23 C.F.R §645.215(a). See also 23 C.F.R §645.209(c). The FHWA will approve the policy upon determination that it is consistent with federal statutes and regulations, and any changes to the policy are also subject to FHWA approval. 23 C.F.R §645.215(b) and (c). Once a state's policy has been approved by the FHWA, the state transportation department can approve requests by a utility to use or occupy part of the right of way of a highway that is part of the Federal-aid highway system if the request is encompassed by that policy. Exceptions to the policy can be granted, but if a state proposes to grant to a utility an exception to its utility accommodation policy, the exception is subject to review and approval by the FHWA. 23 C.F.R § 645.215(d). This may be considered a federal action which would need to meet all requirements of the National Environmental Policy Act (NEPA), 42 U.S.C. §4321 et seq., to be in conformance with federal regulations.

## B. Applicable Minnesota Laws

In addition to these federal laws, MnDOT's policy on utility accommodation must also conform to laws of the State of Minnesota. Article 14 of the Minnesota Constitution establishes the state trunk highway system. It also establishes "a trunk highway fund which shall be used solely for the purposes [of constructing, improving and maintaining the trunk highway system]." Minn. Const. Art. 14, §5. Under Minn. Stat. §161.20, the Commissioner of the Department of Transportation is charged with the responsibility to carry out the directive of Article 14 to construct, improve and maintain the trunk highway system, subject to the directive that trunk highway funds may be used only for trunk highway purposes.

Minnesota has several statutes relating to use of highway rights of way by utilities. Minn. Stat. §222.37, Subd. 1, provides in part:

"Any . . . power company . . . may use public roads for the purpose of constructing, using, operating, and maintaining lines . . . for their business, but such lines shall be so located as in no way to interfere with the safety and convenience of ordinary travel along or over the same; and in the construction and maintenance of such line . . . the company shall be subject to all reasonable regulations imposed by the governing body of any county, town or city in which such public road may be."

Minn. Stat. § 161.45 provides additional obligations for utility facilities occupying portions of a trunk highway right of way. Section 161.45, Subd. 1 provides in part:

"Electric transmission . . . lines . . . which, under the laws of this state or the ordinance of any city, may be constructed, placed or maintained across or along any trunk highway . . . may be so maintained or hereafter constructed only in accordance with such rules as

An Equal Opportunity Employer



may be prescribed by the commissioner who shall have power to prescribe and enforce reasonable rules with reference to the placing and maintaining along, across, or in any such trunk highway of any of the utilities hereinbefore set forth."

Subdivision 2 of §161.45 specifies the general rule that if the relocation of a utility placed in a trunk highway right of way is necessitated by a construction project on the trunk highway, the utility bears the costs associated with the relocation of its facility. However, if a utility facility is located on the Interstate System, then the cost of relocation of such facility is to be paid out of the state Trunk Highway Fund. See Minn. Stat. § 161.46.

Minnesota Rules part 8810.3100 through 8810.3600 contain rules relating to placement of utility facilities in trunk highway rights of way. Under part 8810.3300, a utility must obtain a permit for any construction or maintenance work in a trunk highway right of way. In addition, Subp. 6 of part 8810.3300 requires that, except for the negligent acts of the state, its agents and employees, the utility shall assume all liability for and save the state harmless from any and all claims arising out of the utility's work and occupation of a portion of the trunk highway right of way.

**C. MnDOT's Utility Accommodation Policy**

MnDOT has adopted a policy statement regarding the circumstances and methods under which it will grant permits to utilities to occupy a portion of a trunk highway right of way. MnDOT's Utility Accommodation Policy is in conformance with the federal and state statutes and regulations described above, and is also consistent with the American Association of State Highway and Transportation Officials (AASHTO) publications, A Guide for Accommodating Utilities Within Highway Right of way and A Policy on the Accommodation of Utilities Within Freeway Right of way. MnDOT's Utility Accommodation Policy has been reviewed and approved by FHWA under 23 CFR §645.215(b). Therefore, with respect to Federal-aid highways, further review and approval by the FHWA is required for MnDOT to grant an exception to the general application of the Policy, but FHWA review and approval is not necessary for permits granted within the scope of the Policy.

MnDOT's Utility Accommodation Policy recognizes that it is in the public interest for utility facilities to be accommodated on highway rights-of-way when such use would not interfere with the flow of traffic and safe operation of vehicles or otherwise conflict with applicable laws or impair the function of the highway. The Policy applies to all utilities, both public and private. Therefore it speaks in somewhat generic terms to cover as many anticipated situations as possible.

**II. Overview of Transportation-Related Impacts of HVTLs on Trunk Highways**

The preferred and alternate routes proposed by the Applicants in this matter either cross over or run parallel to trunk highways in a number of locations. When a route is ultimately selected by the Minnesota Public Utilities Commission (MPUC), the Applicants will need to obtain a valid permit from MnDOT in any location where the HVTL will occupy any portion of the highway right of way. It is acknowledged that the Applicant states multiple times that the potential impacts to the state transportation system will be limited, short-term and localized.

0187-1

As discussed in Section 1.3.3, the Applicant will work with MnDOT to obtain necessary permits once a final route is selected.

No changes are made to the EIS in response to this comment.

0187-1

An Equal Opportunity Employer



0187-1 0187-1 cont'd  
Continued

In anticipation of the time when the Applicants will submit applications for permits after a final route is selected, MnDOT has engaged in an ongoing dialogue with representatives of the Applicants and the DOC in an effort to identify information that will be needed to assess the permit applications and, to the degree that specificity is possible at this stage of the proceedings, areas where specific concerns will need to be addressed along various potential route/alignment scenarios. MnDOT believes these discussions have been beneficial for all participants. The discussions have been challenging due to the large number of locations where the proposed HVTL routes and the trunk highways potentially intersect, the variety of unique circumstances that exist along each of these potential locations, and the number of unknowns and uncertainties surrounding the selection of the actual locations where the Applicants will eventually apply for permits from MnDOT.

One of the concepts that has been discussed with the Applicants and the DOC is the importance of recognizing that highway rights of way do not have a uniform width. The width of the right of way, and the distance from the centerline of the roadway to the boundary of the right of way, varies from highway to highway, and even from mile to mile along a given highway. The reasons for this variability are many, and include considerations such as the time when the right of way was purchased, the topography and geology of the area, the negotiations with the individual landowners from whom the right of way was acquired, and the timing and nature of changes and upgrades to the highway that have occurred over the years.

Therefore, a uniform policy that an HVTL can safely be located "X" feet or "Y" feet outside the highway right of way boundary line generally does not work well. A two-dimensional map does not provide sufficient information to determine a suitable alignment for a HVTL. Rather, MnDOT's approach is to evaluate the type of activities that regularly occur on and along highways. These activities can be evaluated in three groups – (a) traffic that uses a highway, (b) maintenance, repair and related activities and structures associated with the ongoing operation of the highway, and (c) construction activities that are likely to occur in the foreseeable future. These functions or uses of the highway each have a zone – i.e., a height and width – in which they take place either along the roadway surface or in the ditches, near bridges, intersections or interchanges where the maintenance and construction activities take place.

Once the zones of these recurring highway activities are identified, a safety buffer zone from the location of the energized wires of the HVTLs must be applied. The Occupational Safety and Health Administration (OSHA) and the National Electric Safety Code (NESC) can provide guidance on the safety clearances for activities near various voltages of HVTLs. The OSHA or NESC safety buffer should be applied between the zones of transportation activities and the location of the energized lines.

1. Traffic That Uses a Highway

Minnesota's trunk highways are designed to facilitate both personal travel and the distribution of freight throughout the state. Pursuant to Minn. Stat. §§169.80 and 169.81, vehicles that do not exceed 13 feet 6 inches in height and 8 feet 6 inches in width can be operated on Minnesota's highways without a permit. Vehicles with larger dimensions, excluding farm vehicles, must obtain a permit. On average, MnDOT has issued tens of thousands of permits each year for oversized vehicles to operate on state trunk highways. These do not include oversized farm machinery (which do not require a permit) nor movements of houses or other buildings such as

0187-2

As discussed in Section 2.13 and Section 5.2.1.6, the Applicant will work with MnDOT to obtain necessary oversized permits.

No changes are made to the EIS in response to this comment.

0187-2

An Equal Opportunity Employer



grain bins. The number of building moves varies between 400 and 600 per year. Of the oversize vehicle permits issued, some were for vehicles over 18 feet 5 inches high. An example of the type of oversize loads frequently transported over trunk highways are the blades, base sections and nacelles used in constructing wind turbines.

In addition to freight and building moves, other traffic on the roadway portion of trunk highways includes such activities as snowplows, which operate on both the roadway and the shoulder. Snowplows are about 13 feet tall, and when their boxes are raised to distribute sand and salt, their height can reach as high as 18 feet.

## 2. Maintenance, Repair and Operational Activities

In addition to the zone associated with traffic traveling on a highway, there is another zone associated with maintenance and operational activities alongside the roadways. Examples of maintenance activities performed by highway workers, and the types of equipment commonly associated with those activities, include the following:

- guardrail and fence installation and repairs, using augers, loaders and skidsteers (which commonly have raised buckets for pulling posts, etc.).
- vegetation control, using mowers, bucket trucks for tree trimming, and equipment for applying herbicides.
- cleaning ditches, culverts and drains, using backhoes and excavators of various sizes that have boom arms that are used to scoop dirt and vegetation and deposit it into a dump truck that will be parked alongside the highway. MnDOT's larger ditch dredging equipment has a horizontal reach as long as 60 feet and a vertical operating dimension of up to 47 feet.
- vehicular accidents on highways often require special equipment to retrieve vehicles and repair damage. For example, when large vehicles such as trucks or buses run off the road or go down large ditches or into wetlands, large equipment with booms or winches may be used to pull them out.
- bridge inspections, using snoopers which have articulating arms that can lift a worker out over the side and then underneath the bridge structure.

Occasionally there is a need for immediate medical transport from roadside locations due to accidents and illnesses. For these situations there are a number of air medical helicopters stationed throughout Minnesota that will land in the roadside environment. These aircraft require clear approach and departure paths as well as an area large enough for the helicopter to land. Given the dimensions of the helicopters used in Minnesota, an area with a diameter of 90 feet should be considered the minimum requirement for landing. There should be two approaches to this area from different directions separated by an arc of at least 90° so that the aircraft can land and take off without a tailwind. Powerlines can be a particularly difficult obstruction for helicopter landings at night. The lines themselves are nearly invisible to the pilot, who must use the presence of poles as evidence that the lines exist. Most helicopters operating in this environment have line cutters installed on the aircraft to cut powerlines they encounter.

Even so, helicopter crashes occur when powerlines get entangled in their rotor system or landing gear.

An Equal Opportunity Employer



0187-2 cont'd

0187-2  
Continued

0187-3

Thank you for providing information on the MnDOT maintenance and operational activities along roadways. Once a route is selected, the Applicant will work with MnDOT to ensure that medical helicopters are able to safely land in the vicinity of the proposed Project and that physical structures maintained by MnDOT are not affected.

0187-3

No changes are made to the EIS in response to this comment.

0187-3 cont'd

MnDOT also maintains a number of structures alongside highways necessary for the safe and efficient operation of the highway, each of which requires periodic installation, maintenance and repair work. Examples of these structures include:

- road signs. The largest signs tend to be on freeways. Signs that extend out over the travel portion of a freeway must have 17.33 feet of clearance to the bottom of the sign, and the top of such signs can be 30.5 feet tall and may require boom trucks, bucket trucks or cranes to install or maintain such signs. Roadside guide signs along freeways can reach 13 feet tall and tend to be located as far out in the clear zone as practical.
- light posts, traffic control signals and poles for traffic monitoring cameras exist at various locations along highways, and range in height from 20 to 50 feet.
- high mast light towers are used along some freeways, and range in height from 100 to 140 feet.
- noise walls, which can be up to 20 feet high, are becoming increasingly common along freeways.

Another type of physical item located along highways is snow fences, either structural or living. Some snow fences are in the highway right of way, and others are placed by agreement with adjoining landowners and may be 150 feet off the highway right of way. MnDOT is usually able to work out arrangements with a utility owner regarding height and placement of vegetation used as a living snow fence in locations where a utility is placed. If living snow fences owned by MnDOT need to be removed or relocated to accommodate a utility placement, compensation for the removed vegetation is usually required as a condition for issuance of the permit.

### 3. Future Construction Activities

MnDOT continually evaluates the future needs for the trunk highway system and has construction projects in varying stages of development. Some have been designed and funded and are ready for construction. Others have been identified as needed or are anticipated due to development trends but have not yet been funded. The types of construction projects MnDOT performs that could be impacted by the location of a HVTL range from relatively minor changes to the width of a highway to major reconstruction projects. Examples of such construction projects might include:

- widening a roadway by addition of travel lanes or turn lanes, installation of a roundabout, or widening a shoulder area;
- rebuilding a highway in a way that changes the location or grade of a roadway; and
- addition of an overpass or interchange on a freeway or other highway.

In addition to changes in the configuration of a highway, consideration must be given to the equipment used during the construction process. Construction projects often involve the use of large excavators and cranes similar in size to the equipment described above which MnDOT uses for its maintenance activities. The equipment used in bridge work is especially large, usually requiring cranes with long booms to lift material into place. The equipment used on construction projects also needs to be refueled at the job site, which requires consideration of the safety precautions necessary for this procedure.

0187-3

Continued

0187-4

Should MnDOT construction activities be necessary in the future that would require relocation of transmission line structures from the proposed Project, the Applicant would be responsible for the costs associated with the relocation (See Section 5.2.1.6). Identifying potential costs for future relocation activities are beyond the scope of this EIS.

No changes are made to the EIS in response to this comment.

0187-4

An Equal Opportunity Employer



The activities associated with vehicular traffic using the roadway surface have a zone in which they typically occur. In addition to evaluating these zones of activity, MnDOT will also consider factors such as the width of the right of way, the topography of the land and the geometry of the roadway in a specific location when assessing the suitability of that location for an HVTL to occupy a portion of a highway right of way.

Location of a HVTL in close proximity to a highway right of way limits future expansion or reconstruction of highways due to the complex and extremely costly nature of either moving the transmission lines or moving the path of the highway. In order for the Minnesota Public Utilities Commission to make a fully-informed selection of a route based on all the pros and cons of the various alternatives, these costs should be recognized and evaluated in the EIS evaluation of the impacts of the proposed routes. The EIS should include an evaluation of the risk of trunk highway funding liabilities, and the potential magnitude of such liabilities, that may be imposed on the Trunk Highway Fund resulting from various proposed alignments along trunk highway rights-of-way.

**III. Routes, Route Segment and Route Variation Proposals**

In applying its Utility Accommodation Policy to a permit application, MnDOT must evaluate each proposed pole location individually in relation to the topography of the land, the geometry of the roadway, the width of the highway right of way, the design of the HVTL structures, and other factors. Given the variability of these factors and the large number of potential locations, MnDOT is not able to provide specific answers at this time about whether it can grant permits for the potential locations where the various route proposals intersect with highway rights of way. As referenced earlier, MnDOT's approach to the Applicants' proposal is to work to accommodate these HVTLs within or as near as feasible to the highway rights of way, based on an evaluation of the specific locations to ensure that appropriate clearance is maintained to preserve the safety of the traveling public and highway workers and the effective operation of the highway system now and in the foreseeable future.

To the degree that specificity is possible at this stage in the process, MnDOT will provide additional information about the locations proposed in the routes involved in the Applicant's proposals.

**A. Highway Crossing Locations Proposed by the Applicants**

The Applicant's preferred and alternate route proposals contain over 15 locations where the proposed HVTLs would cross over a trunk highway, as distinguished from circumstances where it would run parallel to the highway.

Highway crossings generally do not pose insurmountable difficulties in issuing a permit. MnDOT routinely grants such permits to a variety of types of utilities. These permits usually have conditions associated with them, such as placement of the poles so that they do not become a physical obstruction that might be struck by an errant vehicle or block the visibility of traffic. MnDOT also does not permit utilities to run diagonally across intersections, and prefers that crossings occur as close to right angles as possible. Special handling may be required for crossings of scenic byways. MnDOT has a long history of working with utilities, including the Applicants, to establish appropriate conditions in locations where the utility seeks to cross a trunk highway. With the locations proposed by the Applicants in this matter, MnDOT does not

An Equal Opportunity Employer



0187-4 0187-4 cont'd  
Continued

0187-5

The Applicant will work with MnDOT to ensure the proposed Project complies with the Utility Accommodation on Highway Right of Way requirements set forth in the MnDOT Utility Accommodation and Coordination Manual.

No changes are made to the EIS in response to this comment.

0187-5

anticipate encountering such difficulties that there would be locations where it would be unable to grant permits, with appropriate conditions, for the highway crossings proposed in this matter.

**B. Locations Parallel to Highway Rights of Way Proposed by the Applicants**

Section 5.2.1.6 of the DEIS identifies the locations where each of the various potential routes under consideration run parallel to or cross highways and roads. Some of the locations identified are roads or streets maintained by local highway authorities and are not part of the trunk highway system for which MnDOT is the responsible highway authority. The highway locations identified in the DEIS that are part of the trunk highway system over which MnDOT has jurisdiction include MN 1, MN 6, MN 11, MN 38, MN 46, MN 65, MN 72, MN 89, MN 217, MN 308, MN 310, MN 313, US 2, US 71 and US 169.

**IV. Specific Comments on Matters Discussed in the DEIS**

Although MnDOT cannot at this time state with specificity where permits might be granted for each of the locations listed above, there are a few situations where some additional information can be provided that would assist in the development of the EIS.

Section 2.12.1 Transmission Line Maintenance and Operation. On page 40, the DEIS discusses the maintenance and inspection of the transmission line that will be necessary during the life of the structures. The EIS should note that in any locations where the Applicants seek to gain access to the HVTL from a trunk highway for these purposes, or trim vegetation in a trunk highway right of way; they will need to coordinate these activities with MnDOT's Roadside Vegetation Management Unit and obtain any necessary approvals for these activities.

Section 5.2.1.6 – Roadways and Railways in the ROI. Railroads that could be affected by a HVTL route application should be part of the discussions to identify impacts of the proposed routes. Where a proposed HVTL may parallel highway rights of way and there is an existing freight railroad right of way adjacent to the highway, there may not be enough room for construction of the transmission lines outside of the clear zones for both the railroad and the highway. The clear zone is an area that must be free from obstructions or other hazards. The railroads may also have concerns with overhead crossings in their right of way, gate clearances, foundations, and electrical buildup on the rails.

General Impacts, Construction Impacts and Operation, Maintenance, and Emergency Repair Impacts. PUC route permit conditions should include mitigation measures relating to any short term impacts to roadways including but not limited to; temporary closing of roadways, traffic delays, halting of construction for traffic and train accommodation, physical damage to roadways, right of way restoration, temporary MnDOT land access and proper Oversized/Overweight permitting.

Section 5.2.1.9 Recreation and Tourism. On page 140, the DEIS identifies the scenic byways impacted by the routes under considerations – i.e., MN 11, MN 38, and MN 46. Scenic byways are designated because they possess one or more of six intrinsic qualities, including scenic, cultural, recreational, natural, historic and archaeological. An analysis of the physical and visual impact on these intrinsic qualities should be conducted at each proposed crossing location to determine the route with the least adverse impact on the byway routes and corridors. Mitigation

0187-5 0187-5 cont'd  
Continued

0187-6

0187-6

Thank you for the clarification regarding trunk highways that are under MnDOT's jurisdiction, as discussed in Section 5.2.1.6.

No changes are made to the EIS in response to this comment.

0187-7

Information regarding coordination between the Applicant and MnDOT for access to the transmission line from a trunk highway is included in Section 2.12.1 of the EIS.

0187-7

0187-8

Coordination with rail operators is discussed in Section 5.2.1.6. The Applicant will ensure that the proposed Project does not affect the clear zones or any railway operations.

No changes are made to the EIS in response to this comment.

0187-8

0187-9

Applicant Proposed Measures to minimize impacts would be potential MN PUC permit conditions and are discussed in Section 2.13. Further, MN PUC permit conditions will require the Applicant to coordinate with the MnDOT to ensure the proposed Project complies with the Utility Accommodation on Highway Right of Way requirements set forth in the MnDOT Utility Accommodation and Coordination Manual.

No changes are made to the EIS in response to this comment.

0187-9

0187-10

0187-10

Proposed routes and variations cross three scenic byways at a total of five locations for the proposed Project. Detailed analyses of the visual impacts at all five locations where a route variation crosses a scenic byway have not been prepared as part of the Draft EIS. However, detailed analyses and visual simulations were prepared for three route crossings at two scenic byways: Waters of the Dancing Sky Scenic Byway (State Route 11) and Edge of the Wilderness Scenic Byway (State Route 38). These analyses are

An Equal Opportunity Employer



included in Sections 6.2.2.1 and 6.3.6.1 respectively, and visual simulations for these crossings are included in Appendix N, Photo Simulations. The EIS analyzes the contrast produced by the transmission line crossing at these locations. For the two viewpoints for the Waters of the Dancing Sky Scenic Byway (State Route 11), the Draft EIS concludes that the transmission line "would not substantially diminish the visual character or quality of views in this area of the scenic byway." For the viewpoint for the Edge of the Wilderness Scenic Byway (State Route 38), the EIS concludes that the transmission line "would interrupt views of the otherwise natural character of the forest landscape in this area of the scenic highway and diminish the aesthetic quality for viewers with high viewer sensitivity." These analyses and visual simulations are intended to describe and illustrate typical views of the transmission line crossings of scenic byways to provide reviewers with representative examples of what the proposed project would look like at these and the other two locations.

For locations where a proposed route or variation crossing of a scenic byway results in a visual impact, it may be possible to minimize or mitigate the impact by adjusting the alignment to cross perpendicular to the scenic byway (as is currently proposed by the Applicant), micro-siting structure positions to locate them as far as possible away from the edges of the highway, darkening the finish on structures to reduce color contrast, using non-specular conductors, and/or feathering vegetation edges of cleared rights-of-way in the vicinity of the highway to reduce contrast.

Once the proposed Project route is selected, the Applicant will coordinate with the affected scenic byway leaders' group and/or stakeholder group in order to identify any specific measures that may be employed to minimize visual impacts and identify any prohibitions or limitations associated with scenic easements in the vicinity of scenic byway crossings.

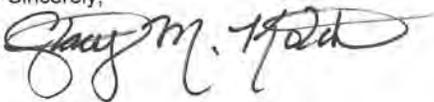
No changes are made to the EIS in response to this comment.

measures should be recommended for unavoidable impacts on intrinsic qualities within the byway corridors. Each scenic byway has a leaders' group and/or stakeholder group which should be contacted as part of the environmental review process. Scenic easements should be investigated to identify any prohibitions or limitations that apply to land uses in the vicinity of the scenic byway.

Finally, MnDOT wishes to underscore the importance of preserving sufficient flexibility for MnDOT to work with the applicant to determine an appropriate specific location for each pole to be placed along a trunk highway right of way. As the selection of the final route is made, in all locations where the route will cross or run parallel to a trunk highway it is imperative that the designated route be sufficiently wide so that MnDOT and the applicant can work collaboratively to address the circumstances at each location and determine a specific alignment that can be permitted consistent with the considerations described in this letter.

MnDOT has a continuing interest in working with the DOC to ensure that possible impacts to highways and other transportation infrastructure are adequately addressed. We appreciate the opportunity to provide these comments. Please feel free to contact me if you have any questions regarding the information provided.

Sincerely,



Stacy Kotch  
Utility Transmission Route Coordinator  
Minnesota Department of Transportation

cc: Stephen Frisco – MnDOT District 2A Permits  
Darren Laesch – MnDOT District 2 Planning Director  
Earl Hill – MnDOT District 2B Permits  
Wayne Scheer – MnDOT District 1 Permits

0187-10 0187-10 cont'd  
Continued

0187-11  
Applicant Proposed Measures to minimize impacts would be potential MN PUC permit conditions and are discussed in Section 2.13. Further, MN PUC permit conditions will require the Applicant to coordinate with the MnDOT to ensure the proposed Project complies with the Utility Accommodation on Highway Right of Way requirements set forth in the MnDOT Utility Accommodation and Coordination Manual.

No changes are made to the EIS in response to this comment.

An Equal Opportunity Employer





IN REPLY REFER TO:

## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

5600 American Boulevard West, Suite 990  
Bloomington, Minnesota 55437-1458



AUG 10 2015

FWS/R3/ER15-306

Ms. Julie Ann Smith, Environmental Protection Specialist  
Office of Electricity Delivery and Energy Reliability (OE-20)  
U.S. Department of Energy  
1000 Independence Avenue S.W.  
Washington, D.C. 20585

Dear Ms. Smith,

The Fish and Wildlife Service (Service) thanks the Department of Energy (DOE) for the opportunity to comment on the Draft Environmental Impact Statement for the Great Northern Transmission Line (GNTL, DOE/EIS 0499). The Service has been closely involved in this project for several years providing technical assistance regarding impacts of this project on important wildlife, resources, and habitat. The Service has submitted four letters to date on this project:

- March 4, 2014: From the Service to the Minnesota Department of Commerce.
- July 1, 2014: From the Service to Minnesota Power (the Applicant).
- August 11, 2014: From Department of Interior (Office of Environmental Policy and Compliance) to DOE (electronically submitted as a draft letter by the Service to DOE November 20, 2014 and again as a signed letter by the Service to DOE July 22, 2015 due to a clerical error).
- August 14, 2014: From the Service to DOE.

In all of these letters, the Service has stated that the GNTL (both construction and long-term use) has the potential to impact Service interest lands, threatened, endangered, or species of concern, migratory birds, bald and golden eagles, wetlands, and wildlife habitat. The Service has emphasized avoidance and minimization of impacts to these resources, as well as appropriate mitigation for impacts that cannot be practicably avoided. The Service continues to stand by these previous comments and recommendations. This letter serves to outline the Service's recommendations on route selection, alignment modification, and additional comments on avoiding and minimizing impacts to migratory birds, listed species, and wetland/vegetation resources. The Service has additionally included a path forward for minimization and mitigation of potential impacts to Service interest lands. The Service makes these recommendations pursuant to the National Wildlife Refuge

0188-1

0188-1

Potential impacts to these resources are discussed in Chapter 6 of the EIS.

No changes are made to the EIS in response to this comment.

Dr. Julie Ann Smith, Environmental Protection Specialist

2

Administration Act (NWRA), Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), Executive Order (E.O.) 13186, Department of Energy's Migratory Bird Program Partnership Agreement, Bald and Golden Eagle Protection Act (BGEPA), Federal Aid in Wildlife Restoration Act (Pitman-Robertson Act), Federal Aid in Sport Fish Restoration Act (Dingell-Johnson Act), and Fish and Wildlife Act of 1956.

#### Route Recommendation and Avoidance of Service Interest Lands

The Service administers numerous tracts within the proposed GNTL routing options as part of the National Wildlife Refuge System (NWRS). Service administered and managed lands are acquired for the preservation of wildlife and their habitats. As stated in previous letters (see above), preservation and avoidance of impact to Service interest lands is one of the Service's highest priorities. The Service is supportive of both route alternatives and alignment modifications that maximize avoidance of Service interest lands. The Service favors a weighted tiered approach of avoidance, minimization, and mitigation of impacts.

The Service recommends the following routes and alignments be chosen for the final route selection:

- In the West section of the project, the Service recommends the selection of the Cedar Bend WMA variation, Hop 2 and the Beltrami North Central Variation 4. The Service believes the combination of these variations is the least impactful option with respect to wildlife, wetland, and forestry resources, as compared to the Applicant's preferred route outlined in the DEIS. Additionally, these variations will completely avoid all refuge impacts in the Western Section of this project. Our reasoning is as follows:
  - The Service prefers the Cedar Bend WMA Variation because:
    - It completely avoids Service interest lands and state Wildlife Management Areas (the Applicant-proposed route impacts 6 acres of Service Lands).
    - It impacts less state forest land and wetlands, fewer sites identified by the Minnesota Department of Natural Resources (MN DNR) as having Biodiversity Significance, High Conservation Value Forests, or Native Plant Communities, and fewer wildlife resources.
    - The impacts to listed species are similar to the Applicant's preferred route.
    - This variation will result in an overall shorter route and can be built within an existing ROW.
  - The Service prefers the Beltrami North Central Variation Routes 4 because:
    - It completely avoids Service interest lands (the Applicant-proposed route impacts 18 acres).
    - It impacts fewer rare (plant) species, fewer sites of Biodiversity Significance, fewer overall impacts to forestry, vegetation, wildlife, shrub wetlands, and rare features.

0188-2

Sections 1.1 and 1.4.3 are revised to indicate that the USFWS has identified its agency preferred alternative, and directs the reader to a new Appendix (Appendix U) of the EIS.

0188-2

0188-2 cont'd

Dr. Julie Ann Smith, Environmental Protection Specialist

3

- It impacts less State Forest and State Fee lands.
  - It impacts a similar (but slightly higher) acreage of National Wetland Inventory (NWI) Wetlands (305 vs. 272 acres of the Applicant-proposed route).
  - It can be built within the existing ROW (except for <1 mile stretch).
  - Impacts to federally listed wildlife resources are similar.
  - The Service acknowledges these variations will result in a slightly longer transmission line and will have a greater impact to water resources. Additionally, slightly more emergent and forested wetlands will be impacted (28 and 169 vs. 23 and 119 acres respectively).
- The Service then recommends adoption of the blue route (where Beltrami North Central Variation 4 connects to the Blue Route).
  - In the Central Section of the project the Service recommends utilization of the Silver Creek WMA Alignment Modification to avoid Service interest lands (specifically the parcel located T-160, R-30, S-27)). The Service acknowledges this would create a new ROW and possible habitat fragmentation, but prefers this option to expanding the existing ROW on Service lands.
  - The Service then recommends the Blue Route be followed to the terminus of the project.

These recommendations by the Service should be considered our strongest recommendation and highest priority; not just one in a series of equally weighted options.

Should the above recommendations not be chosen for the final route selection, the Service recommends the following:

- In the West Section: Should the Cedar Bend WMA variation and the Beltrami North Central Variation 4 not be selected, the Service recommends examining the side-by-side comparison of the preferred route with the Beltrami North Variations 1&2, and the preferred route with the Beltrami North Central Variations 1, 2, 3, and 5 (detailed in the DEIS) to determine the least environmentally impactful alternative. Consideration should be given to existing ROW corridors as well as minimization of impact to wetland and forest resources.
- In the Central Section: If the Orange Route is selected as the final route, the Service recommends examining the side-by-side comparison of the proposed Orange Route and the Beltrami South Central and Beltrami South variations to determine the least environmentally impactful alternative. Consideration should be given to existing ROW corridors as well as minimization of impact to wetland and forest resources.
- In the Central Section: If the Orange Route (with the J2 Segment Option) is selected as the final route, the Service recommends the adoption of the Northholm Variation to avoid impacts to Service interest lands. Because neither the J2 Segment nor the Northholm variation parallel existing corridors, the Service would prefer the Service lands not be impacted.

0188-2 cont'd

0188-2  
Continued0188-2  
Continued

Dr. Julie Ann Smith, Environmental Protection Specialist

4

If it is determined that the Applicant's preferred alternative is the least environmentally impactful option, the Service expects continued coordination with the Applicant to avoid refuge lands within the larger corridor (alignment modifications). If alignment modification within the larger corridor still results in impacts to refuge resources, the Service expects continued coordination with the Applicant to identify, avoid, and minimize impacts to the most sensitive resources within refuge properties through construction and maintenance measures.

As stated in previous letters, any impact to Service interest lands must be mitigated. Please note that mitigation of impacts to Service interest lands will be separate from any mitigation for impacts to listed species, important wildlife resources, and migratory bird resources. The Service lays out the following timeframe, expectations, and requirements for mitigation of impacts to Service interest lands.

Mitigation must result in a net benefit with regard to resources impacted. The Service expects that off-site converted habitat (i.e., wetlands, forests, and grassland that have been converted into agricultural areas) be purchased, restored, and donated (or set into a perpetual easement). These lands will become part of the Service's National Wildlife Refuge System upon acceptance by the Service. Restored parcels must be off-site of areas where impact occurs, but should be in close proximity to existing Service properties. Additionally, mitigation should be in the form of large, contiguous parcels rather than many small isolated parcels. The Service can assist in locating suitable properties. The Service recommends the Applicant closely coordinate with refuge staff on the evaluation of suitable mitigation sites with potential to meet habitat mitigation requirements, before proceeding with acquisition and restoration efforts.

The Service understands that mitigation of impacts to Service interest lands (including assessing impacts and location, acquisition, restoration, and donation of land for mitigation) may take additional time and may lag behind the construction schedule of the GNTL. However, the Service expects that mitigation efforts will closely parallel other construction efforts and be completed in a timely manner. Therefore, should the applicant's preferred final route of the GNTL affect Service interest lands, the Service is prepared to grant a provisional special use permit to authorize construction and accommodate the GNTL's schedule. A final ROW permit will be granted after mitigation for impacts to Service interest lands has been completed and accepted by the Service. Please be aware that issuance of the special use permit authorizes construction activities only. Approval of additional special use permits by the refuge will be required by the Applicant for all activities that occur after the initial construction period or until the ROW is granted. A compatibility determination (by the Service) and dedication of the funds (by the Applicant) must be completed before the provisional special use permit is granted. The ROW request process was laid out in the Service's letter on July 1, 2014, as well as in an email dated March 26, 2015. Additionally, the Service is available to help the Applicant begin this process.

0188-3

The Applicant will work with USFWS to determine the mitigation necessary for the route that will be selected by the MN PUC.

No changes are made to the EIS in response to this comment.

0188-3

Dr. Julie Ann Smith, Environmental Protection Specialist

5

### Migratory Bird Impacts

The Migratory Bird Treaty Act (MBTA) prohibits taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. Bald and golden eagles are afforded additional legal protection under the Bald and Golden Eagle Protection Act (BGEPA, 16 U.S.C. 668-668d). Executive Order (E.O) 13186 ("Responsibilities of Federal Agencies to Protect Migratory Birds") was signed in January of 2001. Its purpose is to further the purposes of the migratory bird conventions, the MBTA, the BGEPA, the Fish and Wildlife Coordination Act, the Endangered Species Act (ESA), the National Environmental Policy Act (NEPA), and other pertinent statutes.

As called for in E.O. 13186, a Memorandum of Understanding (MOU) between DOE and the Service was signed in 2013. Its purpose is to strengthen migratory bird conservation through enhanced collaboration between DOE and the Service, in coordination with state, tribal, and local governments. Under the MOU, DOE agreed to "Protect, enhance, and manage habitats of migratory birds, to the extent practicable," including the following example: "When designing new projects, ensuring that they avoid important migratory bird habitats and otherwise avoid or minimize direct and indirect effects of new projects on migratory birds and their habitats, and when practicable and appropriate, restore and enhance bird habitat."(Section E(1)).

The Service recommends avoidance, minimization, and mitigation of impacts to migratory birds and eagles. These impacts may include, but are not limited to: habitat alteration and destruction, take and disturbance, indirect impacts and collisions and electrocution. Where impacts cannot be avoided or fully minimized, the Service will seek compensatory mitigation for removed habitat which was used by either migratory birds (under E.O. 13186 and the 2013 MOU between DOE and the Service) or by listed species (under the ESA). The Service definition for mitigation is taken from NEPA regulations which includes, "e) compensating for the impact by replacing or providing substitute resources or environments" (40 CFR, Section 1508.20).

The Service calculates mitigation for impacts to habitat for listed species and migratory birds using Habitat Equivalency Analysis (HEA). For a specific parcel of impacted habitat, the Service will only seek compensatory mitigation for listed species or migratory birds (i.e., there is no "double-dipping"). The Service strongly suggests the Applicant initiate contact to discuss the HEA analysis and mitigation for listed species and migratory birds as soon as possible to avoid construction delays. The Service also believes this issue needs to be resolved before a Final EIS can be completed and a permit issued.

The Service wishes to make the following specific comments on the DEIS with regards to migratory bird impacts:

0188-4

Section 5.3.4.3 of the EIS is updated to include information on Executive Order 13186 and the MOU between USFWS and DOE.

0188-4

As discussed in Section 2.11.1 of the EIS, the Applicant would incorporate industry best practices to minimize impacts to migratory birds, which are consistent with the Avian Powerline Interaction Committee (APLIC's) 2012 guidelines. In addition, the MN PUC Route Permit could require that the Applicant develop and implement an Avian Protection Plan. The Applicant would coordinate with the MnDNR and other appropriate agencies in the development of an Avian Protection Plan.

0188-4 cont'd

Dr. Julie Ann Smith, Environmental Protection Specialist

6

The Service has noted several contradictory statements in the DEIS regarding the protection and conservation of migratory birds:

*1.2.4.3. Although not formally subject to or part of an agency consultation process, take permits are not available under the MBTA.*

*5.3.4.3 The MBTA requires Federal agencies to consult with the USFWS to determine if an agency's proposed action would have, or is likely to have, measurable negative effects on migratory bird populations, and if so, to develop measures intended to avoid any negative effects on migratory birds.*

and

*5.3.4.3 The Federal Bald and Golden Eagle Protection Act require consultation with the USFWS to determine if a proposed project may have potential impacts on bald and golden eagles and, if applicable, to develop habitat conservation plans intended to avoid and minimize the project's impacts on the bald and golden eagles.*

Please note that responsibilities of federal agencies regarding the protection of Migratory Birds (including Bald and Golden Eagles) are outlined in E.O. 13186; and the implementation of this act is detailed in the MOU between DOE and the Service (2013).

*1.2.4.3: The Applicant, therefore, has proposed mitigation measures to minimize impacts on migratory birds.*

As discussed above, there exists a MOU between FWS and DOE to help protect migratory bird resources and to mitigate for impacts to those resources. The Service would like more information on the proposed mitigation measures the applicant has proposed, and strongly encourages the Applicant to initiate contact to discuss mitigation.

*2.11.1.4. Surveys would be conducted prior to vegetation removal to avoid impacts on nesting birds and to avoid active nest sites of sensitive species.*

The Service recommends conducting any clearing that may impact migratory birds outside of the breeding season. The Service can help with determination of these dates and applicable habitats.

*2.11.1.4. 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 Service recommends the applicant incorporate distance buffers and daylight/temperature restrictions to avoid impacts to nesting raptors. Eagle disturbance permits may be available in cases where avoidance and minimization measures have been implemented and take is still unavoidable. Permits are available for eagle nest removal. However, the following conditions must be met:

1. The applicant must demonstrate that there is no practicable way to leave the eagle nest.
2. The applicant must more than offset the loss of the nest.

Eagle nest removal permits (other than for emergency reasons) often require additional time for pre-permit coordination (including tribal coordination) and processing.

0188-4  
Continued

0188-5

The Applicant will follow the APLIC guidance as possible during design and construction of the Project, as discussed in Section 2.11.1 of the EIS.

No changes are made to the EIS in response to this comment.

0188-5

Dr. Julie Ann Smith, Environmental Protection Specialist

7

0188-5  
Continued

*2.11.1.A. 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 Service recommends conducting any clearing that may impact migratory birds outside of the breeding season. The Service can help with determination of these dates and applicable habitats. Because bird nests may be concealed and difficult to detect, the Service does not believe that surveys are sufficient to prevent take of bird nests if trees were cleared during the breeding season.

The Service recommends conducting any tree clearing that may impact bats listed under ESA outside of the active season. The Service can help with determination of these dates and applicable habitats. To determine occupancy of habitat by listed bats, the Service recommends the Applicant follow the Range-wide Indiana Bat Summer Survey Guidelines (see enclosure).

#### **Avoiding Collisions**

The Service recommends the GNTL follow Avian Power Line Interaction Committee (APLIC)<sup>1</sup> guidance and recommends transmission lines be bundled and in as few planes as possible. Static wires should be shielded to be made visible, bundled with other wires, or have visual markings (flight diverters) to prevent avian collisions with the lines. The Service can work with both the MN DNR and the Applicant to determine most appropriate places for markers once final route is chosen.

#### *2.5.4: Typical Supporting Structures*

The Service supports the use of self-supporting suspension towers (those without guy-wires). If guy-wires are needed at points along the route, the Service recommends line markings.<sup>1</sup> The Service can work with both the MN DNR and the applicant to determine most appropriate places for markers once final route is chosen.

#### **Lighting**

Security lighting for on-ground facilities, equipment and infrastructure should be motion- or heat-sensitive, down-shielded, and of a minimum intensity to reduce nighttime bird attraction and eliminate constant nighttime illumination, but still allow safe nighttime access to the site.<sup>1</sup>

<sup>1</sup> 2013 U.S. Fish and Wildlife Service (USFWS) Revised Voluntary Guidelines for Communication Tower Design, Siting, Construction, Operation, Retrofitting, and Decommissioning (<http://www.fws.gov/midwest/es/planning/pdf/USFWS2013RevisedGuidanceCommTowers27Sept13.pdf>) and Reducing Avian Collisions with Power Lines -- the State of the Art in 2012. Edison Electric Institute and APLIC.

Dr. Julie Ann Smith, Environmental Protection Specialist

8

2.11.1.4: *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.*

Please note that alignment modifications will likely not be enough to avoid the above impacts. These issues will likely be best avoided and minimized by route selection. Please see the Service's recommendations above in "Route Recommendation and Avoidance of Service Interest Lands".

#### Bald Eagle Impacts

2.11.1.4. *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.*

Please see comments above regarding clearing near nests of eagles and other migratory birds. Please note also that the MN DNR eagle nest database is not up-to-date. The Service recommends rigorous eagle nest and roost surveys be conducted once the final route is determined, preferably the season before clearing is to begin. The Service can assist with developing an eagle survey protocol.

#### Avoiding Wetland Impacts

The Service recommends route selection and alignment modification be utilized to minimize impacts to wetland resources. Transmission towers should span wetlands where possible. Please see exact recommendations above in "Route Recommendation and Avoidance of Service Interest Lands".

#### Avoidance of Vegetation Impacts

Preservation and enhancement of native plant communities should be conducted in order to support the recovery of listed species, such as the Poweshiek skipperling (*Oarisma Poweshiek*). On June 20, 2014, President Obama signed a Presidential Memorandum, "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators," outlining an expedited agenda to address the devastating declines in honey bees and native pollinators, including the monarch butterfly (*Danaus plexippus*). Recent research has showed dramatic declines in monarchs and their habitats leading conservation groups to petition the Service to list the species under ESA. Ensuring adequate and sustainable habitats that meet all their life history needs would be key to conserving the monarch and other pollinator species. The success of both initiatives requires immediate actions to replace and restore monarch and pollinator habitat on both public and private lands across the U.S. landscape. The Service recommends that revegetation of disturbed areas with native plant species include species of nectar-producing plants and milkweed endemic to the area where the mix is applied. Consultation with state botanists is highly recommended.

0188-6

The Applicant will follow previously made recommendations from the USFWS and the APLIC guidance as possible during design and construction of the Project.

No changes are made to the EIS in response to this comment.

0188-6

0188-7

Section 2.13 of the EIS summarizes Applicant-proposed measures to minimize impacts, including potential impacts to rare species. The Applicant has indicated that preconstruction field surveys for rare species, including identification of nest sites during the breeding season, would be conducted and measures to avoid disturbance to nesting birds would be implemented.

0188-7

No changes are made to the EIS in response to this comment.

0188-8

The EIS discusses potential impacts and avoidance, minimization, or mitigation measures to wetlands in Chapter 5 and 6. DOE and DOC-EERA continue to work with USFWS as a cooperating agency in the development of this EIS.

0188-8

No changes are made to the EIS in response to this comment.

0188-9

0188-9

Chapter 6 of the EIS identifies that the MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW, incorporate vegetation clearing, and management of invasive species; this plan could also outline restoration strategies for the proposed Project. The MN PUC typically requires the Applicant to prepare a plan in coordination with the MnDNR as a condition of the Route Permit. The MnDNR typically requires the use of native plant community seed mixes for restoration, which would likely ultimately encourage a healthy population of pollinator species.

Section 5.3.2.1 of the EIS now includes a discussion of potential impact to bees from the proposed Project.

Dr. Julie Ann Smith, Environmental Protection Specialist

9

### Listed Species

The Service is tasked with the protection and recovery of species listed under the ESA. The following are listed, proposed, or candidate species occurring in one or more counties where the GNTL is proposed: Gray Wolf (*Canis lupus*), Canada lynx (*Lynx canadensis*), Piping plover (*Charadrius melodus*), Western prairie fringed orchid (*Platanthera praeclara*), Poweshiek skipperling (*Oarisma poweshiek*), Northern long-eared bat (*Myotis septentrionalis*), and Sprague's pipit (*Anthus spragueii*). The Service recommends this project employ all potential avoidance and minimization measures to reduce impact to these species. The Service will seek compensatory mitigation for removal of habitat that is occupied by a listed species. Please see "Migratory Bird Impacts" above for information on compensatory mitigation. Consultation with the Service under Section 7 of the ESA may be required for this project as described below.

### General Wildlife Comments

In order to minimize wildlife impacts to the fullest degree practicable, the applicant should examine any potential alignment modifications and micrositing of towers in order to lessen the impact to wildlife resources. The applicant should avoid impacts to managed wildlife habitats (WMAs, WPAs, Important Bird Areas, and Grassland Bird Conservation Areas).

Please note that the absence of critical habitat for listed species with the proposed route does not relieve the Applicant of avoidance and minimization measures. Listed species may be present outside of critical habitat designations. The Service recommends examining records of species occurrence near the proposed line to determine the most appropriate route option, as well as alignment within the chosen line corridor. These records can be accessed from the MN DNR Natural Heritage Information System (NHIS) database as well as coordination with the Service. Once the route decision is made, the Service requests further coordination with the Applicant to determine if additional wildlife surveys are necessary. If surveys are necessary to determine the occupancy of habitat by listed bats, the Service recommends the Applicant follow the Range-wide Indiana Bat Summer Survey Guidelines (see enclosure).

*5.3.5.2 General Impacts: "The proposed Project may affect, but is not likely to adversely affect these federally-listed species or designated critical habitat".*

Because the Service has not had the opportunity to review the Biological Assessment (BA) for impacts of this project on listed species, the Service is unable to agree or disagree with this statement.

### Northern Long Eared Bat

*2.11.1.4. 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.*

0188-10

Chapters 5 and 6 (Rare and Unique Natural Resources) of the Final EIS are updated with the most current information available (MnDNR NHIS database) to assess presence and potential impacts on rare species.

0188-10 Chapter 6 of the EIS assess impacts to wildlife resources (i.e. WMAs) for all alternatives.

A Biological Assessment is included in Appendix R of the Final EIS.

0188-11

As discussed in the Biological Assessment (included in Appendix R of the EIS), the Applicant will work with USFWS to minimize impacts to the northern long-eared bat.

0188-11

Dr. Julie Ann Smith, Environmental Protection Specialist

10

The Service will work with the Applicant to develop a Biological Opinion (BO) on the impact of the project to listed bat species. In order for take to be avoided, the Service recommends conducting any

clearing outside of the breeding season. If clearing is to be done in the bat active season, the Service recommends the Applicant follow the Range-wide Indiana Bat Summer Survey Guidelines (see enclosure). Please note that due to anticipated clearing, indirect impacts to bats may occur through loss of available habitat. This component should also be addressed in the BA. Additional conservation measures to minimize bat impacts will be a component of the Service's BO.

#### **Biological Assessment/Opinion**

The Service appreciates the upcoming opportunity to review the draft Biological Assessment in the DEIS. However, the Service will not issue a Biological Opinion and associated Incidental Take Statement (if one is needed) until a final route has been chosen.

Thank you for your consideration of our comments on the Draft EIS for the Great Northern Transmission Line. Please direct any comments or questions to Mags Rheude at our Twin Cities Field Office: 612-725-3548 x2202, [Margaret\\_rheude@fws.gov](mailto:Margaret_rheude@fws.gov).

Sincerely,



Lynn Lewis  
Assistance Regional Director  
Ecological Services  
Midwest Region

Enclosures

0188-11  
Continued

To: Ms. Julie Ann Smith, *Environmental Protection Specialist*  
Office of Electricity Delivery and Energy Reliability (OE-20)  
U.S. Department of Energy  
1000 Independence Avenue S.W.  
Washington, D.C. 20585  
[julica.smith@hq.doe.gov](mailto:julica.smith@hq.doe.gov)

Cc David Moeller  
Minnesota Power  
30 West Superior Street  
Duluth, MN 55802  
[david.dmoeller@allete.com](mailto:david.dmoeller@allete.com)

Brian Mills, US Department of Energy  
US. Department of Energy (OE-20)  
1000 Independence Avenue SW  
Washington, DC, 20585.  
[Brian.Mills@hq.doe.gov](mailto:Brian.Mills@hq.doe.gov)

Bill Storm, Environmental Review Manager  
Minnesota Department of Commerce  
85 7<sup>th</sup> Place East, Suite 500  
St. Paul MN 55101  
[bill.storm@state.mn.us](mailto:bill.storm@state.mn.us)

Lisa Joyal, MN DNR  
Natural Heritage Review Coordinator  
Minnesota Department of Natural Resources  
500 Lafayette Road, Box 25  
St. Paul, MN 55155  
[lisa.joyal@dnr.state.mn.us](mailto:lisa.joyal@dnr.state.mn.us)

Cheryl D. Feigum  
Barr Engineering  
4700 West 77th Street  
Minneapolis, MN 55435-4803  
[CFeigum@barr.com](mailto:CFeigum@barr.com)

Lydia Nelson, PSS and AND  
Michelle.Bissonnette  
*Environmental Scientist, Project Manager*  
HDR  
701 Xenia Avenue South, Suite 600  
Minneapolis, MN 55416  
[lydia.nelson@hdrinc.com](mailto:lydia.nelson@hdrinc.com)  
AND  
[Michelle.Bissonnette@hdrinc.com](mailto:Michelle.Bissonnette@hdrinc.com)

Jim Atkinson, Supervisor  
Environmental Siting and Permitting  
ALLETE, Inc.  
30 W Superior St  
Duluth, MN 55802  
[jbtkinson@allete.com](mailto:jbtkinson@allete.com)

Rick Speer, FWS, Refuges, RO  
[Richard\\_Speer@fws.gov](mailto:Richard_Speer@fws.gov)

Neil Powers, FWS Refuges  
Tamarac National Wildlife Refuge  
35704 County Hwy 26, Rochert, MN 56578

Craig Mowry, FWS Refuges  
Agassiz NWR  
22996 290th St. NE Middle River MN 56737

Jim Leach, FWS Refuges, RO  
[Jim\\_Leach@fws.gov](mailto:Jim_Leach@fws.gov)

Lisa Mandell, FWS  
4101 American Blvd East  
Bloomington, MN 55425  
[Lisa\\_mandell@fws.gov](mailto:Lisa_mandell@fws.gov)

2014

**RANGE-WIDE INDIANA BAT SUMMER SURVEY GUIDELINES**

January 2014

## INTRODUCTION

The Indiana bat (*Myotis sodalis*) was originally listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11, 1967), and is currently listed as endangered under the Endangered Species Act (ESA) of 1973, as amended. This survey protocol provides the U.S. Fish and Wildlife Service's (USFWS) recommended guidance on survey methodology and outlines additional reporting requirements for surveyors.

The following guidance is designed to determine whether Indiana bats are present<sup>1</sup> or likely absent at a given site during the summer (May 15 to August 15). The phased-approach, which includes coordination with the USFWS<sup>2</sup>, habitat assessments, and acoustic, mist-net, radio-tracking, and emergence surveys, supersedes the 2007 and 2013 Indiana Bat Mist-Netting Guidelines. Future changes to this guidance may occur and will be posted on the USFWS Indiana bat survey guidance website (<http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html>). Please check this website to ensure use of the most current version of the guidance.

## OBJECTIVES

The objectives of Indiana bat summer survey guidelines are to (1) standardize range-wide survey procedures; (2) maximize the potential for detection/capture of Indiana bats at a minimum acceptable level of effort; (3) make accurate presence/absence determinations; and (4) aid in conservation efforts for the species by identifying areas where the species is present.

## BACKGROUND

In 2011, the USFWS developed a multi-agency team to determine whether improvements could be made to the 2007 Indiana Bat Mist-Net Protocols. The team included members of the four USFWS regions (Midwest, Northeast, Southeast, and Southwest) where Indiana bats are known to occur, representatives of state natural resource agencies from three of those four regions (Midwest, Northeast, and Southeast), and representatives from three federal agencies (U.S. Geological Survey, Department of Defense, and U.S. Forest Service). We obtained informal peer review of the draft guidelines in February 2012, gathered additional information in 2012, and made a revised version available for public comment in 2013 [78 FR 1879, January 9, 2013, and 78 FR 9409, February 8, 2013].

<sup>1</sup> The guidance are not intended to be rigorous enough to provide sufficient data to fully determine population size or structure.

<sup>2</sup> Coordinate with the appropriate state natural resource agencies and any involved federal agency(ies) whenever "USFWS" coordination is listed. USFWS FO(s) may direct project sponsors to state agencies for existing occurrence information. Coordinate with your local USFWS FO(s) to understand the process for their area of jurisdiction.

We considered the best available information for all aspects of the guidance. For example, please see our white paper<sup>3</sup> outlining the methodologies used to determine the minimum level of survey effort. The USFWS continues to work with local, State, and Federal biologists; scientific and academic institutions; commercial organizations; and other interested parties to collect additional data on the distribution, ecology, and biology of the Indiana bat and looks forward to receiving any additional pertinent information.

#### GENERAL PROCESS

Indiana bat surveys for some proposed projects will require modification (or clarification) of this guidance through coordination with the USFWS FO(s) responsible for the state(s) in which the project occurs<sup>4</sup>. If not already required by federal permit, we encourage federal action agencies and surveyors to develop a proposed survey work plan in coordination with the USFWS FO(s) so that all parties fully understand which methods will be deployed, what assumptions will be made, and what the various outcomes would be based on the results of each step. Project proponents may stop survey work at any point once an assumption or documentation of Indiana bat presence occurs. Pre-survey coordination typically will preclude the need for subsequent reviews of intermediate steps by USFWS FO(s) during the busy field season. An online directory of USFWS FO(s) is available at <http://www.fws.gov/offices/>. Unless otherwise agreed to by the USFWS, negative presence/probable absence survey results obtained using this guidance are valid for a minimum of two years<sup>5</sup> from the completion of the survey. If not already required by federal permit, please submit all results (negative or positive) from any phase to the USFWS FO(s). We strongly encourage this coordination as it improves the USFWS' understanding of (1) the level of survey effort underway and (2) the distribution of the species. A single report can be submitted at the end of all phases conducted for a given project.

USFWS FO(s) level coordination is also important during the survey planning process. The USFWS recognizes that there may be project-specific habitat conditions that do not lend themselves to surveying with either acoustic detectors or mist-nets even though it met the definition of suitable Indiana bat summer habitat. The guidelines that are described in this document are designed to be implemented in habitats conducive to each technique described. We strongly encourage coordination with the FO(s) prior to implementation of methodologies that may not be appropriate for site-specific habitat conditions.

<sup>3</sup> Available at <http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html>

<sup>4</sup> For example, project sponsors for large acreage and/or landscape-scale projects that do not result in permanent habitat loss and would not pose an ongoing threat of lethal take, especially those proposed by land management agencies, may work with local USFWS FOs to apply different scales of surveys (broad vs. project-level) or different types of surveys, such as long-term monitoring results (e.g., forest-wide acoustic transect data) and/or targeted survey efforts (e.g., sub-sampling of large project areas), to address P/A concerns.

<sup>5</sup> The timeframe may be reduced if significant habitat changes have occurred in the area or increased based on local information.

Because Indiana bat surveys may result in take, such surveys should only be conducted by a qualified biologist<sup>6</sup>. Generally, a recovery permit for the Indiana bat authorizes the capture of bats for identification, and handling of bats for measurements, photography, and radio transmitter attachment. Following this guidance will meet standard USFWS requirements; however, surveyors also need to ensure they meet all applicable state permitting and reporting requirements. Failure to follow the survey guidance, as written, or failure to follow a study plan which has received concurrence from the local USFWS FO(s), may result in USFWS FO recommendations for additional survey effort.

The following provides a step-by-step outline of how Indiana bat summer surveys should be conducted in 2014. Some of these steps can occur concurrently.

### **PHASE 1 – INITIAL PROJECT SCREENING**

**Step 1. Coordinate with the U.S. Fish and Wildlife Service Field Office(s)<sup>7</sup> regarding existing Indiana bat summer occurrence information.**  
*[Projects located within known Indiana bat summer habitat will not proceed to Phase 2 of this process.]*

a) If a project (located within or outside of a known maternity colony home range) is already covered under an existing Endangered Species Act (ESA) incidental take authorization (e.g., HCP, BO), then no further summer surveys are needed, follow the procedures previously authorized by the USFWS FO(s).

b) If there are known Indiana bat summer occurrences (e.g., known roost trees, capture locations, foraging locations) within the project action area<sup>8</sup>; **OR**

if there are no known Indiana bat summer occurrences within the proposed project area itself, but the project area is located within a known maternity colony home range<sup>9</sup>; **OR**

if the project is located outside a known maternity colony home range, but is within the range of the Indiana bat (note this can change over time), then proceed to Step 2.

<sup>6</sup> A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for Indiana bats in the state/region in which they are surveying and/or has been authorized by the appropriate state agency to net and handle Indiana bats. Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

<sup>7</sup> Coordinate with the appropriate state natural resource agencies and any involved Federal Action agencies whenever "USFWS" coordination is listed. USFWS FO(s) may direct project sponsors to state agencies for existing occurrence information. Coordinate with your local USFWS FO(s) to understand the process for their area of jurisdiction.

<sup>8</sup> The "action area" is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. [50 CFR Section 402.02]

<sup>9</sup> See USFWS Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects (Questions 4 & 5) <http://www.fws.gov/midwest/endangered/mammals/inba/WindEnergyGuidance.html>

**Step 2. Conduct Habitat Assessment (Desktop or Field-based; see Appendix A).**

- a) If suitable summer habitat is present within the action area, then proceed to Step 3.
- b) If suitable summer habitat is absent within the action area, then no further summer surveys are necessary; however, additional coordination with the USFWS FO(s) will be necessary if Indiana bats may be present during any other season and may be affected by the proposed project.

**Step 3. Assess potential for adverse effects to Indiana bats.**

- a) If the project is not anticipated to result in adverse effects to Indiana bats (as proposed), then no further summer surveys are necessary, coordinate with the USFWS FO(s).
- b) If the project may result in adverse effects to Indiana bats but the impacts can be adequately assessed and conservation measures can be designed to minimize those effects without additional presence/absence information (this includes **all** proposed projects within known maternity colony home ranges, but may include other areas as well), then no further summer surveys are necessary, coordinate with the USFWS FO(s) regarding an assessment of the project's potential effects, development of conservation measures, and determination of the need for any ESA incidental take authorization.
- c) If the project does not meet the conditions of 3a or 3b, then proceed to Phase 2.

**PHASE 2 - PRESENCE/ABSENCE SURVEYS (NETTING OR ACOUSTIC SURVEYS)<sup>10</sup>**

During the summer of 2014, presence/probable absence (P/A) of Indiana bats may be determined by conducting either Step 4 (mist-netting; see Appendix B) or Step 5 (acoustics; see Appendix C) as outlined below. It is the project proponent's choice as to which option to use. The summer survey season is from 15 May through 15 August for either survey option. If netting is chosen as the preferred P/A method and an Indiana bat(s) is captured, then surveyors may immediately begin Phase 4/radio-tracking. Project proponents must decide whether they will proceed to Phase 4 in coordination with the USFWS FO before any mist netting occurs.

<sup>10</sup> Note: acoustic and/or mist-net surveys should be conducted in the best suitable habitat possible for each survey type to increase the likelihood of detecting/capturing Indiana bats. In some cases, the most suitable habitat for effectively conducting surveys may occur outside a project site boundary and may be sampled if landowner permission is available. For projects with multiple survey areas (e.g., >123 acres or >1 km), survey methods may be interchanged. For example, acoustics could be used for one 123-acre survey area and netting could be used for another 123-acre area.

**Step 4. Conduct Mist-Netting Surveys following Recovery Unit-based Protocols<sup>11</sup>**  
(see Appendix B)

**Northeast and Appalachian Recovery Units (CT, DE, MA, MD, NC, NJ, NY, PA, eastern TN, WV, VA, VT):**

Linear projects: a minimum of 6 net nights per km (0.6 miles) of suitable summer habitat.

Non-linear projects: a minimum of 42 net nights per 123 acres (0.5 km<sup>2</sup>) of suitable summer habitat.

For example:

- 7 sites, 2 nets/site for 3 calendar nights = 42 net nights
- 7 sites, 3 nets/site for 2 calendar nights = 42 net nights
- 3 sites, 2 nets/site for 7 calendar nights\* = 42 net nights

\*Maximum of 3 nights of consecutive netting at any given net location. After 3 consecutive nights of netting at the same location, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

- a) If no capture of Indiana bats, then no further summer surveys are necessary<sup>12</sup>.
- b) If capture of Indiana bat(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO.

**Midwest and Ozark-Central Recovery Units (AL, AR, IA, IL, IN, GA, KY, MI, MO, MS, OH, OK, central & western TN, and Lee County, VA):**

Linear projects: a minimum of 4 net nights per km (0.6 miles) of suitable summer habitat.

Non-linear projects: a minimum of 9 net nights per 123 acres (0.5 km<sup>2</sup>) of suitable summer habitat.

For Example:

<sup>11</sup> The Indiana bat populations in the Northeast and Appalachian Recovery Units have been most heavily impacted by white-nose syndrome to date; therefore, we recommend higher survey effort when compared to the Midwest and Ozark-Central Recovery Units. We have no recommendations for reducing the minimum level of effort required to demonstrate probable absence for projects <123 acres in size. Level of effort is based on detection probabilities and occupancy estimates that were derived from past survey efforts that used the same acreage threshold. Level of effort is designed to reach 90% confidence in negative survey results (see Niver et al. 2013).

<sup>12</sup> NOTE: For Phase 2 Presence/Absence Surveys, wherever the phrase "no further summer surveys are necessary" occurs within this document, the USFWS FO(s) is in effect assuming probable absence of Indiana bats.

- 3 sites, 1 nets/site for 3 calendar nights = 9 net nights
- 1 sites, 3 nets/site for 3 calendar nights = 9 net nights

The sampling period for each net shall begin at sunset and continue for at least 5 hours (longer survey periods may also improve success).

\*Maximum of 3 nights of consecutive netting at any given net location. After 3 consecutive nights of netting at the same location, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

- If no capture of Indiana bats, then no further summer surveys are necessary.
- If capture of Indiana bat(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO.

OR

#### Step 5. Conduct Acoustic Surveys<sup>13</sup> (see Appendix C)

Linear projects: a minimum of 2 detector nights per km (0.6 miles) of suitable summer habitat.

Non-linear projects: a minimum of 4 detector nights per 123 acres (0.5 km<sup>2</sup>) of suitable summer habitat.

2 detector locations per 123 acre "site" shall be sampled until at least 4 detector nights has been completed over the course of at least 2 calendar nights (may be consecutive).

For example:

- 2 detectors for 2 nights each (can sample the same location or move within the site)
- 1 detector for 4 nights (must sample at least 2 locations)

The acoustic sampling period for each site must begin at sunset<sup>14</sup> and ends at sunrise each night of sampling.

- Optional coarse screening - for high frequency (HF) or myotid calls (depending on available filters) or Proceed to Step 6

<sup>13</sup> Acoustic surveys are available as a Presence/Absence option throughout the range (i.e., Northeast, Appalachian, Midwest, and Ozark-Central Recovery Units).

<sup>14</sup> Surveys may need to start a little earlier or later than official sunset times (i.e., at "dusk") in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early-flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: [http://aa.usno.navy.mil/data/docs/RS\\_OneYear.php](http://aa.usno.navy.mil/data/docs/RS_OneYear.php)

- ii) If no positive detection of HF calls ( $\geq 35$  kHz) or myotid calls, no further summer surveys necessary.
- iii) If positive detection of HF or myotid calls, then
  - (a) proceed to Step 6 for further acoustic analysis; **OR**
  - (b) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
  - (c) assume presence and proceed to **Phase 3**.

**Step 6. Conduct Additional Acoustic Analyses for each site that had HF or Myotid calls from Step 5 or ALL sites if Step 5 was not conducted.**

Two or more of the currently available 'candidate' acoustic bat ID programs<sup>15</sup> must be used (should use most recent versions). Beginning with acoustic data from night one at each acoustic site, run each night's data for each site through a minimum of two candidate acoustic ID programs. Review results by site by night from each acoustic ID program used<sup>16</sup>.

- a) If Indiana bat presence is considered unlikely by all candidate programs used in analysis, then no further summer surveys necessary.
- b) If Indiana bat presence is considered likely at one or more sites on one or more nights by any candidate programs used in analysis, then
  - i) proceed to Step 7 for qualitative ID; **OR**
  - ii) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
  - iii) assume presence and proceed to **Phase 3**.

**Step 7. Conduct Qualitative Analysis of probable Indiana bat calls from Step 6.**

At a minimum, for each site/night a program considered Indiana presence likely, review all files from that site/night. Qualitative analysis<sup>17</sup> must also include a comparison of the results of each acoustic ID program by site and night (including: number of call files flagged as probable Indiana bats by each tool used; an evaluation of other species identified by the acoustic ID program; individual file level agreements and disagreements on Indiana bats between programs; and a qualitative analysis of ALL probable Indiana bat call sequences to further evaluate that the correct ID has been recommended by the

<sup>15</sup> Candidate programs are listed at

<http://www.fws.gov/midwest/Endangered/mammals/inba/surveys/inbaAcousticSoftware.html>

<sup>16</sup> The candidate acoustic identification programs all have implemented a maximum likelihood estimator (MLE) at this time. If the analysis of collected calls at a given site on a given night results in the probable presence of Indiana bats with high levels of certainty ( $P < 0.05$ ), then select one of the options available in Step 6b.

<sup>17</sup> Qualitative analysis of each acoustic site and night with probable detections of Indiana bats during Step 6 must include the entire night's call data and not just those files making it through the acoustic analysis tools as probable Indiana bats.

program used).

- a) If no visual confirmation of probable Indiana bats, then no further summer surveys necessary.
- b) If visual confirmation of probable Indiana bats, then
  - i) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
  - ii) assume presence and proceed to **Phase 3**.

### **PHASE 3. CONDUCT MIST-NETTING SURVEYS TO CAPTURE INDIANA BATS.**

If netting was not conducted as the P/A method, then netting may be conducted in Phase 3 to capture and characterize (e.g., sex, age, reproductive condition) the Indiana bats that are present in an area and to facilitate Phase 4 efforts. We encourage working with the FOs to develop Phase 3 netting plans based on best available information (e.g., positive acoustic locations). There are no minimum requirements for this phase as this is not a P/A phase.

- a) If no Indiana bats are captured, then coordinate with the USFWS FO.
- b) If Indiana bats are captured, then proceed to **Phase 4**.

### **PHASE 4. CONDUCT RADIO-TRACKING AND EMERGENCE SURVEYS** **(See Appendices D and E).**

#### REFERENCES

- Amelon, S.K. 2007. Multi-scale factors influencing detection, site occupancy, and resource use by foraging bats in the Ozark Highlands of Missouri. PhD Dissertation. University of Missouri – Columbia.
- Duchamp, J.E., M. Yates, R. Muzika, and R.K. Swihart. 2006. Estimating probabilities of detection for bat echolocation calls: an application of the double-observer method. *Wildlife Society Bulletin* 34(2):408-412.
- Niver, R.A., R.A. King, M.P. Armstrong, and W.M. Ford. 2014. Methods to Evaluate and Develop Minimum Recommended Summer Survey Effort for Indiana Bats: White Paper. Accessed 13 January 2014  
<<http://www.fws.gov/midwest/Endangered/mammals/inba/inbasummersurveyguidance.html>>
- Romeling, S., C.R. Allen, and L. Robbins. 2012. Acoustically detecting Indiana bats: how long does it take? *Bat Research News* 53(4):51-58.

Yates, M.D. and R.M. Muzika. 2006. Effect of forest structure and fragmentation on site occupancy of bat species in Missouri Ozark forests. *Journal of Wildlife Management* 70(5):1238-1248

APPENDIX A  
PHASE 1 SUMMER HABITAT ASSESSMENTS

Summer habitat assessments are Step 2 of Phase 1- Initial Project Screening. The information below is provided to assist applicants, consultants, and/or project proponents (hereinafter termed the "applicant") in establishing whether summer surveys for Indiana bats should be conducted. As a reminder, the first step for determining presence of Indiana bats at a given site is to determine whether there is any existing occurrence data available for the vicinity of the project from the local USFWS FO. This step can be conducted remotely via a desktop analysis (e.g., use of aerial photography to assess the potential presence of suitable habitat). The applicant is responsible for developing and providing sufficient information as to whether potentially suitable summer Indiana bat habitat exists within a proposed project area. If suitable habitat is present, the applicant should calculate the amount and submit this to the USFWS FO(s) and determine the need for any presence/absence surveys (Phase 2). Note: if Indiana bats are present or assumed to be present during any phase, more detailed habitat information may be necessary to adequately assess the potential for impacts (see attached example Indiana Bat Habitat Assessment Datasheet). If no suitable habitat is present, no surveys are needed to assess risk during the summer. Habitat assessments for Indiana bats can be completed any time of year and applicants are encouraged to submit results and proposed Phase 2 study plans well in advance of the summer survey season.

#### PERSONNEL

Habitat assessments should be completed by individuals with a natural resource degree or equivalent work experience.

#### DEFINITION FOR POTENTIALLY SUITABLE SUMMER HABITAT

Suitable summer habitat for Indiana bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats<sup>18</sup> such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags  $\geq 5$  inches dbh<sup>19</sup> (12.7 centimeter) that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat. We recommend that project proponents or their representatives

<sup>18</sup> Non-forested habitats typically should be excluded from acreages used to establish a minimum level of survey effort for Phase 2 surveys.

<sup>19</sup> While trees  $< 5$  inches ( $< 12.7$  cm) dbh that have exfoliating bark, cracks, crevices, and/or hollows may have some potential to be male Indiana bat summer roosting habitat, the USFWS does not consider early-successional, even-aged stands of trees  $< 5$  inches dbh to be suitable roosting habitat for the purposes of this guidance. Suitable roosting habitat is defined as forest patches with trees of 5-inch (12.7 cm) dbh or larger. However, early successional habitat with small diameter trees may be used as foraging habitat by Indiana bats. Therefore, a project that would remove or otherwise adversely affect  $\geq 20$  acres of early successional habitat containing trees between 3 and 5 inches (7.6-12.7 cm) dbh would require coordination/consultation with the USFWS FO to ensure that associated impacts would not rise to the level of take. The USFWS may request P/A surveys if  $> 20$  acres of early successional habitat were proposed for removal.

APPENDIX A  
PHASE 1 SUMMER HABITAT ASSESSMENTS

coordinate with the appropriate USFWS Field Office to more clearly define suitable habitat for their particular region as some differences in state/regional suitability criteria may be warranted (e.g., high-elevation areas may be excluded as suitable habitat in some states).

SUBMISSION OF HABITAT ASSESSMENT AND PHASE 2 STUDY PLAN (IF NEEDED)

If a proposed project may affect (positively or negatively) Indiana bats and the conditions outlined in Step 3 a or b are not met, a habitat assessment report should be submitted to the appropriate USFWS FO(s) (and/or to the lead Federal Action Agency, such as the USACE, as appropriate) along with a draft study plan for the Phase 2 (acoustic or netting) survey (if suitable habitat is present). Complete reports will include the following:

1. Full names and relevant titles/qualifications of individuals (e.g., John E. Smith, Biologist II, State University, B.S. Wildlife Science 2007) completing the habitat assessment and when the assessment was conducted
2. A map and latitude/longitude or UTM clearly identifying the project location (or approximate center point) and boundaries
3. A detailed project description (if available)
4. Documentation of any known/occupied spring staging, summer, fall swarming, and/or winter habitat for Indiana bats within or near the project area
5. A description of methods used during the habitat assessment
6. A summary of the assessment findings and a completed Indiana Bat Habitat Assessment Datasheet (see attached below; use of this particular datasheet is optional)
7. Other information that may have a bearing on Indiana bat use of the project area (e.g., presence of fall or winter habitat [caves, crevices, fissures, or sinkholes, or abandoned mines of any kind], bridges and other non-tree potential summer roosts.)
8. Any other information requested by the local USFWS FO(s) related to the project

In addition, Phase 2 Study Plans should contain the following:

1. A statement as to which type of P/A surveys will be conducted (i.e., mist netting or acoustic surveys) and how the proposed survey level of effort (i.e., total # of net nights or detector nights) was calculated/determined;
2. A map depicting the proposed number of survey sites (mist netting or acoustic) and their tentative distribution throughout the project area;
3. A tentative list of surveyors names and copies of relevant federal permits (if required in the project State); and
4. A tentative survey schedule (e.g., start date, duration, end date).

APPENDIX A  
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Township/Range/Section: \_\_\_\_\_  
 Lat Long/U/TM/ Zone: \_\_\_\_\_ Surveyor: \_\_\_\_\_

**Brief Project Description**

| Project Area               | Total Acres        | Forest Acres                         | Open Acres                  |
|----------------------------|--------------------|--------------------------------------|-----------------------------|
| Project                    |                    |                                      |                             |
| Proposed Tree Removal (ac) | Completely cleared | Partially cleared (will leave trees) | Preserve acres- no clearing |
|                            |                    |                                      |                             |

**Vegetation Cover Types**

| Pre-Project | Post-Project |
|-------------|--------------|
|             |              |

**Landscape within 5 mile radius**

Flight corridors to other forested areas?

---

Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

**Proximity to Public Land**

What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?

APPENDIX A  
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area  
A single sheet can be used for multiple sample sites if habitat is the same

|                                |
|--------------------------------|
| <b>Sample Site Description</b> |
| Sample Site No.(s): _____      |

|                                       |                              |              |           |   |
|---------------------------------------|------------------------------|--------------|-----------|---|
| <b>Water Resources at Sample Site</b> |                              |              |           | Describe existing condition of water sources: |
| Stream Type (# and length)            | Ephemeral                    | Intermittent | Perennial |   |
| Pools/Ponds (# and size)              | Open and accessible to bats? |              |           |   |
| Wetlands (approx. ac.)                | Permanent                    | Seasonal     |           |   |
|                                       |                              |              |           |   |

|  |                |                   |                   |  |
|--|----------------|-------------------|-------------------|--|
| <b>Forest Resources at Sample Site</b> |                |                   |                   |  |
| Closure/Density                        | Canopy (> 50%) | Midstory (20-50%) | Understory (<20%) | 1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100% |
| Dominant Species of Mature Trees       |                |                   |                   |  |
| % Trees w/ Exfoliating Bark            |                |                   |                   |  |
| Size Composition of Live Trees (%)     | Small (3-8 in) | Med (9-15 in)     | Large (>15 in)    |  |
| No. of Suitable Snags                  |                |                   |                   |  |

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? \_\_\_\_\_

|                             |
|-----------------------------|
| <b>Additional Comments:</b> |
|                             |

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

**Photographic Documentation:** habitat shots at edge and interior from multiple locations; understory/midstory/canopy, examples of potential suitable snags and live trees, water sources

APPENDIX B  
PHASE 2 or 3 MIST-NETTING

Mist-netting can be used as a presence/probable absence method (Phase 2 surveys) or it can be conducted for the purpose of attempting to capture Indiana bats after detection during acoustic presence/probable absence surveys (Phase 3 surveys). The same recommendations (e.g., season, personnel, equipment, net placement, checking nets) apply for either use of mist-netting surveys.

SUMMER MIST-NETTING SEASON: May 15<sup>20</sup> – August 15

Capture of reproductive adult females (i.e., pregnant, lactating, or post-lactating) and/or young of the year during May 15 – August 15 confirms the presence of a maternity colony in the area. Since adult males and non-reproductive females have commonly been found summering with maternity colonies, radio-tracking results will be relied upon to help determine the presence or absence of a maternity colony or large concentrations of bats in the area when only males and/or non-reproductive females are captured.

#### PERSONNEL

A qualified biologist(s)<sup>21</sup> must (1) select/approve mist-net set-ups in areas that are most suitable for capturing Indiana bats, (2) be physically present at each mist-net site throughout the survey period, and (3) confirm all bat species identifications. This biologist may oversee other biological technicians and manage mist-net set-ups in close proximity to one another as long as the net-check timing (i.e., every 10 minutes) can be maintained while walking between nets.

#### COORDINATION WITH USFWS FO(s)

If not already required by federal permit, we recommend that applicants submit a draft study plan for all survey phases to the USFWS FO(s) for review and approval. Study plans should include a map/aerial photo identifying the proposed project area boundaries, suitable bat habitats and acreages within the project area, and the proposed number and tentative locations of net sites.

#### EQUIPMENT

Use the finest, lowest visibility mesh mist-nets commercially available, as practicable. Currently, the finest net on the market is 75 denier, 2 ply, denoted 75/2 (Arndt and Schaetz 2009); however, the 50 denier nets are still acceptable for use at this time. The finest mesh size available is approximately 1½ inches (38 millimeters).

<sup>20</sup> Due to concerns with transmission of white-nose syndrome, some USFWS FO(s) and state natural resource agencies have delayed the start of the Indiana bat summer field survey season/mist-netting until June 1. Surveyors/applicants should always coordinate with local USFWS FO(s) and state natural resource agencies before beginning surveys.

<sup>21</sup> A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for Indiana bats in the state/region in which they are surveying and/or has been authorized by the appropriate state agency to net and handle Indiana bats. Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

APPENDIX B  
PHASE 2 or 3 MIST-NETTING

No specific hardware is required. There are many suitable systems of ropes and/or poles to hold nets. The system of Gardner et al. (1989) has been widely used. See NET PLACEMENT for minimum net heights, habitats, and other netting requirements that affect the choice of hardware.

To minimize potential for disease transmission, any equipment that comes in contact with bats should be kept clean and disinfected, following approved protocols; this is particularly a concern relative to white-nose syndrome (WNS). Disinfection of equipment to avoid disease transmission (e.g., WNS) is required; protocols are posted at <http://www.whitenosesyndrome.org/>. Federal and state permits may also have specific equipment restrictions and disinfection requirements.

MINIMUM PRESENCE/ABSENCE MIST-NETTING LEVEL OF EFFORT (PHASE 2)

**Conduct Mist-Netting Surveys following Recovery Unit-based protocols<sup>22</sup>**

**Northeast and Appalachian Recovery Units (CT, DE, MA, MD, NC, NJ, NY, PA, eastern TN, WV, VA, VT):**

Linear projects: a minimum of 6 net nights per km (0.6 miles) of suitable summer habitat.

Non-linear projects: a minimum of 42 net nights per 123 acres<sup>23</sup> (0.5 km<sup>2</sup>) of suitable summer habitat.

For example:

- 7 sites<sup>24</sup>, 2 nets<sup>25</sup>/site for 3 calendar nights = 42 net nights
- 7 sites, 3 nets/site for 2 calendar nights = 42 net nights
- 3 sites, 2 nets/site for 7 calendar nights\* = 42 net nights

Maximum of 3 nights of consecutive netting at any given net location. After 3 consecutive nights of netting at the same location, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

- a) If no capture of Indiana bats, then no further summer surveys are

<sup>22</sup> The Indiana bat populations in the Northeast and Appalachian Recovery Units have been most heavily impacted by white-nose syndrome; therefore, we recommend higher survey effort when compared to the Midwest and Ozark-Central Recovery Units.

<sup>23</sup> We have no recommendations for reducing the minimum level of effort required to demonstrate probable absence for projects <123 acres in size. Detection probabilities and occupancy estimates were derived from past survey efforts that used the same acreage threshold (see Niver et al. 2013).

<sup>24</sup> A site is defined as a geographic area to be sampled. It can include one or more nets that can be managed by one Qualified Biologist.

<sup>25</sup> A net is defined as any combination of individual panels and poles (e.g., single, double, triple high) to fill the area (e.g., corridor) being sampled.

APPENDIX B  
PHASE 2 or 3 MIST-NETTING

necessary<sup>20</sup>

- b) If capture of Indiana bat(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO(s).

**Midwest and Ozark-Central Recovery Units (AL, AR, GA, IA, IL, IN, KY, MI, MO, MS, OH, OK, and central & western TN):**

Linear projects: a minimum of 4 net nights per km (0.6 miles) of suitable summer habitat.

Non-linear projects: a minimum of 9 net nights per 123 acres (0.5 km<sup>2</sup>) of suitable summer habitat.

- 3 sites, 1 nets/site for 3 calendar nights = 9 net nights
- 1 sites, 3 nets/site for 3 calendar nights = 9 net nights

Maximum of 3 nights of consecutive netting at any given net location. After 3 consecutive nights of netting at the same location, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

- a) If no capture of Indiana bats, then no further summer surveys are necessary.
- b) If capture of Indiana bat(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO(s).

**MIST-NETTING SURVEYS TO CAPTURE INDIANA BATS AFTER ACOUSTICS WERE USED AS P/A METHOD (PHASE 3)**

If netting was not conducted as the P/A method, then netting may be conducted to capture and characterize (e.g., sex, age, reproductive condition) the Indiana bats (documented through the Phase 2 acoustic P/A survey) present in an area and to facilitate Radio-tracking (Phase 4) efforts. We encourage working with the FO(s) to develop Phase 3 netting plans based on best available information (e.g., positive acoustic locations). There are no minimum requirements for this phase as this is not a P/A phase.

- a) If no Indiana bats are captured, then coordinate with the USFWS FO.
- b) If Indiana bats are captured, then proceed to **Phase 4** as previously decided in coordination with the FO(s).

<sup>20</sup> NOTE: For Phase 2 Presence/Absence Surveys, wherever the phrase "no further summer surveys are necessary" occurs within this document, the USFWS FO(s) is in affect assuming probable absence of Indiana bats during the summer.

APPENDIX B  
PHASE 2 or 3 MIST-NETTING

NET PLACEMENT

Potential travel corridors (e.g., streams, logging trails) typically are the most effective places to net (although other places may also be productive; see Carroll et al. 2002). Place nets approximately perpendicular across the corridor. Nets should fill the corridor from side to side, extending beyond the corridor boundaries when possible, and from stream (or ground) level up to the overhanging canopy. Nets of varying widths and heights may be used as the situation dictates. A typical set is at least 5 m to 9 m high consisting of two or more nets stacked on top one another and from 6 m to 18 m wide. If netting over water, ensure there is enough space between the net and the water so that captured bats will not get wet.

Occasionally it may be necessary or desirable to net where a suitable corridor is lacking. The typical equipment described in the section above may be inadequate for these situations, requiring innovation on the part of the surveyor (see Humphrey et al. 1968). See Kiser and MacGregor (2005) for additional discussion about net placement.

Although no minimum spacing between mist-nets is being specified, surveyors should distribute net set-ups throughout suitable habitat. Net set-ups can be repeatedly sampled throughout the project, but generally no more than 2-3 nights at a single location is recommended. In addition, changing locations within a project area may improve capture success (see Robbins et al. 2008; Winhold and Kurta 2008). Photo-document placement of nets.

SURVEY PERIOD

The survey period for each net shall begin at sunset<sup>27</sup> and continue for at least 5 hours (longer survey periods may also improve success).

CHECKING NETS

Each net set-up should be checked approximately every 10 minutes, never exceeding 15 minutes (Gannon et al. 2007). If surveyors monitor nets continuously, take care to minimize noise, lights and movement near the nets. Monitoring the net set-up continuously with a bat detector (ideally using ear phones to avoid alerting bats) can be beneficial: (a) bats can be detected immediately when they are captured, (b) prompt removal from the net decreases stress on the bat and potential for the bat to escape (MacCarthy et al. 2006), and (c) monitoring with a bat detector also allows the biologist to assess the effectiveness of each net placement (i.e., if bats are active near the net set-up but avoiding capture), which may allow for adjustments that will increase netting success on subsequent nights. There should be no other disturbance near the nets, other than to check nets and remove bats. Biologists should be prepared to cut the net if a bat is severely entangled and cannot be safely extracted within 3 or 4 minutes (CCAC 2003; Kunz et al. 2009).

<sup>27</sup> Surveys may need to start a little earlier or later than official sunset times (i.e., at "dusk") in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early-flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: [http://na.usno.navy.mil/data/docs/RS\\_OneYear.php](http://na.usno.navy.mil/data/docs/RS_OneYear.php).

APPENDIX B  
PHASE 2 or 3 MIST-NETTING

Capture and handling are stressful for bats. Emphasis should be on minimizing handling and holding bats to as short a time as possible to achieve field study objectives. Indiana bats should not be held for more than 30 minutes after capture, unless the individual is targeted for radio-tracking. Bats targeted for radio-tracking should be released as quickly as possible, but no longer than 45 minutes after capture, or as allowed in federal and state permits. See Kunz and Kurta (1988) for general recommendations for holding bats.

WEATHER AND LIGHT CONDITIONS

Severe weather adversely affects capture of bats. Some Indiana bats may remain active despite inclement weather and may still be captured while others in the same area become inactive. Therefore, negative surveys combined with any of the following weather conditions throughout all or most of a sampling period are likely to require an additional night of mist-netting: (a) temperatures that fall below 50°F (10°C); (b) precipitation, including rain and/or heavy fog, that exceeds 30 minutes or continues intermittently during the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/seconds; 3 on Beaufort scale).

NOTE: Provided that nets are not dripping wet, surveyors can resume netting to meet the minimum 5-hour requirement after short periods of adverse weather. If nets are under good cover, light rain may not alter bat behavior. However, if no bats are being captured during marginal weather, coordinate with the USFWS FO(s).

It is typically best to place net set-ups under the canopy where they are out of moonlight, particularly when the moon is half-full or greater. Net set-ups illuminated by artificial light sources should also be avoided.

DOCUMENTATION OF *MYOTIS SODALIS* CAPTURES

If an Indiana bat(s) is captured during mist-netting, protocols for radio-tracking and emergence survey requirements, as provided in Appendix D and E, respectively, should be followed. In addition, the appropriate USFWS FO(s) must be notified of the capture within 48 hours (or in accordance with permit conditions), and the sex and reproductive condition of the bat and GPS coordinates of the capture site should be provided.

Several species of bats from the genus *Myotis* share common features which can make identification difficult; Indiana bats and little brown bats (*Myotis lucifugus*) can be particularly difficult to distinguish. Photo-documentation of all bats captured and identified as Indiana bats and the first 10 little brown bats per project are requested to verify the identifications made in the field.

Photo-documentation should include diagnostic characteristics:

- a ¾-view of face showing ear, tragus, and muzzle
- view of calcar showing presence/absence of keel
- a transverse view of toes showing extent of toe hairs

APPENDIX B  
PHASE 2 or 3 MIST-NETTING

If a bat from the genus *Myotis* is captured during mist netting that cannot be readily identified to the species level, then species verification may be attempted through fecal DNA analysis. Collect one or more fecal pellets (i.e., guano) from the bat in question by placing it temporarily in a holding bag (15 minutes is usually sufficient, no more than 30 minutes is recommended). The pellet (or pellets) collected should be placed in a small vial (e.g., 1.5 ml) with silica gel desiccant; pellets from each individual bat should be stored in separate vials and out of direct light. Fees charged by independent laboratories for sequencing fecal DNA samples is generally inexpensive (approx. \$50 per guano sample), however, it has been challenging to identify labs willing to consistently conduct these analyses. Any additional information and a list of available laboratories will be made available on the Indiana bat webpage on the USFWS's Region 3 website (<http://www.fws.gov/midwest/Endangered/mammals/inba/index.html>).

#### SUBMISSION OF MIST-NETTING RESULTS

Provide results of netting surveys to the appropriate USFWS FO(s) in accordance with previously agreed upon<sup>28</sup> timeframes. If Indiana bats are captured, this report should also include the results of subsequent radio-tracking and emergence counts. Reports should include the following:

1. Copy of prior phase reports (if not previously provided).
2. Explanation of any modifications from original survey plan (e.g., altered net locations).<sup>29</sup>
3. Description of net locations (including site diagrams), net set-ups (include net heights), survey dates, duration of surveys, weather conditions, and a summary of findings.
4. Map identifying netting locations and information regarding net set-ups, including lat/long or UTM, individual net placement, and net spacing (i.e., include mist-netting equipment in photographs of net locations).
5. Full names of mist-netting personnel attending each mist-net site during an operation, including the federally-permitted/qualified biologist present at each mist-net site. Indicate on the field data sheet the full name of person who identified bats each night at each site.
6. Legible copies of all original mist-netting datasheets (see example datasheet below) and a summary table with information on all bats captured during the survey including, but not limited to: capture site, date of capture, time of capture, sex, reproductive condition, age, weight, right forearm measurement, band number and type (if applicable), and Reichard's wing damage index score (Reichard and Kunz, 2009).

<sup>28</sup> As discussed in the Introduction, we encourage coordination with USFWS FO(s) prior to implementation of any surveys to ensure that all parties agree upon the need for surveys, the methods proposed, and the decisions from various survey results.

<sup>29</sup> If the USFWS previously agreed upon the study plan we need to understand whether the revised work still accomplished the agreed upon methods.

APPENDIX B  
PHASE 2 or 3 MIST-NETTING

7. Photographs of all net set-ups, as well as all Indiana bats and the first 10 little brown bats captured from each project, so that the placement of netting equipment and identification of species can be verified. Photographs of bats should include all diagnostic characteristics that resulted in the identification of the bat to the species level.
8. Any other information requested by the local USFWS FO(s) related to the project.

REFERENCES

- Arndt, R.J. and B.A. Schaetz. 2009. A tale of two deniers: nylon versus polyester mist nets. *Bat Research News* 50(3):57.
- Carroll, S.K., T.C. Carter, and G.A. Feldhamer. 2002. Placement of nets for bats: effects on perceived fauna. *Southeastern Naturalist* 1:193-198.
- Canadian Council on Animal Care (CCAC). 2003. CCAC species-specific recommendations on bats. 9pp. Available at: [http://www.ccac.ca/en/CCAC\\_Programs/Guidelines\\_Policies/GDLINES/BatsFinal20May03.htm](http://www.ccac.ca/en/CCAC_Programs/Guidelines_Policies/GDLINES/BatsFinal20May03.htm) (Accessed October 30, 2008).
- Gannon, W.L., R.S. Sikes, and the Animal Care and Use Committee of the American Society of Mammalogists. 2007. Guidelines of the American Society of Mammalogists for the use of wild mammals in research. *Journal of Mammalogy* 88:809-823.
- Gardner, J. E., J.D. Garner, and J.E. Hofmann. 1989. A portable mist-netting system for capturing bats with emphasis on *Myotis sodalis* (Indiana bat). *Bat Research News* 30:1-8.
- Humphrey, P.S., D. Bridge, and T.E. Lovejoy. 1968. A technique for mist-netting in the forest canopy. *Bird-Banding* 39(1): 43-50.
- Kiser, J.D. and J.R. MacGregor. 2005. Indiana bat (*Myotis sodalis*) mist net surveys for coal mining activities. Pp. 169-172 in K.C. Vories and A. Harrington (eds.), *The Proceedings of the Indiana bat and coal mining: a technical interactive forum* Office of Surface Mining, U.S. Department of the Interior, Alton, IL. Available at: [http://www.mcrc.osmre.gov/MCR/Resources/bats/pdf/Indiana\\_Bat\\_and\\_Coal\\_Mining.pdf](http://www.mcrc.osmre.gov/MCR/Resources/bats/pdf/Indiana_Bat_and_Coal_Mining.pdf). (Accessed October 06, 2011).
- Kunz, T.H. and A. Kurta. 1988. Capture methods and holding devices. Pp. 1-29 in T.H. Kunz (ed.), *Ecological and behavioral methods for the study of bats*. Smithsonian Institution Press, Washington, D.C.

APPENDIX C  
PHASE 2 ACOUSTIC SURVEYS

SUBMISSION OF ACOUSTIC SURVEY RESULTS

Provide results of acoustic surveys to the appropriate USFWS FO(s) in accordance with previously agreed upon<sup>37</sup> timeframes. Each acoustic survey report should include the following:

1. Copy of habitat assessment (if not previously provided)
2. Explanation of any modifications from original survey plan (e.g., altered site locations)<sup>38</sup>
3. Description of acoustic monitoring sites, survey dates, duration of survey, weather conditions, and a summary of findings
4. Map identifying acoustic monitoring locations and a corresponding table including the GPS coordinates
5. Full names of all personnel conducting acoustic surveys, including those that selected acoustic sites and deployed detectors, and include copies of state and federal permits (if applicable)
6. Full name and resume of individual(s) conducting qualitative acoustic analyses
7. Table with information on acoustic monitoring and resulting data, including but not limited to: detector GPS coordinates, survey dates, survey hours
8. Description of acoustic detector brand(s) and model(s) used, microphone type, use of weatherproofing, acoustic monitoring equipment settings (e.g., sensitivity, audio and data division ratios), deployment data (i.e., deployment site, habitat, date, time started, time stopped, orientation), and call analysis methods used
9. Acoustic analysis software program output/summary results by site by night (i.e., number of calls detected, species composition, MLE results)
10. Detailed analysis and results of any qualitative acoustic analysis conducted on those projects where a program(s) considered Indiana bat presence likely, including justification for rejecting any program MLE results (if applicable).
11. Photographs of each acoustic site documenting the location of the detector, the orientation of the detector, and the detection cone (i.e., what the detector sampled).
12. A description of how proper functioning of bat detectors was verified
13. Any other information requested by the local USFWS FO(s) related to the project

<sup>37</sup> As discussed in the Introduction, we encourage coordination with USFWS FO(s) prior to implementation of any surveys to ensure that all parties agree upon the need for surveys, the methods proposed, and the decisions from various survey results.

<sup>38</sup> If the USFWS previously agreed upon the study plan we need to understand whether the revised work still accomplished the agreed upon methods.

APPENDIX C  
PHASE 2 ACOUSTIC SURVEYS

Two or more of the currently available 'candidate' acoustic bat ID programs<sup>34</sup> must be used (should use most current software versions available). Beginning with acoustic data from night one at each acoustic site, run each night's data for each site through a minimum of two candidate acoustic ID programs. Review results by site by night from each acoustic ID program used<sup>35</sup>.

- a) If Indiana bat presence is considered unlikely by all candidate programs used in analysis, then no further summer surveys necessary.
- b) If Indiana bat presence is considered likely at one or more sites on one or more nights by any candidate programs used in analysis, then
  - i) proceed to Step 7 for qualitative ID; **OR**
  - ii) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
  - iii) assume presence and proceed to **Phase 3**.

**Step 7. Conduct Qualitative Analysis of probable Indiana bat calls from Step 6.**

At a minimum, for each site/night a program considered Indiana presence likely, review all files from that site/night. Qualitative analysis<sup>36</sup> must also include and present within a written report a comparison of the results of each acoustic ID program by site and night (including: number of call files flagged as probable Indiana bats by each tool used; an evaluation of other species identified by the acoustic ID program; individual file level agreements and disagreements on Indiana bats between programs; and a qualitative analysis of ALL probable Indiana bat call sequences to further evaluate whether the correct ID has been made by the program(s) used).

- a) If no visual confirmation of probable Indiana bats, then no further summer surveys necessary.
- b) If visual confirmation of probable Indiana bats, then
  - i) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
  - ii) assume presence and proceed to **Phase 3**.

<sup>34</sup> Candidate programs are listed at <http://www.fws.gov/midwest/Endangered/mammals/inba/surveys/inbaAcousticSoftware.html>

<sup>35</sup> The candidate acoustic identification programs all have implemented a maximum likelihood estimator (MLE) at this time. If the analysis of collected calls at a given site on a given night results in the probable presence of Indiana bats with high levels of certainty ( $P < 0.05$ ), then select one of the options available in Step 6b.

<sup>36</sup> Qualitative analysis of each acoustic site and night with probable detections of Indiana bats during Step 6 should include the entire night's call data and not just those files making it through the acoustic analysis tools as probable Indiana bats in Step 6.

APPENDIX C  
PHASE 2 ACOUSTIC SURVEYS

MINIMUM LEVEL OF EFFORT

The number of acoustic survey sites required for a project will be dependent upon the overall acreage of suitable habitat proposed to be impacted by the action. To determine the acoustic survey effort, quantify the amount of suitable summer habitat within the project area.

Linear projects: a minimum of 2 detector nights per km (0.6 miles) of suitable summer habitat.

Non-linear projects: a minimum of 4 detector nights per 123 acres (0.5 km<sup>2</sup>) of suitable summer habitat.

2 detector locations per 123 acre "site" shall be sampled until at least 4 detector nights has been completed over the course of at least 2 calendar nights (may be consecutive).

For example:

- 2 detectors for 2 nights each (can sample the same location or move within the site)
- 1 detector for 4 nights (must sample at least 2 locations)

The acoustic sampling period for each site must begin at sunset<sup>33</sup> and ends at sunrise each night of sampling.

ANALYSIS OF RECORDED ECHOLOCATION CALLS

**Step 5. Optional coarse screening - for high frequency (HF) or myotid calls (depending on available filters) or Proceed to Step 6.**

- a) If no positive detection of HF calls ( $\geq 35$  kHz) or myotid calls, no further summer surveys necessary.
- b) If positive detection of HF or myotid calls, then
  - i) proceed to Step 6 for further acoustic analysis; **OR**
  - ii) assume presence of Indiana bats and coordinate with the USFWS FO(s); **OR**
  - iii) assume presence and proceed to **Phase 3**.

**Step 6. Conduct Additional Acoustic Analyses for each site that had HF or Myotid calls from Step 5 or ALL sites if Step 5 was not conducted.**

<sup>33</sup> Surveys may need to start a little earlier or later than official sunset times (i.e., at "dusk") in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early-flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: [http://aa.usno.navy.mil/data/docs/RS\\_OneYear.php](http://aa.usno.navy.mil/data/docs/RS_OneYear.php)

APPENDIX C  
PHASE 2 ACOUSTIC SURVEYS

Orientation

Detectors deployed near the ground (e.g., on a tripod) should be aimed 45 degrees or more above horizontal. Microphones deployed higher within the flight path/zone (e.g., on a pole) should be oriented horizontally. In some circumstances (e.g., forest openings), it might be desirable to aim a detector's microphone vertically. This has shown to record high-quality calls but precludes the use of weatherproofing for protection of the microphone, since no currently-approved weatherproofing system will adequately protect the microphone of a detector aimed vertically.

Deploy detectors at or below the lowest expected flight height of the bats but high enough above ground vegetation to avoid interference within the detection cone. Once acoustic sites are identified, photographs documenting the orientation, detection cone (i.e., "what the detector is sampling"), and relative position of the microphone should be taken for later submittal to the USFWS FO(s) as part of the acoustic survey report.

Weather Conditions

If any of the following weather conditions exist at a survey site during acoustic sampling, note the time and duration of such conditions, and repeat the acoustic sampling effort for that night: (a) temperatures fall below 50°F (10°C) during the first 5 hours of survey period; (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first 5 hours of the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale) during the first 5 hours of the survey period. At a minimum, nightly weather conditions for survey sites should be checked using the nearest NOAA National Weather Service station and summarized in the survey reports.

Weatherproofing

Most bat detectors are not weatherproof when delivered from the factory. Recording without after-market weatherproofing is preferred as the addition of these systems may result in some signal degradation. **The decision to weatherproof detectors or not should be determined nightly based on the likelihood of precipitation in the survey area.**

For directional microphones, the use of a polyvinyl chloride (PVC) tube<sup>32</sup>, generally in the form of a 45-degree elbow the same diameter as the microphone (Britzke et al. 2010) is acceptable, if the situation requires the use of after-market weatherproofing. Attach the elbow to a weatherproof box that houses the main portion of the detector. Point the microphone into one end of the elbow and point the open end of the elbow in the direction to be monitored (generally 45 degrees to horizontal). Another option for weatherproofing detectors is to detach the microphone from the detector so that the detector can be placed in a weatherproof container but the microphone (tethered by a cable) remains unobstructed.

Other after-market weatherproofing systems may become available and approved by the USFWS provided they show that call quality and the number of calls recorded are comparable to those without weatherproofing.

<sup>32</sup> The PVC option has only been tested with AnaBat detectors and directional microphones. It may not perform as well with other detector microphone combinations.

APPENDIX C  
PHASE 2 ACOUSTIC SURVEYS

Verification of Deployment Location

It is recommended to temporarily attach GPS units to each detector (according to manufacturer's instructions) to directly record accurate location coordinates for each acoustic site that is paired with the acoustic data files. Regardless of technique used, accurate GPS coordinates must be generated and reported for each acoustic survey site.

Verification of Proper Functioning

It is highly recommended that surveyors ensure acoustic detectors are functioning properly through a periodic verification of performance to factory specifications (a service currently offered or in development by several manufacturers). It may be possible that independent service bureaus would be willing to perform this service, providing that a standard test/adjustment procedure can be developed.

It is also recommended to ensure equipment is working during set-up in the field. This can be done simply by producing ultrasound (e.g., finger rubs, calibrator, or follow the equipment manufacturer's testing recommendations) in front of the microphone at survey start and survey finish. This documents that the equipment was working when deployed and when picked up (and by assumption throughout the entire period). Detector field settings (e.g., sensitivity, frequency, etc.) should follow the recommendations provided by the manufacturer. Surveyors should also save files produced by detectors (e.g., log files, status files, sensor files) as an excellent way to provide documentation when equipment was functioning within the survey period. Many types of detectors allow for setting timers that initiate and end recording sessions. This saves battery life as well as reducing the number of extraneous noise files recorded. However, if the units are visited when the timer is off, the surveyor cannot verify that the unit is functioning properly. This is particularly important in areas where no bat activity is recorded for the entire night or during the last portion of the night. In these cases, if the surveyor cannot demonstrate that the detector was indeed functioning properly throughout the survey period then the site will need to be re-sampled, unless adequate justification can be provided to the USFWS FO(s).

Selection of acoustic sites is similarly important. Suitable set-up of the equipment should result in high-quality call sequences that are adequate for species identification. Nights of sampling at individual sites that produce no bat calls may need to be re-sampled unless adequate justification (e.g., areas with significant bat population declines due to WNS) can be provided to the USFWS FO(s). Modifications of the equipment (e.g., changing the orientation) at the same location on subsequent nights may improve quantity and quality of call sequences recorded, which can be determined through daily data downloads. If modifications of the equipment do not improve call identification, then the detectors will need to be moved to a new location.

APPENDIX C  
PHASE 2 ACOUSTIC SURVEYS

ACOUSTIC SAMPLING PROTOCOL

Detector/Microphone Placement

Detector/Microphone placement is critical to the successful isolation of high-quality bat call sequences for later analysis. The following locations are likely to be suitable sites for detectors/microphones, including, but not limited to: (a) forest-canopy openings; (b) near water sources; (c) wooded fence lines that are adjacent to large openings or connect two larger blocks of suitable habitat; (d) blocks of recently logged forest where some potential roost trees remain; (e) road and/or stream corridors with open tree canopies or canopy height of more than 33 feet (10 meters); and (f) woodland edges (Britzke et al. 2010). It is also important to assess the volume and area of highest sensitivity within the zone of detection around the microphone to ensure the best detector/microphone placement and orientation. If detectors/microphones are placed in unsuitable locations, effective data analysis may be impossible, and the results of the sampling effort will likely be invalid.

Many features (e.g., vegetation, water, wind turbines, high-tensile power-lines, micro-wave towers) can reduce the quality of call sequences recorded in the field and impact the surveyor's ability to record high-quality bat call sequences by causing calls to reflect off of these surfaces. The following recommendations are provided to aid surveyors in their selection of acoustic sites. If surveyors choose acoustic sites outside of these recommendations, then adequate justification for doing so should be provided with the acoustic survey report provided to the USFWS FO(s); otherwise, results from these sites will not be accepted. Surveyors should deploy detectors/microphones: (a) at least 5 feet (1.5 meters) in any direction from vegetation or other obstructions (Hayes 2000; Weller and Zabel 2002); (b) in areas without, or with minimal<sup>30</sup>, vegetation within 33 feet (10 meters) in front of the microphone; (c) parallel to woodland edges; and (d) at least 49 feet (15 meters) from known or suitable roosts<sup>31</sup> (e.g., trees/snags, buildings, bridges, bat houses, cave or mine portal entrances).

Elevating a detector greater than 1.5 meters above ground level vegetation can dramatically improve recording quality. For example, microphones can be attached horizontally to a pole to listen out into flight space, rather than just listening up from the ground. This will serve to increase the volume of airspace sampled and avoid the distortion effect of recording near the ground.

Surveyors should distribute acoustic sites throughout the project area or adjacent habitats. In most cases, acoustic sites should be at least 656 feet (200 meters) apart. If closer spacing is determined to be necessary or beneficial (e.g., multiple suitable habitats and acoustic sites immediately adjacent to each other), sufficient justification must be provided in the acoustic survey report submitted to USFWS FO(s).

<sup>30</sup> If necessary, surveyors can remove small amounts of vegetation (e.g., small limbs, saplings) from the estimated detection cone at a site, much like what is done while setting up mist-nets. Deployment of detectors/microphones in closed-canopy locations that typically are good for mist-netting are acceptable as long as the area sampled below the canopy does not restrict the ability of the equipment's detection cone to record high-quality calls (i.e., the vegetation is outside of the detection cone).

<sup>31</sup> If the surveyor discovers a potential roost and wishes to document bat use, please refer to Appendix E for guidance on conducting emergence surveys and contact the USFWS FO(s).

APPENDIX C  
PHASE 2 ACOUSTIC SURVEYS

SUMMER ACOUSTIC SURVEY SEASON: May 15 – August 15

PERSONNEL

**Overall:** Acoustic surveyors should have either completed one or more of the available bat acoustic courses/workshops (e.g., BCI, BCM, AnaBat) or be able to show similar on-the-job or academic experience.

**Detector Deployment:** Acoustic surveyors should have a working knowledge of the acoustic equipment and Indiana bat ecology. Surveyors should be able to identify appropriate detector placement sites and establish those sites in the areas that are most suitable for recording high-quality Indiana bat calls. Thus, it is highly recommended that all potential acoustic surveyors attend appropriate training and have experience in the proper placement of their field equipment.

**Acoustic Analysis:** Acoustic surveyors should have a working knowledge of the candidate acoustic analysis programs. Thus, it is highly recommended that all potential acoustic surveyors attend appropriate training and have experience in the analysis of acoustic recordings.

**Qualitative Analysis:** Individuals qualified to conduct qualitative analysis of acoustic bat calls typically have experience: (1) gathering known calls. This provides a valuable resource in understanding how bat calls change and the variation present in them; (2) identifying bat calls recorded in numerous habitat types; (3) familiarity with the species likely to be encountered within the project area; and (4) individuals must have multiple years of experience and must have stayed current with qualitative ID skills. A resume (or similar documentation) must be submitted along with final acoustic survey reports for anyone making final qualitative identifications.

COORDINATION WITH USFWS FO(s)

If not already required by federal permit, we recommend that applicants submit a draft study plan for all survey phases to the USFWS FO(s) for review and approval. Study plans should include a map/aerial photo identifying the proposed project area boundaries, suitable bat habitats and acreages within the project area, and the proposed number and tentative locations of acoustic monitoring sites.

DETECTOR AND MICROPHONE REQUIRED CHARACTERISTICS

Full-spectrum and/or zero-crossing detectors are suitable for use in this survey protocol.

Directional microphones are the only microphone type accepted for acoustic surveys at this time, although omni-directional microphones that have been converted to directional microphones are also acceptable. Microphones attached to detectors via a cable are also acceptable.

Sample Data Sheets for Indiana Bat Surveys

| Net Site Diagram |                   | Dominant Vegetation       |   |   |
|------------------|-------------------|---------------------------|---|---|
|                  | 1                 |                           |   |   |
|                  | 2                 |                           |   |   |
|                  | 3                 |                           |   |   |
|                  | 4                 |                           |   |   |
|                  | 5                 |                           |   |   |
|                  |                   | Net Site(s) by Habitat    |   |   |
|                  | Habitat           | A                         | B | C |
|                  | River             |                           |   |   |
|                  | Stream            |                           |   |   |
|                  | Pond              |                           |   |   |
|                  | Road Bat Corridor |                           |   |   |
|                  | Cave Mine         |                           |   |   |
|                  | <b>Total</b>      |                           |   |   |
|                  |                   | No. of Poles X Net length |   |   |
|                  | A                 | =                         | X |   |
|                  | B                 | =                         | X |   |
|                  | C                 | =                         | X |   |
|                  | D                 | =                         | X |   |
| Other Species:   |                   |                           |   |   |
| <b>Comments:</b> |                   |                           |   |   |
|                  |                   |                           |   |   |
|                  |                   |                           |   |   |



APPENDIX B  
PHASE 2 or 3 MIST-NETTING

- Kunz, T.H., R. Hodgkison, and C.D. Weise. 2009. Methods of capturing and handling bats. Pp. 3-35 in T.H. Kunz and S. Parsons (eds.), *Ecological and behavioral methods for the study of bats*, second edition. The Johns Hopkins University Press, Baltimore, Maryland.
- MacCarthy, K.A., T.C. Carter, B.J. Steffen, and G.A. Feldhamer. 2006. Efficacy of the mist-net protocol for Indiana bats: A video analysis. *Northeastern Naturalist* 13:25-28.
- Reichard, J.D., and T.H. Kunz. 2009. White-nose syndrome inflicts lasting injuries to the wings of little brown myotis (*Myotis lucifugus*). *Acta Chiropterologica* 11: 457-464.
- Robbins, L.W., K.L. Murray, and P.M. McKenzie. 2008. Evaluating the effectiveness of the standard mist-netting protocol for the endangered Indiana bat (*Myotis sodalis*). *Northeastern Naturalist* 15:275-282.
- Winhold, L. and A. Kurta. 2008. Netting surveys for bats in the Northeast: differences associated with habitat, duration of netting, and use of consecutive nights. *Northeastern Naturalist* 15:263-274.

APPENDIX C  
PHASE 2 ACOUSTIC SURVEYS

REFERENCES

- Britzke, E.R, B.A. Slack, M.P. Armstrong, and S.C. Loeb. 2010. Effects of orientation and weatherproofing on the detection of bat echolocation calls. *Journal of Fish and Wildlife Management* 1(2):136-141.
- Hayes, J. P. 2000. Assumption and practical considerations in the design and interpretation of echolocation-monitoring studies. *Acta Chiropterologica* 2:225-236.
- MacKenzie, D.I., and J.A Royle. 2005. Designing occupancy studies: general advice and allocating survey effort. *Journal of Applied Ecology* 42:1105-1114.
- Weller, T. J., and C. J. Zabel. 2002. Variation in bat detections due to detector orientation in a forest. *Wildlife Society Bulletin* 30:922-930.

APPENDIX D  
PHASE 4 RADIO-TRACKING

PERSONNEL

**Transmitter Attachment:** A qualified biologist<sup>39</sup> who is experienced in handling Indiana bats and attaching radio transmitters must perform transmitter attachments, as further explained in the protocol below.

**Tracking:** Biological technicians and/or a qualified biologist who is experienced in tracking transmittered bats must be present and actively involved in all tracking activities for Indiana bats as further explained in the protocol below.

METHODS

If one or more Indiana bats are captured, the following radio-tracking protocols will be applicable:

1. Biologists should coordinate in advance with USFWS FO(s) regarding recommendations for the number and distribution of transmitters (e.g., prioritization of sex/age, maximum number per site) and whether foraging data would be beneficial to collect. Also, professional judgment should be used to determine whether attachment of transmitters could compromise the health of a bat. Since the maximum holding times for Indiana bats targeted for radio-tracking is 45 minutes, or as allowed in federal and state permits, surveyors should be prepared to place transmitters on bats immediately following their capture to minimize holding times.
2. The radio transmitter, adhesive, and any other markings (e.g., wing bands) should weigh less than 5% of pre-attachment body weight (Aldridge and Brigham 1988, American Society of Mammalogists 1998), but must not weigh more than 10% of a bat's total body weight (Kurta and Murray 2002) and must comply with any USFWS and state permits. In all cases, the lightest transmitters capable of the required task should be used, particularly with pregnant females and volant juveniles. With pregnant bats, biologists should always use the lightest transmitter possible but no more than 5% of their expected non-pregnant weight.
3. Proposed radio telemetry equipment (e.g., receivers, antennas, and transmitters) and frequencies should be coordinated with the appropriate state natural resource agency and USFWS FO(s).
4. The qualified biologist or biological technician(s) should track all radio-tagged bats captured to diurnal roosts in accordance with permit requirements. We generally recommend tracking until the transmitter fails, fall off, or cannot be located for at least 7

<sup>39</sup> A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for federally-listed bats in the state/region in which they are surveying and/or has been authorized by the appropriate state agency to mist-net for Indiana bats. Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

APPENDIX D  
PHASE 4 RADIO-TRACKING

days and should conduct a minimum of 2 evening emergence counts at each identified roost (See Appendix F for Emergence Survey Protocols). However, biologists are encouraged to continue radio-tracking efforts for the life of the transmitter. Biologists should contact the USFWS FO(s) immediately if they plan to cease tracking efforts before the 7-day tracking period ends. If landowner access is denied, approximate roost locations (i.e., coordinates) should be determined using triangulation.

5. Daily radio telemetry searches for roosts must be conducted during daylight hours and should be conducted until the bat(s) is located or for a minimum of 4 hours of ground or 1 hour of aerial-searching effort per tagged bat per day for 7 days. However, multiple bats captured at the same net location or nearby may be tracked simultaneously. Once a signal is detected, tracking should continue until the roost is located. At a minimum, biologists should document all ground and aerial-searching effort for all bats not recovered during radio-tracking for submittal with the survey report. For each roost identified during tracking, the biologist should complete a "USFWS Indiana Bat Roost Datasheet" (Appendix D).
6. To minimize potential for disease transmission, any equipment that comes in contact with bats should be kept clean and disinfected, following approved protocols; this is particularly a concern relative to WNS. Protocols are posted at <http://www.whitenosesyndrome.org/>. Federal and state permits may also have specific equipment restrictions and disinfection requirements.

#### SUBMISSION OF RADIO-TRACKING RESULTS

Phase 4 radio-tracking results should be included with the Phase 2 or 3 mist-netting report and submitted to the appropriate USFWS FO(s). Each report should include the following information related to radio-tracking efforts:

1. Copy of prior phase reports (if not previously provided)
2. Explanation of any modifications from original survey plan (e.g., number of transmitters used, frequency of transmitters changed)<sup>40</sup>
3. Map and narrative detailing all ground and aerial searching effort for all bats not recovered during radio-tracking and relative to the negotiated or agreed effort as determined by the appropriate USFWS FO(s)
4. Map summarizing Indiana bat data collected from summer surveys for the proposed project (e.g., project area boundary and results from the site habitat assessment, acoustic survey, mist-net survey, radio-tracking, and emergence surveys)
5. Full names and permit numbers of personnel who attached transmitters to Indiana bats and full names of all personnel conducting radio-tracking efforts
6. Photographs of all roosts identified during radio-tracking
7. Legible copies of all original USFWS Indiana Bat Roost Datasheets
8. Any other information requested by the local USFWS FO(s) where work was conducted

<sup>40</sup> If the USFWS previously agreed upon the study plan we need to understand whether the revised work still accomplished the agreed upon methods

APPENDIX D  
PHASE 4 RADIO-TRACKING

REFERENCES

- Aldridge, H., and R.M. Brigham. 1988. Load carrying and maneuverability in an insectivorous bat: a test of the 5% "rule." *Journal of Mammalogy* 69:379-382.
- American Society of Mammalogists. 1998. Guidelines for the capture, handling and care of mammals. *Journal of Mammalogy* 79:1416-1431.
- Kurta, A., and S. Murray. 2002. Philopatry and migration of banded Indiana Bats (*Myotis sodalis*) and effects of radio transmitters. *Journal of Mammalogy* 83:585-589.

APPENDIX D  
PHASE 4 RADIO-TRACKING

**USFWS INDIANA BAT ROOST DATASHEET**

Biologists (Full Name): \_\_\_\_\_ Date: \_\_\_\_\_

UTM: Zone \_\_\_\_\_ Easting \_\_\_\_\_ Northing \_\_\_\_\_ OR

LAT \_\_\_\_\_ LONG \_\_\_\_\_

Property Owner: \_\_\_\_\_ Phone# \_\_\_\_\_

State \_\_\_\_\_ County \_\_\_\_\_ Site # \_\_\_\_\_

Roost # \_\_\_\_\_ Roost Name: \_\_\_\_\_

*Roost Tree Data*

Species: \_\_\_\_\_ Live \_\_ Snag \_\_ Other \_\_

(if other, explain) \_\_\_\_\_

DBH (in or cm) \_\_\_\_\_ Total Height (ft or m) \_\_\_\_\_

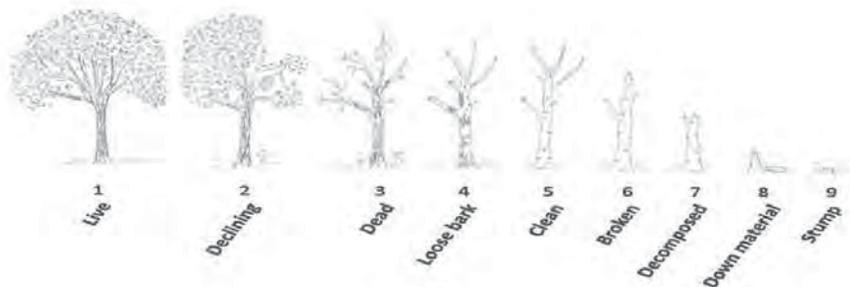
Height of roost area (if known) \_\_\_\_\_ Dist. from capture site \_\_\_\_\_

Roost position aspect (deg) \_\_\_\_\_

Exfoliating bark on bole (%) \_\_\_\_\_ Describe: sloughing \_\_ platy \_\_ tight \_\_

Cavities present? \_\_ If so, describe: \_\_\_\_\_

Roost Decay State: 1 2 3 4 5 6 7 8 9 Other





APPENDIX E  
PHASE 4 EMERGENCE SURVEYS

PERSONNEL

Qualified biologists<sup>41</sup>, biological technicians, and any other individuals deemed qualified by a local USFWS FO may conduct emergence surveys for Indiana bats by following the protocols below.

EMERGENCE SURVEYS FOR KNOWN INDIANA BAT ROOSTS

The following protocols should begin as soon as feasible after identification of a diurnal roost (ideally that night):

1. Bat emergence surveys should begin one half hour before sunset<sup>42</sup> and continue until at least one hour after sunset or until it is otherwise too dark to see emerging bats. The surveyor(s) should be positioned so that emerging bats will be silhouetted against the sky as they exit the roost. Tallies of emerging bats should be recorded every few minutes or as natural breaks in bat activity allow. There should be at least one surveyor per roost. Surveyors must be close enough to the roost to observe all exiting bats but not close enough to influence emergence. That is, do not stand directly beneath the roost, do not make noise or carry on a conversation, and minimize use of lights (use a small flashlight or similar to record data, if necessary). Do not shine a light on the roost as this may prevent or delay bats from emerging. Use of an infra-red, night vision, or thermal-imaging video camera or spotting scope is encouraged but not required. Likewise, use of an ultrasonic bat detector may aid in identifying the exact timing of bats emerging and may be used to help differentiate between low- and high-frequency bats species, and therefore, is strongly recommended. If multiple roosts are known within a colony, then simultaneous emergence surveys are encouraged to estimate population size. [Note: If a roost cannot be adequately silhouetted, then the local USFWS FO(s) should be contacted to discuss alternative survey methods].
2. Bat activity is affected by weather; therefore emergence surveys should not be conducted when the following conditions exist: (a) temperatures that fall below 50°F (10°C); (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale).
3. Surveyors should use the attached (or similar) "Bat Emergence Survey Datasheet".

<sup>41</sup> A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for federally-listed bats in the state/region in which they are surveying and/or has been authorized by the appropriate state agency to mist-net for Indiana bats. Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

<sup>42</sup> Surveys may need to start a little earlier or later than one half hour before official sunset times (i.e., before "dusk") in some settings such as deep/dark forested valleys or ridge tops, respectively. Sunset tables for the location of survey can be found at: [http://aa.usno.navy.mil/data/docs/RS\\_OneYear.php](http://aa.usno.navy.mil/data/docs/RS_OneYear.php)

APPENDIX E  
PHASE 4 EMERGENCE SURVEYS

4. Surveyors should also complete an "Indiana Bat Roost Datasheet" for each roost known to be used by one or more Indiana bats (see Appendix D for an example).
5. Completed datasheets should be included in reports prepared for the USFWS.

EMERGENCE SURVEYS FOR POTENTIAL INDIANA BAT ROOSTS

In some limited cases (e.g., individual hazard tree removal during the active season), surveyors may have the option of conducting emergence surveys for individual potential Indiana bat roosts to determine use prior to removal. The following protocol applies to these surveys:

1. Consult with the local USFWS FO(s) to determine whether a tree(s) that needs to be felled/ cleared may be potential roosting habitat for Indiana bats and whether conducting an emergence survey is an appropriate means of avoiding take of Indiana bats<sup>43</sup>. In general, the USFWS only approves of conducting emergence surveys as a means of avoiding direct take of bats for projects that only affect a very small number of potential roosts (e.g., less than or equal to 10)<sup>44</sup> in relatively small project areas. An online directory of USFWS offices is available at <http://www.fws.gov/offices/>.
2. If the USFWS FO(s) approves/concurs with Step 1, then follow the emergence guidelines for Emergence Surveys for Known Indiana Bat Roosts (above) to determine if any bats are roosting in the tree(s).
3. At the conclusion of the emergence survey:
  - a. If **no** bats were observed emerging from the potential roost(s), then it maybe felled immediately. If safety concerns dictate that a tree cannot be felled immediately (i.e., in the dark), then the tree(s) should be felled as soon as possible after sunrise on the following day. If a tree is not felled during the daytime immediately following an emergence survey, then the survey has to be repeated, because bats may switch roosts on a nightly basis. Immediately after the tree is felled, a visual inspection of the downed tree must be completed to ensure that no bats were present, injured, or killed. The USFWS FO(s) should be contacted immediately, if bats are discovered during this inspection.
  - b. If **1 or more** bats (regardless of species, because species identification cannot reliably be made during visual emergence counts alone) are observed emerging from the roost, then it should **not** be felled, and the USFWS FO(s) should be contacted the next working day for further guidance.

<sup>43</sup> If a potential bat roost tree poses an imminent threat to human safety or property, then emergency consultation procedures should be followed as appropriate. (50 CFR §402.05). If a hazard tree does not pose an imminent threat, then the USFWS requests that it be felled during the bat's inactive season (i.e., generally from October – March, but contact the FO for specific dates for your area.) When possible, felling of potential roost/hazard trees should be avoided during the primary maternity period (June – July) to avoid potential adverse effects to non-volant pups.

<sup>44</sup> Areas containing >10 hazard trees will be assessed by the USFWS on a case-by-case basis with the project proponent.

APPENDIX E  
PHASE 4 EMERGENCE SURVEYS

SUBMISSION OF EMERGENCE SURVEY RESULTS

Emergence survey results should be included with the mist-netting survey report, unless the survey was completed as an evaluation of potential roosts, and should be submitted to the appropriate USFWS FO(s) for review. Each survey report should include the following information related to emergence survey efforts:

1. Copy of prior phase reports (if not previously provided)
2. Explanation of any modifications from the Phase 4 emergence count study plan (e.g., number of potential roosts surveyed), if applicable
3. Summary of roost emergence data
4. Map identifying location of roost(s) identified during radio-tracking and/or emergence surveys for Indiana bat(s) including GPS coordinates
5. Full names of personnel present during emergence survey efforts and who conducted emergence surveys of roosts
6. Photographs of each identified roost
7. Copies of all "Emergence Survey" and "Indiana Bat Roost" datasheets
8. Any other information requested by the local USFWS FO(s) where work was conducted
9. Copy of the pre-approved site-specific written authorization from USFWS and/or state natural resource agency (if required)



APPENDIX E  
PHASE 4 EMERGENCE SURVEYS

Site Name/#: \_\_\_\_\_ Roost Name/#: \_\_\_\_\_

| Time   | Number of Bats Leaving Roost* | Comments / Notes |
|--|-------------------------------|------------------|
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
|  |                               |                  |
| Total Number of Bats Observed Emerging from the Roost/Feature During the Survey: |                               |                  |

\* If any bats return to the roost during the survey, then they should be subtracted from the tally.

**Describe Emergence:** Did bats emerge simultaneously, fly off in the same direction, loiter, circle, disperse, etc. If a radio-tagged bat was roosting in the tree, at what time did it emerge?

---



---



---





30 west superior street / duluth, minnesota 55802-2093 / fax: 218-723-3955 /www.allete.com

David R. Moeller  
Senior Attorney  
218-723-3963  
dmoeller@allete.com

August 10, 2015

**VIA Email and E-FILING**

William Cole Storm, Planning Director State  
Minnesota Department of Commerce  
85 7<sup>th</sup> Place East, Suite 500  
Saint Paul, MN 55101

Julie Ann Smith, PhD, Federal Document Manager  
DOE Office of Electricity Delivery and Energy Reliability  
1000 Independence Avenue SW  
Washington, DC, 20585

Re: *In the Matter of the Request by Minnesota Power for a Route Permit for the  
Great Northern Transmission Line*  
MPUC Docket No. E015/TL-14-21  
DoE No. EIS-0499

Dear Mr. Storm and Ms. Smith,

Please find enclosed Minnesota Power's response to the Great Northern Transmission Line Draft Environmental Impact Statement released on June 19, 2015. Parts of this response have previously been included in supplemental testimony submitted on July 31, 2015 in MPUC Docket E015/TL-14-21. This response includes the following documents:

- Minnesota Power DEIS Comments Summary;
- Minnesota Power's Comments on the Draft Environmental Impact Statement;
- Minnesota Power's DEIS Cost Comments;
- Map of Potential Displacements – Cedar Bend WMA Variation;
- Magnetic Field Simulation Results: Projected Peak Loading;
- Magnetic Field Simulation Results: Max Continuous Rating;
- Audible Noise Simulation Results;
- Response to Request for Information dated April 6, 2015 – Substation Noise;

Mr. Storm and Ms. Smith

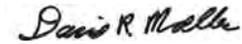
Page 2

August 10, 2015

- Manitoba Justice Letter dated June 2, 2015;
- Manitoba Hydro Letter dated July 30, 2015; and
- Great Northern Transmission Line Draft EIS Errata Table.

Please feel free to contact me at the number above if you should have any questions.

Yours truly,



David R. Moeller

DRM:sr

Enc.

## Minnesota Power DEIS Comments Summary

### Purpose and Need and Alternatives

- The statement of purpose from Minnesota Power’s Application should appear, word-for-word, in the FEIS.
- The FEIS should clearly state that the “alternative border crossings” are infeasible.
  - Routes leading to border crossings not being considered for a Presidential permit are infeasible because they are outside of the MN PUC’s jurisdiction to approve.
  - DOE’s preferred alternative must be the endpoint for the project, and routes that do not reach that endpoint should be declared infeasible.
  - Routes that would require Minnesota Power and Manitoba Hydro to restart their regulatory processes are infeasible because they would not fulfill the region’s established need for more energy and transmission capacity by 2020.
- The FEIS should recognize in Sections 6.2.2 and 6.2.3 that Roseau WMA Variation 1 and the Cedar Bend Variations would provoke significant public opposition, and that such opposition would violate Minnesota Power’s purposes for the project.

### Human Settlement Effects

- All tables titled “Land Ownership within the Anticipated ROW” and all figures titled “Land Ownership within the ROI” should be revised to include privately owned land.
- Section 5.3.1.1 should emphasize that aesthetic effects will be greater in agricultural areas, where structures will be visible well outside of the ROI for aesthetic effects.
- Section 5.2.1.1 should clearly explain that displacement of homes and other structures is possible anywhere within the route, not just within the anticipated ROW.
- Chapter 6 should not include state forests in discussions or calculations of effects on aesthetics, vegetation, or wildlife; state forests are relevant only to forestry and land ownership effects.
- Sections 5.3.2.1, 5.4.2.1, and 5.5.2.1 should include language clearly recognizing the potential for permanent adverse agricultural effects outside of the ROW, particularly in the West Section.

### Corridor Sharing

- Because corridor sharing only has a significant environmental benefit if it involves paralleling the existing 230 kV or 500 kV lines, the FEIS text and tables should not account for corridor sharing in other circumstances.

0190-1

Thank you for providing your DEIS Comments Summary. Responses to all issues identified in the Comments Summary are included as part of the detailed comment responses.

No changes are made to the EIS in response to this comment.

0190-1

0190-1 cont'd

0190-1  
Continued

- Because paralleling the abandoned corridor has no environmental benefits, Section 6.4.3 should not describe it in text or tables as an opportunity for corridor sharing.
- The FEIS should clearly state that paralleling existing transmission lines does not reduce the amount of forest land or vegetation that must be cleared within the 200-foot ROW, and should remove all statements suggesting that corridor sharing offers forestry or vegetation benefits.
- Section 6.4.1.7 should explain that the consequences of an outage are significantly greater for the Effie and East Bear Lake Variations, which would place three Manitoba tie lines (two 500 kV and one 230 kV) the same corridor and require the new line to cross both of those tie lines.

#### **Environmental Effects**

- Because there is an active mine permit within the Balsam Variation ROW, that route should be considered infeasible in the FEIS.
- Chapters 5 and 6 should acknowledge that selection of routes other than the Proposed Blue or Orange Routes would likely require relocation of the Series Compensation Station, and that any new location would likely require several acres of wetland fill.
- Because the FEIS did not include the necessary 250-foot separation between HVTL centerlines, it failed to capture the displacement of four residences within the Cedar Bend WMA Variation ROW.
- The DEIS should acknowledge in Chapter 6 that the Cedar Bend WMA Variation cannot be built as drawn because it passes through an infeasibly narrow pathway between two existing substations.

#### **Costs**

- The FEIS should not compare costs on a per-mile basis, because that is irrelevant to both cost recovery and the Applicant's decision of whether to build the Project.
- The FEIS should recognize that route variations or permit conditions that increase Project costs will have an effect on ratepayers.

#### **Relative Merits Tables**

- The "stoplight motif" relative merits tables in Chapter 6 are unhelpful and misleading. Minnesota Power has prepared updated tables that include both numbers and colors, and the FEIS should either replace the graphics in Chapter 6 with those provided by Minnesota Power, or include Minnesota Power's tables in an appendix.

## Minnesota Power's Comments on the Draft Environmental Impact Statement

On the whole, the Draft Environmental Impact Statement (DEIS) for the Great Northern Transmission Line (GNTL) presents an accurate picture of the Project's potential environmental effects. Minnesota Power commends the U.S. Department of Energy (DOE) and the Minnesota Department of Commerce Energy, Environmental Review and Analysis unit (EERA) for their thoroughness in documenting these effects. Minnesota Power is further pleased that the public has now had the opportunity to see that the Project's overall effects are relatively small, and differ little among the various route alternatives.

That said, Minnesota Power believes that the Final EIS can improve on several important aspects of the DEIS's analysis. Those issues are discussed in detail below.<sup>1</sup>

### I. The DEIS should accurately reflect Minnesota Power's objectives.

#### A. The EIS must contain a statement of purpose and need that is shaped by the Application at issue.

The Council on Environmental Quality (CEQ) regulations implementing NEPA require that an EIS "briefly specify the underlying purpose and need to which the agency is responding . . . ."<sup>2</sup> That statement of purpose and need naturally derives from, and depends on, the circumstances that trigger the agency action. When an agency is responding to a private applicant's request, as EERA and PUC are here, its purpose and need must account for that request.<sup>3</sup> Indeed, the agency should specify a purpose and need that allows the alternatives studied in the EIS to be "shaped by the application at issue and by the function the agency plays in the decisional process."<sup>4</sup>

Section 1.2.2. of the DEIS states that "[t]he purpose of and need for DOE action is to decide whether . . . to grant the Applicant a Presidential permit." Minnesota Power does not object to that characterization, as far as it goes. But "[w]here a private party's proposal triggers a project," the EIS statement of purpose and need must also "give substantial weight to the goals and objectives of that private actor."<sup>5</sup> In that regard, the DEIS is deficient.

#### B. The DEIS's discussion of "Minnesota Power's Objectives" should include the statement of purpose contained in Minnesota Power's Application.

Section 2.2—entitled "Applicant's Objectives"—purports to identify "three factors" that are driving Minnesota Power's decision to construct the GNTL. That discussion, however, fails to account for Chapter 2 of Minnesota Power's Application, which carefully describes the

<sup>1</sup> Minnesota Power's comments focus on the body of the DEIS. Presumably any changes that are made in the Final EIS will also be reflected in the Executive Summary, which is not specifically addressed below.

<sup>2</sup> 40 C.F.R. § 1502.13. The Rules implementing Minnesota Environmental Policy Act (MEPA) similarly require that the project description in the EIS "allow the public to identify the purpose of the project." Minn. R. 4410.2300(E).

<sup>3</sup> *City of Angoon v. Hodel*, 803 F.2d 1016, 1021 (9th Cir. 1986); *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991).

<sup>4</sup> *Citizens Against Burlington*, 938 F.3d at 199.

<sup>5</sup> *BioDiversity Conservation Alliance v. Bureau of Land Mgm't*, 608 F.3d 709, 715 (10th Cir. 2010).

0190-2

With regard to purpose and need, DOE has determined the purpose and need is adequate, per program goals and objectives and no changes are made to the purpose and need or alternatives analyzed in the EIS.

Section 2.2 of the EIS is modified to include the Applicant's purpose for the proposed Great Northern Transmission Line Project by adding the following:

"The Applicant's federal and state permit applications states that the purpose of the proposed Project is to efficiently provide the Applicant's customers and the region with energy that will: (a) help meet the region's growing energy demands; (b) advance Minnesota Power's *EnergyForward* strategy of increasing its generation diversity and renewable portfolio; (c) strengthen electric system reliability; and (d) fulfill the Applicant's obligations under its power purchase agreements with Manitoba Hydro, all in a manner that is consistent with the Applicant's commitment to making a positive impact on communities."

0190-2

The EIS is updated with accurate information about the status of the MN PUC's certificate of need process and related written order issued by the MN PUC on June 30, 2015.

company's purpose in proposing the GNTL Project. Specifically, the Application states that the purpose of the GNTL is:

To efficiently provide the Applicant's customers and the region with clean, emission-free energy that will

- (a) help meet the region's growing energy demands
- (b) advance the Applicant's *EnergyForward* strategy of increasing its generation diversity and renewable portfolio
- (c) strengthen system reliability
- (d) fulfill the Applicant's obligations under its power purchase agreements with Manitoba Hydro

all in a manner that is consistent with the Applicant's commitment to making a positive impact on communities.

An EIS that studies the potential environmental effects of a private applicant's proposed project should never attempt to "redefine the goals of the proposal,"<sup>6</sup> as the DEIS does in Section 2.2. Indeed, an agency has a responsibility to consider "private goals, especially when the agency is determining whether to issue a permit or license."<sup>7</sup>

To the extent that the DEIS omits information from the Application on the grounds that "the need for the transmission line is the central issue of the MPUC's ongoing certificate of need proceeding," it is both outdated and incorrect. As the DEIS itself acknowledges elsewhere, the MPUC approved at its May 14, 2015 agenda hearing granting a Certificate of Need for the GNTL Project and subsequently on June 30, 2015 issued a written order, for which no party requested reconsideration.<sup>8</sup> Consequently, the need for the GNTL Project can no longer be questioned.<sup>9</sup> At the same time, federal law requires the EIS to account for Minnesota Power's "private goals" as it evaluates alternatives.<sup>10</sup> The DEIS as written does not fulfill this requirement.

Minnesota Power's statement of purpose should appear, word-for-word, in the EIS. Only then can the EIS's evaluation of alternatives be properly "shaped by" both the Application at issue and DOE's responsibility to consider whether to issue a Presidential permit.

**II. The Department of Energy's preferred border crossing is the only feasible border crossing alternative.**

**A. The federal government has the exclusive authority to select the location of the international border crossing.**

Executive Order 10485 states that "the proper conduct of the foreign relations of the United States requires that executive permission be obtained" for any facilities located "at the borders of the United States." That executive permission takes the form of a Presidential permit, which—in

<sup>6</sup> *Citizens Against Burlington*, 938 F.2d at 199.

<sup>7</sup> *Alaska Survival v. Surface Transp. Bd.*, 705 F.3d 1073, 1085 (9th Cir. 2013).

<sup>8</sup> MPUC Docket No. E015/CN-12-1163, MPUC Order dated June 30, 2015.

<sup>9</sup> Minn. R. 7850.3700, subp. 7.

<sup>10</sup> *Id.*

0190-2 cont'd

0190-2  
Continued

0190-3

MN PUC is the siting authority for transmission lines within the state of Minnesota up to the U.S.-Canada international border. The EIS analyzes alternative border crossings that were proposed during scoping at the request of resource agencies that are intended to inform the MN PUC transmission line route selection. At the time of the state scoping decision (see Appendix D), the Applicant did not sufficiently object to the scoping expansion. MN PUC cannot authorize an international border crossing, but the MN PUC may perform its due diligence in considering alternative routes to what was proposed by the Applicant in its Route Permit application.

Sections S.7 and 4.1.1 of the EIS are made to clearly state that the alternative border crossings considered in the EIS are done so only for the purposes of the analysis supporting the Route Permit and transmission line siting decision, but are not being considered by DOE as alternatives to its consideration of the crossing proposed by the Applicant in its applications to both DOE and MN PUC 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. This proposed border crossing is also identified as DOE's preferred alternative in the EIS in Sections S.6.2, 1.2.2, and 1.2.2.1.

0190-3

0190-3 cont'd

0190-3  
Continued

the case of electric transmission facilities—must be obtained from DOE.<sup>11</sup> As a federal district court in Minnesota has explained, “the President’s authority to issue [a] border-crossing Permit comes by way of his constitutional authority over foreign affairs and authority as Commander in Chief . . . .”<sup>12</sup>

By nature, the conduct of foreign relations is “an area where federal uniformity is essential.”<sup>13</sup> “Foreign commerce,” in particular, “is pre-eminently a matter of national concern.”<sup>14</sup> To that end, Article II of the Constitution gives the President the “vast share of responsibility for the conduct of our foreign relations.”<sup>15</sup>

In the case of Presidential permits for international border crossings, the President is explicitly exercising the federal power to conduct “foreign relations.”<sup>16</sup> When such exclusive “national power” is invoked, it may not be “obscured by state or local action.”<sup>17</sup> Indeed, the President’s authority to conduct foreign relations preempts and invalidates any action by state or local entities that would infringe on the national power.<sup>18</sup> States simply are not permitted to “intrude . . . into the field of foreign affairs[,] which the Constitution entrusts to the President and the Congress.”<sup>19</sup>

DOE’s role under Executive Order 10485 is to consider whether issuing a Presidential permit for the border crossing facility proposed by Minnesota Power is consistent with the public interest.<sup>20</sup> If DOE determines that a permit should issue, it will be exercising delegated Presidential authority to conduct foreign relations.<sup>21</sup>

Neither the State of Minnesota nor any other state has authority to alter the location of an international border crossing. The Final EIS accordingly should note that any routes inconsistent with the single border crossing for a Presidential permit are outside of the MPUC’s jurisdiction to approve.

**B. The Department of Energy’s preferred alternative is the only permissible endpoint for the GNTL project.**

A Presidential permit application is a request for permission to cross the U.S. border at a single, specific location. DOE regulations implementing Executive Order 10485 accordingly require that every application for a Presidential permit include a “detailed map . . . showing the physical location, longitude and latitude of the facility on the international border.”<sup>22</sup> After extensive

<sup>11</sup> *Id.*; see Executive Order 12038 (transferring authority from the Federal Power Commission to the Secretary of Energy).

<sup>12</sup> *Sierra Club v. Clinton*, 689 F. Supp. 2d 1147, 1163 (D. Minn. 2010).

<sup>13</sup> *Japan Line Ltd. v. Los Angeles Cty.*, 441 U.S. 434, 448 (1979).

<sup>14</sup> *Id.*

<sup>15</sup> *American Ins. Ass’n v. Garamendi*, 539 U.S. 396, 414 (2003).

<sup>16</sup> E.O. 10485.

<sup>17</sup> *Crosby v. National Foreign Trade Council*, 530 U.S. 363, 381 (2000).

<sup>18</sup> See, e.g., *American Ins. Ass’n*, 539 U.S. at 419-20; *Crosby*, 530 U.S. at 385-86.

<sup>19</sup> *American Ins. Ass’n*, 539 U.S. at 417 (quoting *Zschemig v. Miller*, 389 U.S. 429, 432 (1968)).

<sup>20</sup> Executive Order 10485, § 1(a)(3).

<sup>21</sup> *Sierra Club*, 689 F. Supp. 2d at 1163.

<sup>22</sup> 10 C.F.R. § 205.322(b)(2).

negotiations, Minnesota Power and its Canadian partner, Manitoba Hydro, agreed on the border crossing location that DOE is considering as part of the Presidential permit process.<sup>23</sup>

The DEIS announces in Section 1.2.2.1 that “DOE’s preferred alternative is to grant a Presidential permit to Minnesota Power’s proposed international border crossing.” That announcement should foreclose consideration of any alternative border crossings. DOE has exclusive authority to permit an international border crossing, and its preference is to permit the border crossing agreed to by Minnesota Power and Manitoba Hydro that is being considered in the Presidential Permit process (the “Presidential Permit Border Crossing”). The Minnesota transmission line routing process should take that border crossing as the northern endpoint for the GNTL Project, just as it has accepted the expanded Blackberry substation as the southern endpoint.

Because DOE has identified a preferred international border crossing, the Final EIS should note that all other border crossings are no longer permissible endpoints for the GNTL Project.

**C. Because Canada’s regulatory process is not considering any other crossing, the other “alternatives” would not result in a transmission line project.**

Even apart from DOE’s exclusive jurisdiction over international border crossings, and its preferred alternative for this Project, no border crossing is feasible other than the Presidential Permit Border Crossing.

**1. No alternative border crossing is feasible given the current status of the Canadian environmental review process.**

As the DEIS was being finalized, the government of Manitoba filed a letter with the Administrative Law Judge assigned to the GNTL Route Permit proceedings.<sup>24</sup> That letter explains that, after a “detailed route selection process” in Canada, “*Manitoba Hydro has selected a specific proposed route*” for purposes of the Canadian regulatory process.<sup>25</sup> That route ends at the Presidential Permit Border Crossing.<sup>26</sup> When Manitoba Hydro files its Environmental Impact Statement with the appropriate Canadian authorities, it will not contain any alternative border crossings.<sup>27</sup> Canadian authorities will conduct “an extensive review” of Manitoba Hydro’s filing, but “that review is based upon the *single proposed route and selected border crossing*.”<sup>28</sup> No other border crossing will be considered as part of the Canadian process.<sup>29</sup> And, as the DEIS acknowledges, it is not DOE’s or EERA’s role to consider potential environmental effects in Canada, or to second-guess the Canadian environmental review process.<sup>30</sup>

<sup>23</sup> Letter from Manitoba Hydro to Minn. Dep’t of Commerce at 2 (July 30, 2015) (MH Letter).

<sup>24</sup> See Docket No. E015/RP-14-21, Document ID 0156-111176-01, Letter from Gordon E. Hannon, General Counsel, Manitoba Justice to Administrative Law Judge Ann O’Reilly (June 2, 2015) (Manitoba Justice Letter).

<sup>25</sup> *Id.* at 6 (emphasis added).

<sup>26</sup> *Id.*

<sup>27</sup> *Id.* at 6-7; MH Letter at 2.

<sup>28</sup> *Id.* at 7 (emphasis added).

<sup>29</sup> *Id.* at 7-8.

<sup>30</sup> DEIS at 11-12. (“NEPA does not require an analysis of environmental impacts that occur within another sovereign nation that result from actions approved by that sovereign nation.”)

0190-3 cont'd

0190-3  
Continued

0190-4

Thank you for your comment. No change is made in the EIS in direct response to this comment, however, Section 1.3.2 is updated with information about the status of the Canadian process for siting this project in Canada by Manitoba Hydro as provided by comment letters submitted by both the Province of Manitoba’s General Counsel (see response to comment 078-1) and Manitoba Hydro (see response to comments 079-1 and 079-2).

0190-4

Even more recently, Manitoba Hydro itself has transmitted a letter to EERA clearly stating that it “can only support the agreed-upon border crossing . . . known as the “Proposed Border Crossing – Blue/Orange Route in the Draft EIS.”<sup>31</sup> That letter briefly summarizes the “robust, transparent analysis of routes and all potential border crossings” that took place in Canada, and explains how that process led to the selection of the Blue/Orange Route as the “preferred end point for each entity.”<sup>32</sup> Leaving no doubt about where things now stand in the Canadian process, the letter further states that “Manitoba Hydro does **not** have routes that connect to the border crossing variations included in the Draft EIS.”<sup>33</sup>

It makes no common sense for the EIS to continue evaluating border crossing alternatives that are not being considered as part of the Canadian review process. The GNTL Project cannot exist unless it connects to the Manitoba Hydro transmission line that will bring hydroelectricity into the United States from Canada. A border crossing that does not match any crossing being considered in Canada is fundamentally infeasible, and should be treated that way in the Final EIS.

Practically speaking, the selection of an “alternative border crossing” would cause both Minnesota Power and Manitoba Hydro to reconsider their long-term plans for meeting their customers’ energy needs.<sup>34</sup> The companies have spent considerable resources identifying a border crossing that was “in the best interests of the overall project and acceptable to both parties.”<sup>35</sup> If the MPUC identified a different crossing, it is unlikely that the companies would invest more time or effort in the GNTL, and the project would be abandoned.

**2. It is not feasible for Minnesota Power to submit a new Presidential permit application at this stage.**

The DEIS fails to recognize the infeasibility of the alternative border crossings. Instead, it proposes in Section 1.2.2.1 that “[i]f the MN PUC issues a permit for a route with a different border crossing . . . , the Applicant could submit an amended Presidential permit application to DOE . . . .” Setting aside the DOE’s exclusive power to determine the location of an international border crossing, requiring Minnesota Power to restart the application process is infeasible because it would thwart the purposes of the GNTL Project.

Selecting an “alternative border crossing” would not simply require Minnesota Power to restart its Presidential permit application process. Manitoba Hydro would also have to agree to that border crossing and obtain approval from Canadian authorities.<sup>36</sup> And even if Manitoba Hydro did file “new or amended applications containing a different proposed route,” it “would be very unlikely that the necessary studies and the regulatory process would be completed in time to

<sup>31</sup> MH Letter at 1.

<sup>32</sup> *Id.* at 2.

<sup>33</sup> *Id.*

<sup>34</sup> MPUC Docket No. E015/CN-12-1163, MPUC Order dated June 30, 2015 at 2: “The project is part of a joint effort with Manitoba Hydro to construct a new Canada-United States transmission interconnection. The project is intended to provide hydropower and wind storage energy products to Minnesota Power’s customers and will provide an additional 500 MW of transfer capacity from the line.”; see MH Letter at 2.

<sup>35</sup> Manitoba Justice Letter at 6; MH Letter at 2.

<sup>36</sup> Manitoba Justice Letter at 6.

0190-4 cont'd

0190-4  
Continued

0190-5

Thank you for your comment. The EIS analyzes alternative border crossings that were proposed during scoping at the request of resource agencies and are intended to inform the MN PUC transmission line route selection. MN PUC cannot authorize an international border crossing, but the MN PUC may perform its due diligence in this EIS in considering alternative routes to what was proposed by the Applicant in its Route Permit application.

Sections S.7 and 4.1.1 of the EIS are changed to clearly state that the alternative border crossings considered in the EIS are done so only for the purposes of the analysis supporting the Route Permit and transmission line siting decision, but are not being considered by DOE as alternatives in its Presidential permit decision. The international border crossing proposed by the Applicant in its applications to both DOE and MN PUC 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, is clearly identified as DOE's preferred alternative in the EIS in Sections S.6.2, 1.2.2, and 1.2.2.1.

DOE has determined the purpose and need is adequate, per program goals and objectives, and no changes are made to the alternatives analyzed in the EIS.

0190-5

meet the proposed 2020 in-service date” required by the power purchase agreements between Manitoba Hydro and Minnesota Power.<sup>37</sup>

Fulfilling the June 2020 in-service date specified by those power purchase agreements is one aspect of Minnesota Power’s purpose for the GNTL Project. That purpose stems from the MPUC’s determination that Minnesota Power faces “capacity and energy deficits over the period 2020 – 2035.”<sup>38</sup> As a result, Minnesota Power “need[s] a significant additional amount of peaking capacity and energy to meet its future capacity and energy needs.”<sup>39</sup> If an alternative border crossing cannot meet the June 2020 in-service date, it is not feasible, and should be excluded from further consideration in the EIS under NEPA<sup>40</sup> and the MPUC’s rules.<sup>41</sup>

The Final EIS should state that all “alternative border crossings” are infeasible because they cannot satisfy the Project’s purpose and need to have the GNTL in service by 2020, as required by Minnesota Power’s power purchase agreements with Manitoba Hydro.

### **III. The DEIS does not adequately describe potential effects on human settlement and agriculture.**

#### **A. The Roseau Lake WMA Variation 1 and Cedar Bend WMA Variation violate Minnesota Power’s purposes for the GNTL Project.**

As a matter of corporate philosophy, Minnesota Power is committed to having a positive impact on the communities it serves. That is why the company spent years planning the GNTL Project, listening to the people who lived in the areas where the line might be routed, and carefully identifying a route that would receive widespread acceptance from the community. By and large, the company believes that it was successful in achieving that goal, as evidenced by the minimal amount of public opposition to the Proposed Blue/Orange Route.

To ensure that the GNTL Project remained consistent with Minnesota Power’s philosophy as it progressed through environmental review, the company built its commitment to having a positive impact on communities into the project’s statement of purpose. As discussed above, DOE and EERA are legally obligated to consider that purpose as part of the DEIS’s statement of underlying purpose and need for the project.

Unfortunately, the DEIS contains two route variations that plainly would not have a positive impact on their host community. Roseau Lake WMA Variation 1 would, as the DEIS acknowledges, include 50 residences within a 3,000-foot route—more than one residence for every mile of transmission line.<sup>42</sup> The route would also include more than 12,600 acres of

<sup>37</sup> Manitoba Justice Letter at 8; MH Letter at 2.

<sup>38</sup> MPUC Docket No. E015/CN-12-1163, Findings of Fact and Conclusions of Law at 33, ¶ 175 (Mar. 16, 2015) as approved in MPUC Order dated June 30, 2015.

<sup>39</sup> *Id.*

<sup>40</sup> “The [EIS] need not consider an infinite range of alternatives, only reasonable or feasible ones.” *Alaska Survival*, 705 F.3d at 1087.

<sup>41</sup> Minn. R. 7850.3700, subp 7 (“When the Public Utilities Commission has issued a Certificate of Need for a ...high voltage transmission line...the environmental assessment shall not address questions of need, including size, type, and timing; questions of alternative system configurations; or questions of voltage.”).

<sup>42</sup> DEIS at 270, Table 6-13.

0190-5 cont'd

0190-5  
Continued

0190-6

The potential impact on human settlement and agricultural land is evaluated for all alternatives in the EIS. As discussed in Section 5.2.1 of the EIS, high voltage transmission line projects, like the proposed Great Northern Transmission Line project, have the potential to impact human settlement in a variety of ways, including potential displacement of humans which can be assessed by evaluating the presence or absence of human settlement features like residences, churches, schools, etc. The EIS also goes on to assess the potential for impacts to humans for all alternatives in terms of several other closely related resource areas, including, noise, public health and safety, transportation, air quality, electronic interference, and property values. Impacts to agricultural lands and practices are evaluated for all alternatives in Chapter 6 of the EIS.

0190-6

The purpose of the EIS is to evaluate the potential impacts from DOE granting a Presidential permit for the proposed Great Northern Transmission Line project and alternatives evaluated to inform the Route Permit decision to be made by the MN PUC.

No changes are made to the EIS in response to this comment.

agricultural land.<sup>43</sup> Having spoken with the farmers and residents who would be affected by Roseau Lake WMA Variation 1, Minnesota Power can say with confidence that they would not view the transmission line as having a positive effect on their community. Indeed, many of them have expressed staunch opposition to the line being located on their property.

The situation is similar with the Cedar Bend WMA Variation. There are 101 residences within the 3,000-foot route width.<sup>44</sup> That means Minnesota Power would face an average of more than five residences for every mile of transmission line. The route also contains over 2,600 acres of agricultural land.<sup>45</sup> Again, Minnesota Power has listened to the residents in this area, and knows that they do not want a transmission line built along the proposed Cedar Bend WMA Variation route. Building a line in the face of unified, vocal public opposition is not usually consistent with having a positive impact on communities.

Because the Roseau Lake WMA Variation 1 and the Cedar Bend WMA Variation would each have a negative effect on their host communities, they do not satisfy Minnesota Power's purpose in building the GNTL Project, and should be eliminated from further consideration in the Final EIS.

**B. The DEIS must account for effects on human settlement by identifying effects on privately owned land.**

Among the 14 "routing factors" that the MN PUC considers when deciding whether to permit a high-voltage transmission line, the first-listed is "effects on human settlement."<sup>46</sup> The DEIS acknowledges as much in Section 1.3.1.1.

Minnesota Power's purpose for the GNTL—which, as discussed above, should be incorporated into the EIS—also includes "making a positive impact in on communities." Consideration of private property accordingly was central to the company's multi-year routing and public outreach process for the GNTL.<sup>47</sup>

In addition, the Working Group that was assembled by the EERA to review the GNTL project emphasized that the GNTL "is a public purpose project and should therefore be routing as much as possible on public land, minimizing impact to human settlement and private property use."<sup>48</sup>

Despite all of this, the DEIS's discussion of effects does not measure the effects of the proposed route and route variations on privately owned property. As a result, the DEIS does not adequately measure "effects on human settlement," as required by the Minnesota Rules.

To begin with, Chapter 5 of the DEIS describes the Affected Environment and Potential Impacts, but omits any discussion of privately owned lands as a factor that would be affected by the Project. Consistent with Minnesota Rules 7850.4100(A), Minnesota Power's purpose for the

<sup>43</sup> *Id.* at 272, Table 6-14.

<sup>44</sup> DEIS at 289, Table 6-25.

<sup>45</sup> *Id.* at 291, Table 6-26.

<sup>46</sup> Minn. R. 7850.4100(A).

<sup>47</sup> Minnesota Power Received over 1,000 comments on the Project, the majority of which expressed concern over impacts to private property, residences, and agriculture.

<sup>48</sup> DEIS Appendix C at 11.

0190-6 cont'd

0190-6  
Continued

0190-7

The tables in the Land Use Compatibility Sections in Chapter 6 of the EIS are updated with the total acres of land in the ROW, along with acres of public and private land in the ROW. The titles of the land ownership figures were updated to indicate public land ownership. As such, private land is not shown on the land ownership figures.

0190-7

GNTL Project, and the instructions from the Working Group, Chapter 5 should be revised to include a statement that effects on privately owned lands are an important consideration in the EIS.

Chapter 6 is also deficient when it describes the Comparative Environmental Consequences of each Route and Alignment Modification.

Although the Human Settlement analysis for each “Variation Area” discusses land ownership, it does not mention privately owned land. Likewise, the acreage of privately owned land within each Variation is not included in any table or figure in Chapter 6. The discussion of Land Ownership instead focuses on how each Variation impacts state forest, state fee, county, state conservation, or USFWS interest lands.

Table 6-15 for the Roseau Lake WMA Variation Area is presented as an example:

**Table 6-15 Land Ownership within the Anticipated ROW in the Roseau Lake WMA Variation Area**

| Resource                                  | Type                                    | Evaluation Parameter | Roseau Lake WMA Variation Area |                             |                             |
|---|---|----------------------|--------------------------------|-----------------------------|-----------------------------|
|   |   |                      | Proposed Blue/Orange Route     | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 |
| State Forests                             | --                                      | Acres within ROW     | 334                            | 6                           | 52                          |
| State Fee Lands <sup>(1)</sup><br>Total   | --                                      | Acres within ROW     | 453                            | 6                           | 145                         |
| State Fee Lands <sup>(1)</sup><br>by Type | Consolidated Conservation               | Acres within ROW     | 346                            | 6                           | 96                          |
|   | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW     | 13                             | 0                           | 11                          |
|   | Trust Fund                              | Acres within ROW     | 94                             | <0.5                        | 39                          |
|   | Federal - State Lease                   | Acres within ROW     | 0                              | 0                           | 0                           |

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152)

Note(s): Totals may not sum due to rounding

(1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.

All of the “Land Ownership within the Anticipated ROW...” tables in Chapter 6 generally look similar to this example.<sup>49</sup> None of them mention private land ownership.<sup>50</sup>

Because these tables do not account for privately owned land, they are unclear about how many **total** acres are within the ROW for each alternative within the Variation Area. More important, the tables make no effort to calculate the amount of privately owned land within each ROW. It is difficult for the Administrative Law Judge (ALJ), the MN PUC, or any other reader to fully

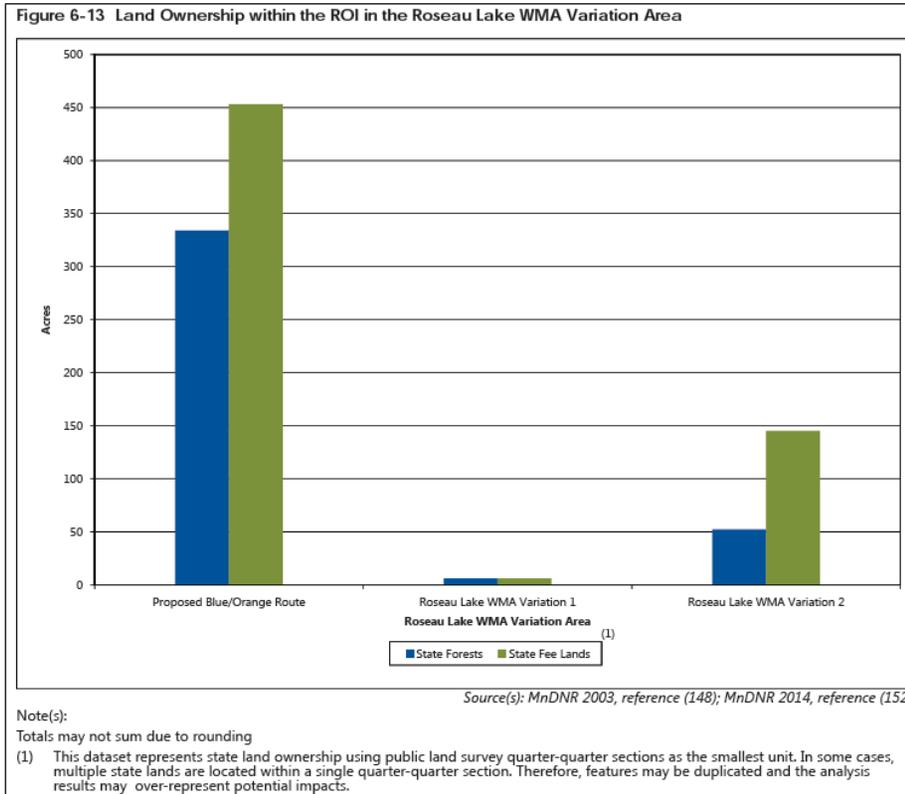
<sup>49</sup> Table 6-3; Table 6-15; Table 6-27; Table 6-39; Table 6-51; Table 6-68; Table 6-80; Table 6-91; Table 6-102; Table 6-112; Table 6-124; Table 6-136; Table 6-145; Table 6-162; Table 6-174; Table 6-185; Table 6-197; and Table 6-206.

<sup>50</sup> In addition, the land ownership tables are misleading about how much public land is within the ROW. The categories of “State Forests” and “State Fee Land” appear to overlap, leaving the impression of more total acres of state land than are actually present.

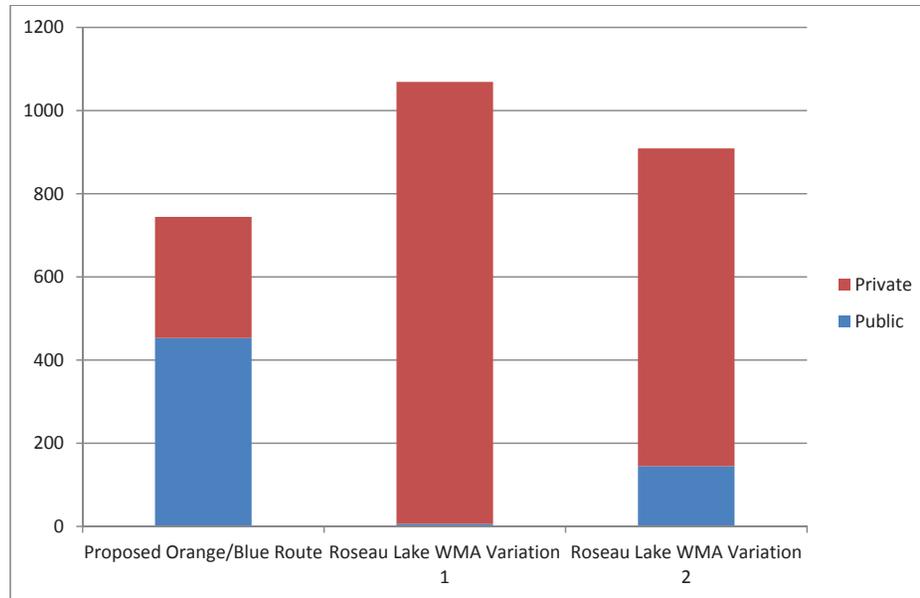
account for human settlement effects without an understanding of how much land is owned by individual human beings—many of whom likely live and work on the land they own.

The problem with the land ownership tables in Chapter 6 is, if anything, magnified in the corresponding figures. For example, Figure 6-13, entitled “Land Ownership within the ROI in the Roseau Lake WMA Variation Area,” shows that the Proposed Blue/Orange Route has over 450 acres of state fee lands and more than 300 acres of state forests. Roseau Lake WMA Variation 1, by contrast, has very little of either. The height of the bars strongly suggests that the Proposed Blue/Orange Route has significantly greater effects on “Land Ownership.”

0190-7  
Continued



In fact, the huge swaths of land within the Roseau Lake WMA Variation 1 ROI are privately owned. If Figure 6-13 took that land ownership into account, it would look quite different:



Because tables and figures that omit the amount of privately owned land from the calculation of land ownership are misleading, and do not fully account for potential effects on human settlement, all of the land ownership figures and tables, as well as the accompanying discussion, should be revised to include effects on privately owned land.

**C. The discussion of aesthetics should recognize that the ROI is too simplistic in agricultural areas.**

Consistent with the instructions in the Minnesota Rules, the DEIS attempts to evaluate effects on human settlement in part by considering the Project's potential aesthetic effects.<sup>51</sup> Unfortunately, that analysis falls short in a manner that understates aesthetic effects, especially in agricultural areas.

Section 5.3.1.1 (and similar sections for the Central and East Sections) defines the ROI for aesthetic effects as "1,500 feet from the anticipated alignment of the transmission line." That distance is reasonable in places where the line is located in a forested area, and thus visually obscured by surrounding trees.

The situation is different, however, in predominantly agricultural areas. As the DEIS acknowledges, "[a]esthetic impacts are likely to be greatest for views of the proposed Project in

<sup>51</sup> Minn. R. 7850.4100(A).

0190-7 cont'd

0190-7  
Continued

0190-8

As stated in Section 5.3.1.1, "The 1,500 foot ROI for aesthetic resources was identified because the proposed Project is *most likely* to be visible within this near-foreground distance zone and views of the proposed Project from aesthetic resources within this distance zone have the *greatest potential* to result in visual impacts for sensitive viewers" (*emphasis added*). The EIS also states, in Section 5.3.1.1, that "Aesthetic impacts are likely to be greatest for views of the proposed Project in the foreground distant zone (i.e., up to about 0.5 miles from the proposed Project), but impacts can also be substantial for views from greater distances." Thus, 1,500 feet provides a reasonable distance within which aesthetic resources may be identified and compared for the different route variations and modifications to assess potential aesthetic impacts, but the EIS does not identify that aesthetic impacts would only occur within this distance. In addition, while distance is an important factor in determining the level of aesthetic impact, a variety of other factors in combination contribute to determining aesthetic impacts. As stated in Section 5.3.1.1 "Impacts on aesthetics are assessed based on the extent of changes to landscape character and scenic quality, the level of contrast introduced by the proposed Project, its proximity to viewers, and the visual sensitivity related to views of the proposed Project." Depending on these factors, aesthetic impacts are as likely to occur in forested areas as agricultural areas. Therefore, while there is a greater potential for aesthetic impacts in the near-foreground and foreground distance zones, it cannot be reliably stated that there is a "potential for greater aesthetic effects in agricultural areas, where long-distance visibility tends to be much higher."

0190-8

Visual simulations, provided in Appendix N, Photo Simulations, of the EIS, were prepared for seven viewpoints within the study area to represent typical views of the proposed Project. These simulations are intended to provide reviewers with a sense of what the transmission line would look like from various distances and in various landscape settings within the study area.

No changes are made to the EIS in response to this comment.

the foreground distance zone (i.e. up to *about 0.5 miles* from the proposed Project), but impacts can also be substantial for views from greater distances.”<sup>52</sup> In fact, “a recent study on the visibility of transmission lines in western landscapes” found that structures were “noticeable to causal observers at *up to 10 miles* and strongly attracted attention at up to *3 miles*.”<sup>53</sup> Residents of the agricultural areas that predominate in the West Section of the study area may thus experience aesthetic effects—in other words, they will see the proposed transmission line—at distances far greater than 1,500 feet.

For example, Table 6-13, “Aesthetic Resources within the ROI in the Roseau Lake WMA Variation Area,” currently lists the number of houses within 500 feet, 1,000 feet, and 1,500 feet of the proposed route and variations. Most of that Variation Area—especially for Roseau Lake WMA Variation 1—is within a “western landscape” like the one referenced in the DEIS. There are 727 residences within 3 miles of Roseau Lake WMA Variation 1. The study cited in Chapter 5 suggests that most or all of these residences would be affected by the proposed variation.

To account for the study of western landscapes cited in the DEIS, Section 5.3.1.1 of the Final EIS should include a discussion that emphasizes the potential for greater aesthetic effects in agricultural areas, where long-distance visibility tends to be much higher.

**D. Displacement effects are not the same for all alternatives, and should not be dismissed in Chapter 5.**

Under Minnesota Rules, consideration of effects on human settlement must include “displacement” caused by the proposed transmission line.<sup>54</sup> The DEIS describes displacement as something that “would have similar expected general impacts . . . for all proposed routes and variations.”<sup>55</sup> According to the DEIS, “[d]isplacements are relatively rare,” and would occur only within the 200-foot ROW for the transmission line.<sup>56</sup> The DEIS goes on to conclude that “there are no residences, churches, schools, daycares, or nursing homes within the [200-foot] ROI that would be displaced as a result of the anticipated alignment.”<sup>57</sup>

Simply using the ROW as the ROI for displacement does not adequately account for potential effects. As the DEIS explains in Section 1.3.1.4, the MN PUC will permit a 650-3,000 foot route. The 200-foot ROW may be located anywhere within the permitted Route, not necessarily on the presently anticipated alignment. That means that any residence or other building within the entire 650-3,000 foot route faces a possibility of displacement.<sup>58</sup> This potential effect could readily be captured using a table that included both the number of residences and other buildings within the 200-foot ROW, as well as the number of residences or other buildings within the potential 3,000-foot permitted route.

<sup>52</sup> DEIS at 159 (emphasis added).

<sup>53</sup> *Id.*

<sup>54</sup> Minn. R. 7850.4100(A).

<sup>55</sup> DEIS at 77.

<sup>56</sup> *Id.* at 78.

<sup>57</sup> *Id.*

<sup>58</sup> The Final EIS should note that Minnesota Power has carefully evaluated the Proposed Blue and Orange Routes, and is confident that it can avoid displacing any residences along those routes. The route variations, by contrast, have not been subject to careful scrutiny, increasing the risk of displacement within the route.

0190-8 cont'd

0190-8  
Continued

0190-9

While the MN PUC may permit a 650-3,000 foot route, as identified in the Generic Route Permit Template (Appendix B of the EIS, Section 3.1): "Any alignment modifications within the designated route shall be located so as to have comparable overall impacts relative to the factors in the Minn. Rules, part 7850.4100, as does the alignment identified in this permit, and shall be specifically identified and documented in and approved as part of the plan and profile submitted pursuant to Section 4.1 of this permit."

When evaluating direct impacts throughout the EIS, the ROW, not the route width is regularly used for analysis because of this procedural requirement should the proposed alignment change. Further, including an evaluation of the route width instead of the ROW would result in an overestimation of the potential impacts as not all residences outside of the defined ROW would be displaced; only those that would be within the 200 foot ROW of the revised alignment.

No changes are made to the EIS in response to this comment.

0190-9

For example, as already noted above, the Roseau Lake WMA 1 Variation has no residences within the expected ROW, but 50 within the potential 3,000-foot route. The Cedar Bend WMA Variation is just 19.6 miles long, but has 101 homes within a 3,000-foot route width. The Effie Variation has 14 residences within its 3,000-foot route, but would have less room to maneuver around them due to the presence of two existing high-voltage transmission lines. None of these issues is adequately addressed in the DEIS.

The Final EIS should acknowledge in Section 5.2.1.1 that any residence or other building within the permitted Route could be displaced. Moreover, because the number of residences and other buildings within the potential routes, the issue of displacement should be discussed for each Variation Area in Chapter 6, not dismissed as a similar effect in Chapter 5.

**E. State forests should not be overemphasized as an effect on human settlement because many of them are inaccessible to residents.**

As described above, the DEIS underemphasizes displacement and aesthetic effects on residences—both of which are issues directly relevant to human settlement. At the same time, the DEIS overemphasizes certain “aesthetic resources” that have a far more attenuated connection to human settlement.

Section 5.3.1.1 rightly acknowledges that “visual resources are generally defined as the natural and built features of the landscape that may be viewed by the public . . . .”<sup>59</sup> Yet its definition of “aesthetic resources includes “state forests” and “national forests,” neither of which is typically “viewed by the public” within the Project Area. What is more, the DEIS already addresses public recreation opportunities within state forests by including trails, campgrounds, and water access points in its list of aesthetic resources. Adding state forests to the list essentially double-counts these public recreational opportunities, while ignoring the fact that the vast state forests in the project area are rarely used as recreational areas. The Final EIS accordingly should eliminate state forests from its calculation of aesthetic effects.

The presence of state forests is also overemphasized or double-counted in other parts of the DEIS. Chapter 6 includes state and national forests in its analysis of Land Ownership, Land-Based Economies, and Vegetation for each Variation Area. Chapter 7 accounts for state forests when evaluating the relative merits of each route variation’s effects on Aesthetics, Land Use Compatibility, Forestry, Vegetation, and Wildlife.

As Map 5-12 illustrates, forest land is the dominant land cover type within the proposed routes and route variations. As a result, the proposed routes and variations have nearly identical effects on state forests—especially when those routes are considered as a whole. It would not be unreasonable to discuss state forests in Chapter 5 as effects common to all alternatives, and omit them from the comparative analyses in Chapters 6 and 7.

The Final EIS should explicitly acknowledge that all proposed routes and route variations affect similar amounts of state forest land. In addition, Chapter 6 of the Final EIS should not include state forests in its discussion of aesthetics, vegetation, or wildlife. The presence of state forests is useful only to calculate effects on forestry and land ownership.

<sup>59</sup> DEIS at 158.

0190-9 cont'd

0190-9  
Continued

0190-10

Presence of state forest land is not double counted in the EIS. For example, in the Vegetation sections of Chapter 6, acres of GAP forested land cover types are provided in addition to acres of state forest land (in an effort to provide the reader with all relevant information). These acreages are not meant to be summed and are never summed in the EIS. Further, state forests serve multiple uses to the state and to the public (land-based economies, recreation and tourism, wildlife, etc.) and to accurately reflect the proposed Project's impact on each of these uses, discussion of state forests within multiple resource areas is appropriate within the EIS.

No changes are made to the EIS in response to this comment.

0190-10

**F. The DEIS should more clearly state the ways in which different alignments will affect agricultural lands.**

In addition to requiring the MN PUC to consider a project's effects on human settlement, the Minnesota Rules also mandate consideration of "effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining."<sup>60</sup> This factor is especially significant in the Project Area, where agriculture is a rare resource, while forests and wetlands are plentiful. Yet the DEIS fails to fully capture the potential effects on agriculture in several places.

Section 5.3.2.1 describes the potential impact to agricultural practices across the Project Area. The text states:

The ROI for this analysis of impacts to agriculture includes the anticipated 200-foot ROW of the proposed transmission line . . . [T]his ROI was selected based on the expectation that, given the construction activities proposed, the majority of impacts on agriculture would likely be limited to this area.<sup>61</sup>

Contrary to these statements in the DEIS, the effects of the proposed transmission line on agricultural practices are not generally temporary and short-term in nature, and they are not necessarily limited to the 200-foot ROW. Permanent effects that may occur outside of the ROW include effects on drive lines (for agricultural machinery) and effects caused by angle structures, which can limit aerial spraying for agriculture in an area much greater than the ROW. These concerns were raised during scoping, and should be addressed in the EIS.<sup>62</sup>

Minnesota Power recognizes that permanent effects outside the ROW are not easily quantified in terms of acreage. Nonetheless, the discussion of Land-Based Economies in Sections 5.3.2.1, 5.4.2.1, and 5.5.2.1 should include language recognizing this potential for permanent, adverse agricultural effects outside of the ROW, particularly in the West Section.

**IV. The DEIS's discussion of corridor sharing is misleading and inaccurate.**

The Minnesota Rules for routing high-voltage transmission lines place particular emphasis on corridor sharing—i.e., the "use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries," and the "use of existing transportation, pipeline, and electrical transmission systems or rights-of-way."<sup>63</sup> Minnesota Power accordingly considered such corridor sharing opportunities when it developed its proposed routes. The DEIS's analysis of corridor sharing, however, fails to account for the different environmental benefits that different types of corridors may offer, especially in the context of a 500 kV transmission line like the GNTL.

<sup>60</sup> Minn. R. 7850.4100(C).

<sup>61</sup> DEIS at 167.

<sup>62</sup> See Scoping Summary Report at C-10, C-18.

<sup>63</sup> Minn. R. 7850.4100(H), (J).

0190-11

The majority of impacts to agriculture would occur within the ROW, as Chapter 5 and 6 of the EIS suggests. Section 5.3.2 discusses potential impacts to agriculture that may occur outside of the ROW, including aerial spraying, irrigation systems, and precision farming systems.

As discussed in Section 1.3.1.4 of the EIS, once a route is selected and a permit is issued, the Applicant would contact landowners to gather information about their property and their concerns and discuss how the ROW would best proceed across the property. The Applicant will work with landowners to minimize impacts to agriculture.

No changes are made to the EIS in response to this comment.

0190-12

References to an ROI in the Corridor Sharing sections of Chapter 5 and Chapter 6 are removed from the EIS.

The purpose of the Corridor Sharing sections in Chapter 6 is to present all available information on potential for paralleling existing corridors, including transmission lines, roads, trails, field lines, and PLSS boundaries. The tables in the Corridor Sharing sections of Chapter 6 are intentionally broken down by corridor types so that one can identify the percentages of each alternative that would parallel each type of existing corridor, as opposed to just providing a total number of corridor sharing for each alternative. Furthermore, these tables are broken down in a hierarchical manner to place emphasis on paralleling corridors in the following order: transmission line, road/trail, field line, and PLSS.

As the EIS states, paralleling existing corridors can reduce fragmentation on the landscape, which could influence impacts associated with human settlement and the natural environment. As such, the potential for paralleling existing transmission line corridors is discussed when analyzing all alternatives within a variation area in Chapter 6 for several resources, such as aesthetics, vegetation, and wildlife.

**A. The DEIS should be clear that not all “corridors” have the same—or any—environmental benefits, and adjust its calculations accordingly.**

**1. It is inappropriate to use a quarter-mile ROI to identify corridor sharing.**

To account for the presence of corridor sharing, the DEIS defined a ROI that “generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations.”<sup>64</sup> The DEIS explains this definition by first acknowledging that “as distance from existing corridors increases, the benefits of corridor sharing diminish.”<sup>65</sup> But the DEIS fails to explain why benefits exist within a quarter-mile (1,320 feet), and not some other, shorter distance.

As the DEIS acknowledges, the primary benefit of corridor sharing is to “minimize[] fragmentation of the landscape” and “adjacent property.”<sup>66</sup> But those benefits do not exist for corridors a quarter-mile away.

For example, an existing 200-foot transmission line ROW through a forested area may cause “fragmentation”—a break between two larger forested areas—that could adversely affect wildlife. If a new line is built parallel to the existing line, additional fragmentation is avoided if the new 200-foot ROW is adjacent or nearly adjacent to the existing one. If the new ROW is 1,000 feet away from the old one, however, the result would be *more* fragmentation—an isolated, 1,000-foot stretch of forested land in-between two 200-foot ROWs. Yet the DEIS counts both of these scenarios as favorable “corridor sharing.” Similarly, the DEIS would potentially identify a “corridor sharing” benefit for a transmission line that is hundreds of feet away from an agricultural field boundary, even though any location other than directly on the field boundary would offer no benefits whatsoever to adjacent property.

Because the 0.25 ROI results in misleading conclusions about corridor sharing, the Final EIS should not use it. The Final EIS should further recognize that, realistically, corridor sharing creates environmental benefits only if the new centerline is specifically designed to take advantage of a corridor sharing opportunity. Many of the route variations studied in the DEIS are not so designed.

**2. The only corridor sharing that provides significant environmental benefits for a project like this is paralleling a 500 kV or 230 kV line.**

The Minnesota Rules requiring the MN PUC to consider various types of corridor sharing do not distinguish between them. An environmental analysis should.

Not all corridor sharing offers the same environmental benefits, especially for a 500 kV transmission line like the GNTL. There are few, if any, environmental benefits to paralleling a field line, which may change from season to season. Likewise, paralleling PLSS lines, which are not necessarily connected to any landscape features, does not reduce environmental effects.

<sup>64</sup> DEIS at 193.

<sup>65</sup> *Id.*

<sup>66</sup> *Id.*

0190-12  
Continued 0190-12 cont'd  
The ROI was used as an outer limit when reviewing the alternatives for corridor sharing or paralleling opportunities as required under Minnesota Rule 7850.4100 subpart h and subpart j. When the transmission line is located along other transmission lines, it was paralleling the other transmission lines, not sharing a corridor. Opportunities for corridor sharing or paralleling are located as close to the road, section line, etc. as possible in order to meet the intent of Minnesota Rule 7850.4100 subpart h and subpart j.

No changes are made to the EIS in response to this comment.

For similar reasons, paralleling an existing two-lane road offers no environmental benefits for a 500 kV transmission line. The primary benefit of paralleling an existing road or small transmission line is to reduce the total ROW by overlapping the two ROWs. The ROW for a 500 kV line, however, cannot overlap the ROW for an existing road or small transmission line.<sup>67</sup> What is more, paralleling existing roads and small transmission lines in agricultural areas could have the adverse effect of reducing farm equipment mobility. Ultimately, the only significant corridor sharing benefits that may exist in this project would accrue from paralleling an existing 230 kV or 500 kV transmission line, where corridor sharing could reduce fragmentation.

Section 6.2.2.6 and Table 6-23 illustrate the importance of this distinction. As written, the tables list and calculate all "Feature Sharing Corridors" for the Roseau Lake WMA Variations, including transmission lines, field lines, PLSS lines, and roads. Table 6-23 thus makes it appear that the Proposed Orange/Blue Route would offer the benefits of corridor sharing along 60% of its length, while the Roseau Lake WMA Variation 2 would provide those same benefits along 71% of its length. But it is far more important that 33% of the Proposed Orange/Blue Route would parallel large transmission lines, as opposed to 27% of the Roseau Lake WMA Variation 2.<sup>68</sup> Because the DEIS does not make this clear, it could be misleading to the decisionmakers and the public.

The Final EIS should explain that the benefits of corridor sharing are only significant where the proposed GNTL would parallel an existing 230 kV line or an existing 500 kV line. Other corridor sharing calculations should be dropped from comparison tables.

### 3. Paralleling the abandoned corridor offers no environmental benefits.

The Balsam Variation Area – Balsam Variation Scoping Decision Route was accepted for analysis in the DEIS because there once was a transmission line corridor in that area. That line has since been removed, the ROW sold, and the landscape re-planted with trees and other natural vegetation. Section 6.4.3 nevertheless concludes that the impacts of the Balsam Variation are minimized or reduced because it "parallels an abandoned corridor."

There are no environmental benefits to paralleling an abandoned transmission line corridor in these circumstances. Contrary to the suggestion in Section 6.4.3, the "abandoned corridor" is not being used as a trail, or for recreational purposes of any kind. It should instead be regarded as greenfield or open land that presents no corridor sharing opportunities.

The Final EIS should remove all text and tables that inaccurately describe the abandoned corridor or identify it as an opportunity for corridor sharing.

### B. The DEIS inaccurately suggests that paralleling existing transmission lines reduces effects on forestry and vegetation.

Chapter 6 repeatedly concludes that paralleling existing transmission line ROW minimizes or reduces the impact to forestry, vegetation, wildlife, threatened and endangered species, and rare

<sup>67</sup> The DEIS is inaccurate on this point. See DEIS at 194.

<sup>68</sup> As discussed below, the variation itself parallels no transmission lines. Table 6-23 is actually counting the corridor sharing in areas where the Proposed Orange/Blue Route and Roseau Lake WMA Variation 2 share the same route.

0190-12 cont'd

0190-12  
Continued

0190-13

The Balsam Variation is located in an abandoned corridor that is under a conservation easement. The text in the EIS is revised in the Summary, Chapter 5, and Chapter 6. The edit changed the text from "the Balsam Variation will parallel an abandoned corridor" to "the Balsam Variation would be located in an abandoned corridor." This abandoned transmission line corridor is not included in the acreages/percentages for corridor sharing shown in the EIS.

0190-14

Chapter 6 of the EIS quantifies the acres of forested land in the ROW for each alternative. This is the metric by which one can assess quantities of forest that would be removed for each alternative. As discussed in both the EIS and the Applicant's Route Permit Application (Section 6.4), creating a new corridor within an unfragmented forest alters the integrity of that forest, with consequences for all other resources (i.e. wildlife, rare species) dependent on that unfragmented forest.

No changes are made to the EIS in response to this comment.

0190-13

0190-14

species and communities. As discussed above, corridor sharing—properly defined—may offer benefits insofar as it minimizes habitat fragmentation effects. But corridor sharing does not significantly reduce effects on forests.

To ensure safety and system reliability, ROW corridors for large transmission lines cannot overlap. Thus, even when a new line parallels an existing one, the entire 200-foot ROW must be cleared. If that ROW contains forest land or other vegetation, the same amount of forest would be cleared as if the line did not parallel an existing line. The DEIS seems not to recognize this fact, claiming that a route would have fewer effects on “timber activities” because it offered the most opportunities for corridor sharing.<sup>69</sup>

The Final EIS should clearly state that paralleling existing transmission lines does not reduce the amount of forest land or vegetation that must be cleared within the 200-foot ROW, and should remove all statements suggesting that corridor sharing offers forestry or vegetation benefits.

**C. The DEIS does not accurately describe the potential effects of existing transmission lines on electrical system reliability.**

Electrical system reliability is one of the factors MN PUC is required to consider in determining which route to select and permit.<sup>70</sup> Strengthening system reliability is also one of Minnesota Power’s explicit goals in building the GNTL Project. The DEIS, however, fails to adequately account for the adverse effects on electrical system reliability that can result from transmission line paralleling and transmission line crossing.

**1. Paralleling the existing Manitoba-United States tie lines increases adverse effects on system reliability.**

The DEIS acknowledges that the more parallel ROWs or common corridors are used for multiple transmission lines—particularly high voltage facilities—the more likely it becomes that an outage involving multiple facilities could occur.<sup>71</sup> The DEIS also rightly states that Minnesota Power should evaluate the electrical reliability impact of corridor sharing on a case-by-case basis.<sup>72</sup> But the DEIS only applies this principle where the Project would be in a common corridor with the existing 500 kV Manitoba–United States tie line.<sup>73</sup> Other parallel corridor scenarios are generally handled by considering whether there would be two or three transmission lines in a common corridor. The DEIS generally assumes that locating two lines in the same corridor would not adversely affect electrical system reliability,<sup>74</sup> while locating three lines in the same corridor would have potential adverse effects.<sup>75</sup>

In reality, the electrical reliability impacts of establishing a common transmission line corridor are much more nuanced, depending primarily on the purpose and expected performance of the transmission lines. In this case, the only parallel corridor scenarios that have any noteworthy

<sup>69</sup> DEIS at 275.

<sup>70</sup> Minn. R. 7850.4100(K); *see* DEIS at 194.

<sup>71</sup> DEIS at 195.

<sup>72</sup> *Id.*

<sup>73</sup> *See, e.g., id.* at 197 (discussing system reliability in the West Section).

<sup>74</sup> *See, e.g., id.* at 238 (discussing reliability in the East Section).

<sup>75</sup> *Id.*

0190-14 cont'd

0190-14  
Continued

0190-15

The following text is added to Section 2.8.3 of the EIS: According to the Applicant, the electrical reliability impacts of establishing a parallel transmission line corridor depend primarily on the purpose and expected performance of the transmission lines. None of the alternatives that parallel existing corridors with 69 kV, 115 kV, or 230 kV transmission lines that do not connect Manitoba and the United States would impact electrical system reliability.

If the proposed Project parallels the existing 230 kV tie line corridor, the impact of a simultaneous, unexpected outage of the two facilities on electrical reliability would be minimal, but still notable because the lines would share a common purpose of transferring power from Manitoba to the United States. If the Proposed Project parallels the existing 500 kV tie line corridor, a simultaneous unexpected outage would have a greater impact on electrical system reliability because the transmission lines not only share a common load, but would also carry similar (and greater) amounts of power.

If three transmission lines (i.e., the Proposed Project, 500 kV tie line, and 230 kV tie line) are located in parallel corridors, a simultaneous unexpected outage of the Proposed Project and two tie lines could have the greatest impact to electrical reliability.

0190-15

electrical system reliability impacts are those involving the Project and one or more of the existing Manitoba–United States tie lines. The Final EIS accordingly should recognize that none of the common corridor scenarios involving 69 kV, 115 kV, or 230 kV lines that do not connect Manitoba and the United States has any significant impact on electrical system reliability, regardless of how many transmission lines are located in the common corridor.

Where the Project shares a common corridor with the existing 230 kV tie line, the impact of a simultaneous, unexpected outage of the two facilities on electrical reliability would be relatively minimal, but still notable because the lines would share a common purpose of transferring power from Manitoba to the United States. Where the Project shares a common corridor with the existing 500 kV tie line, a simultaneous unexpected outage would have a greater impact on electrical system reliability because the lines not only share a common purpose, but would also carry similar (and greater) amounts of power. The Final EIS should thus recognize that establishing a common corridor with the Project and another Manitoba–United States tie line carries an elevated level of risk to electrical system reliability.

Where the Project would be placed in a common corridor with both of the existing tie lines, as proposed in the Effie and East Bear Lake Variations, a simultaneous unexpected outage of the three tie lines would have a substantially greater impact to electrical reliability than would paralleling just one of those tie lines. Such an event would leave only two operating tie lines, both of which are far smaller. This would severely weaken the Manitoba–United States transmission interface, putting a significant amount of Minnesota load at risk that would not be at risk during a simultaneous outage of the two 500 kV lines. The Final EIS accordingly should explain that establishing a common corridor with the Project, the existing 500 kV tie line and the existing 230 kV tie lines—as proposed in the Effie and East Bear Lake Variations—carries the highest level of risk to electrical system reliability of any proposed route or variation, and that a simultaneous unexpected outage of the Project and these two particular transmission lines could have severe consequences for the electric power system in Manitoba and Minnesota.

**2. Crossing the existing Manitoba-United States tie lines increases adverse effects on system reliability.**

The DEIS briefly acknowledges that Minnesota Power wants to minimize the number of times the GNTL crosses existing transmission lines, for the sake of system reliability.<sup>76</sup> But there is no further discussion of the construction, operation, and maintenance effects that would be caused by new transmission line crossings.

As with the parallel corridors, the only line crossing scenarios that have any noteworthy electrical system reliability effects are those involving the Project and one or more of the existing Manitoba–United States tie lines. To ensure safety, constructing such crossing spans would require an outage of the line being crossed. Increasing the number of crossings would increase the number of discrete outages required. This could limit construction timeframes because system requirements may not always permit such outages. The Final EIS should explicitly recognize this potential system reliability factor.

0190-15  
Continued

0190-16

The following text is added to Section 5.3.7 of the EIS: Based on information provided by the Applicant, to ensure safety, constructing such crossing spans would require an outage of the line being crossed. Increasing the number of crossings could increase the number of discrete outages required. This could limit construction timeframes because system requirements may not always permit such outages.

0190-16

<sup>76</sup> DEIS at 195.

Similar issues could occur during operation and maintenance of the Project. When one of the tie lines is out of service for maintenance, the power transfer capability on the Manitoba–United States interface is intentionally limited to avoid overloading the remaining tie lines. The larger the tie line, the more limited the transfer capability when it is out of service. When two of the tie lines must be taken out of service simultaneously, such as for maintenance of a crossing span, transfer capability during the outage would be further reduced, magnifying the impact of the outage on the reliability of the system. Limiting the number places where the GNTL crosses the existing Manitoba–United States tie lines would limit these effects.

Finally, transmission line crossings in general increase the likelihood of conductor-to-conductor contacts, which occur when the conductors of one line fall onto the conductors of another line. While this risk is relatively minimal, especially given that appropriate design criteria considerations that be incorporated at all crossing locations, it is impossible for one line to fall on the other if they do not cross.

The FEIS should recognize that the creating new transmission line crossings involving the existing Manitoba–United States tie lines has electrical reliability impacts during construction, operation, and maintenance of the Project, and that these impacts are best mitigated by limiting the total number of crossings.

**V. The DEIS understates certain effects that would result from the route variations.**

**A. There is an active mine permit that makes the Balsam variation infeasible.**

Under the Minnesota Rules, the MPUC is required to account for the effects of a proposed transmission line on “land-based economies,” including “mining.”<sup>77</sup>

In December 2014, Magnetation LLC<sup>78</sup> began operating its “Plant Four” within the ROW for the Balsam Variation. Magnetation has both a mineral lease and a mine permit for this operation, neither of which is identified in the DEIS. In fact, the DEIS erroneously states that “no active mining operations that could pose existing public health and safety hazards have been identified in the Project footprint.”<sup>79</sup> That is no longer the case with respect to the Balsam Variation, which would traverse a large stockpile of red ore tailings that is a part of Magnetation’s active operations. It should go without saying that a high-voltage transmission line cannot feasibly cross an active mine site.

The Final EIS should state that Magnetation’s mining operations eliminate the Balsam Variation from further consideration as a feasible alternative.

<sup>77</sup> Minn. R. 7850.4100(C).

<sup>78</sup> Magnetation Inc. is a natural resources and iron ore mining company that has developed a process to recover high-quality iron ore concentrate from previously abandoned waste stockpiles and tailings basins. Magnetation LLC is a joint venture between Magnetation Inc. and AK Steel Corporation.

<sup>79</sup> DEIS at 155.

0190-16 cont'd

0190-16  
Continued

0190-17

The southern portion of the Balsam Variation crosses known state mineral resources leased by the MnDNR. The area is within the property boundary for Magnetation as shown on the map at <http://www.magnetation.com/home/wp-content/uploads/2014/05/Land-Plant4JLOPropBound300dpi.pdf>. While transmission lines cannot be constructed on active mine features, the 3,000 foot route width could allow flexibility to site the transmission line to avoid the feature. Construction of transmission lines could affect future mining operations if the transmission line or structures encumber the lease or interfere with access to mineable resources or the ability to remove these resources. However, if a conflict were to arise, then the transmission line and structures would need to be relocated to allow access to the mineral resource.

Sections S.10.3.3, 6.4.3.2 and 7.2.2.4 of the EIS are updated with information related to the Balsam Variation and mining.

0190-17

**B. Selecting a route variation would likely require relocation of the Series Compensation Station, which could have significant wetland fill effects not documented in the DEIS.**

The DEIS rightly acknowledges that constructing the GNTL Project will involve construction of a Series Compensation Station somewhere near the midpoint of the line.<sup>80</sup> It does not, however, address the effects that certain route variations would have on the location of the Series Compensation Station.

Electrical design optimization studies concluded that the best location for the Project's series compensation station is near the midpoint of the combined Manitoba and Minnesota projects, running from the Dorsey Substation near Winnipeg, Manitoba, Canada, to Minnesota Power's existing Blackberry Substation near Grand Rapids, Minnesota, USA. Based on this conclusion and the preliminary estimated line lengths in Manitoba and Minnesota, Minnesota Power undertook a site search to identify a viable series compensation station site somewhere on the segment of the Proposed Blue/Orange Route that runs generally west to east, south of Warroad in Roseau County. Since the series compensation station, similar to a traditional substation, would require permanent filling of any wetlands located within the estimated 6 acre footprint of the facility, a primary goal of Minnesota Power's site search was to minimize the facility's environmental effects by identifying a predominantly upland site for the series compensation station.

As shown in Map 6-18, viable upland sites in the search area are limited. Minnesota Power has obtained an option to purchase the only viable upland site it found—a 60 acre privately owned parcel that is currently cultivated. This proposed series compensation station site is located at almost the exact overall midpoint of the line based on the preliminary estimated line lengths, making it an ideal site from both an engineering and environmental perspective.

Three of the route variations analyzed in the DEIS would impact Minnesota Power's ability to use the site that it has optioned for the series compensation station. Two of those variations—the Cedar Bend WMA Variation and Beltrami North Variation 2—would bypass Minnesota Power's proposed series compensation station site entirely, forcing Minnesota Power to give up its option on the proposed site and seek an entirely different site for the series compensation station. The DEIS does not discuss or evaluate the impact of relocating the series compensation station as a result of these two variations, even though a new series compensation station site would almost certainly have greater wetland fill and/or aesthetic impacts (or other types of impacts). A different site would also potentially be less optimal from an engineering perspective if it couldn't be located as near to the overall midpoint of the combined projects as Minnesota Power's proposed site.

The other variation, Beltrami North Variation 1, follows the north side of the existing 500 kV line through the series compensation station site. While the same site could be utilized, placing the series compensation station—and thus the new transmission line—on the north side of the existing 500 kV line would increase the human impact of the project, because the facility would be closer to and more visible from nearby residences. The DEIS does not discuss or evaluate the

<sup>80</sup> DEIS at 15.

0190-18 0190-18  
Section 2.9.4 of the EIS is updated with a statement explaining that the proposed location of the Series Compensation Station is specific to the Proposed Blue Route or the Proposed Orange Route. Until the final route is permitted by the MN PUC, specific wetland impacts for the the Series Compensation Station are unknown.

aesthetic impact (or any other type of impact) from relocating the series compensation station to the north side of the existing 500 kV line as a result of Beltrami North Variation 1.

The Final EIS should address the potential relocation of the Series Compensation Station, noting that such relocation would likely increase wetland fill and other effects, in addition to causing significant engineering difficulties.

**C. Because the DEIS does not consistently show a 250-foot separation between the existing HVTL and proposed variation centerlines, the effects of those variations are misstated.**

Safety and system reliability generally require a minimum 250-foot separation between the centerlines of any existing 230 kV or 500 kV transmission line and the proposed GNTL line.<sup>81</sup> Unfortunately, it appears that the GIS maps used in preparing the DEIS did not consistently maintain this minimum separation distance for some of the route variations proposed during the scoping process.

Because the affected environment is often similar throughout the project area, moving the route variation ROWs to a proper distance away from the existing transmission lines is unlikely to substantially change the effects calculations in the DEIS. There is, however, one important exception that Minnesota Power identified in the Cedar Bend WMA Variation. If a 250-foot separation were in place between the proposed Cedar Bend WMA Variation ROW centerline and the existing 230 kV line centerline, it would result in displacement of four homes.<sup>82</sup> These displacements are not accounted for anywhere in the DEIS.

The Final EIS should acknowledge that, if its proposed ROW is properly spaced away from the existing transmission line, the Cedar Bend WMA Variation would displace four homes.

**D. The DEIS does not account for the location of existing HVTL substations, some of which would render the variation route infeasible.**

Throughout the DEIS, there is little mention of the substations that serve the existing 500 kV and 230 kV tie lines. But especially with respect to the Cedar Bend WMA Variation, those substations are likely to cause insurmountable difficulties.

Although it is not easy to see in the DEIS maps, the “Common Start Point” for the Cedar Bend WMA Variation is nearly adjacent to two operating substations—one that serves the existing 500 kV line, and one that serves the existing 230 kV line. (The problem can be seen in the DEIS Map Book, Map 7, although these substations are there incorrectly identified as “communication towers.”) The Cedar Bend WMA Variation proposed ROW appears to thread right between these two substations. From a construction, operation, and electrical system reliability perspective, however, such a path for the new line is simply not possible.

<sup>81</sup> The DEIS acknowledges this need for “all new” ROW in several places, and notes that 250 or 300 foot ROW may be needed for longer spans. DEIS at S-4, 27, 238.

<sup>82</sup> See attached map, Potential Displacements: Cedar Bend WMA Variation Area.

0190-18 cont'd

0190-18  
Continued

0190-19

The Applicant provided the shapefiles used in the EIS analysis for their Proposed Blue Route, Proposed Orange Route, C2 Segment Option Variation, and J2 Segment Option Variation. In addition, the Applicant provided a memo with design changes (December 1, 2014) which assumed a 250 foot separation between the anticipated alignments when paralleling existing 500 kV transmission line.

The shapefiles provided by the Applicant show that where their proposed alternatives parallel the existing 500 kV transmission line, there is a separation of 250 feet between the anticipated alignments. However, in the shapefile, where the proposed alternatives parallel the existing 230 kV transmission lines, the distance between the anticipated alignments is 150 feet. And where the proposed alternatives parallel an existing 115 kV transmission line, there is a separation of 150-300 feet between the anticipated alignments.

Based on the distance provided in the Applicant's shapefile for paralleling existing 230 kV transmission lines, the Cedar Bend WMA Variation (which parallels an existing 230 kV transmission line) would not displace four residences. If the MN PUC selects the Cedar Bend WMA Variation, the Applicant will need to work within the 3,000 foot route to develop an anticipated alignment.

0190-20

No changes are made to the EIS in response to this comment.

0190-20

Communication towers are located at the subject substations and are accurately identified on related maps (e.g., Map 6-65 in Volume II of the EIS). No information is provided by the Applicant that supports the conclusion made in this comment that it would not be possible for the proposed transmission line to be routed between between these substations.

No changes are made to the EIS in response to this comment.

There is no feasible way to build, operate, or maintain a 500 kV line that passes so close to two existing substations. That fact alone makes the Cedar Bend WMA Variation infeasible, and should exclude it from further consideration in the Final EIS.

**VI. The DEIS does not adequately discuss the Project's costs or the effects of increasing those costs.**

**A. The EIS should not compare costs on a per-mile basis, because that is irrelevant to both cost recovery and the Applicant's decision of whether to build the Project.**

The Minnesota Rules require the PUC to consider the "costs of constructing, operating, and maintaining" a proposed high-voltage transmission line.<sup>83</sup> And while they need to be updated in the Final EIS, the DEIS does include the total costs of the GNTL Project. In addition, the DEIS's discussion of construction costs consistently cites the "cost per mile" for building various route alternatives.<sup>84</sup> That factor is irrelevant, and should not be carried forward in the Final EIS.

Nothing in the Minnesota Rules suggests that the PUC will consider the per-mile cost of the GNTL Project. This makes sense, because the PUC sets cost recovery rates based on the total costs to the project proponent, not the per-mile cost. A project with a longer route, such as Roseau Lake WMA Variation 1, might cost less to build on a per-mile basis, but its overall length makes its total cost far higher. Neither Minnesota Power nor ratepayers would see any benefit from the theoretical per-mile cost of such a route. Indeed, both Minnesota Power and its ratepayers would obviously prefer a line that costs less overall, regardless of how much it costs per mile.

Because cost-per-mile is irrelevant, it should not be discussed in the Final EIS.

**B. The EIS should recognize that route variations or permit conditions that increase Project costs will have an effect on ratepayers.**

Presumably, costs are included in the list of factors that the PUC considers when licensing a new transmission primarily because increases in cost can lead to increases in the rates paid by consumers. Yet this issue is left unmentioned in the DEIS.

Cost increases are important because Minnesota Power's Certificate of Need establishes a "soft cap" on recovery for the estimated cost for the GNTL Project.<sup>85</sup> If the Project significantly exceeds those costs, the PUC will likely consider a rate increase to ensure cost recovery. This is particularly problematic for route variations that cost far more than the Proposed Blue/Orange Route, like Roseau Lake WMA Variation 1.

As shown in Minnesota Power's relative merit assessment tables, variations that exceed the cost of the proposed route by more than 20% should be clearly identified because they are more likely to result in rate increases for consumers.

<sup>83</sup> Minn. R. 7850.4100(L).

<sup>84</sup> See, e.g., DEIS at 349 (Table 6-62), 353 (Table 6-65).

<sup>85</sup> MPUC Docket No. E-015/CN-12-1163, MPUC Order dated June 30, 2015 at 19.

0190-20 cont'd

0190-20  
Continued

0190-21

The cost per mile was originally provided by the Applicant in a data call so is included in Chapter 6 of the Draft EIS. For clarification, the Final EIS is updated to describe this as average cost per mile in the tables.

0190-21

0190-22

The relative merit tables in Chapter 6 of the EIS use the 20% threshold as a way to highlight cost differences.

0190-22

**VII. The DEIS recognize the problems with comparing route variations without using common start and end points for each variation.**

In several places, the DEIS groups multiple variations together to compare them with the Proposed Blue/Orange Route. The document never explains why it does this, but the result is often misleading.

Creating common start and end points for purposes of comparison requires variations that actually have the same starting and ending points. Only then can the decisionmaker and the public accurately identify the ways in which the environmental effects of the routes may differ. What is more—and what the DEIS does not consistently accomplish—the route variations should be treated as variations from the Proposed Blue/Orange Route, not as one of several ways to travel between two arbitrarily chosen points.

Unfortunately, the DEIS makes several comparisons using multiple variations with different end points. The result is that one or more of the variations share the same route for a certain distance, and that shared route is included in the comparison of effects. It should go without saying that such route variations cannot truly be compared to one another, or to the proposed route.

The Final EIS should clearly acknowledge when its calculation of effects is based in part on areas where the Proposed Blue/Orange Route and the route variation are identical.

**VIII. The color-coded tables in Chapter Six do not serve their intended purpose, and should be eliminated or substantially modified.**

**A. The color-coded tables cannot assist the decisionmaker or the public in comparing environmental effects among alternatives.**

Throughout Chapter 6, the DEIS uses what it describes as a “stoplight motif” to “describe the relative merits of each alternative.”<sup>86</sup> These graphics purport to compare effects across alternatives, apparently with the goal of creating a shorthand reference that can be used in determining the route that best meets the state’s routing criteria. At least for a project of this size and scope, however, a simplification of this nature is not helpful to the decisionmaker or the public.

**1. The GNTL Project is too long, and the DEIS contains too many variations, to be compared using numerous, independent graphics.**

It is possible that a relative merits graphic with a “stoplight motif” would provide some insight into comparative environmental effects for a project with two or three widely divergent routes with common start and ending points. For a project like the GNTL, with two proposed routes and 22 sometimes overlapping route variations, such graphics only add confusion.

The DEIS contains a separate relative merits graphic for every variation area in three separate sections that cover large portions of northern Minnesota. The decisionmaker cannot simply start with the first graphic, decide on a preferable route, and then move to the next graphic, because

<sup>86</sup> DEIS at 344.

0190-23  
Chapter 4 of the EIS explains and provides maps that show the alternatives in each variation area. The shared portion(s) of the alternatives are shown on Maps 4-3, 4-4, 4-6, 4-7, 4-15, and 4-17. All maps in Chapter 4 also show the shared portions of the Proposed Blue Route, Proposed Orange Route, or Proposed Blue/Orange Route.

Section 4.2 defines the terms used to describe the analysis of the alternatives in this EIS. Section 4.3 describes the starting and ending points for the alternatives.

No changes are made to the EIS in response to this comment.

0190-24  
The relative merits table provided by the Applicant used different methodology and is included in the Appendix Y of the Final EIS.

0190-24

0190-24 cont'd

0190-24  
Continued

selecting one route variation eliminates certain variations in other sections. This requires the decisionmaker to jump from graphic-to-graphic, skipping comparisons made irrelevant by prior route choices.

What is more, there is no principled reason to start with a particular variation area when putting together a preferred route. A decisionmaker who progressively eliminated variations starting with the west section could end up with a different route from one who began with the east section, even if both had precisely the same values when reading the comparison graphics.

Worst of all, the variation areas do not represent equal units of measurement with respect to the routing factors. For example, the border crossing area contains about 10-25 miles of transmission line, depending on the variation. The Pine Island variation area, by contrast, contains over 100 miles of transmission line. Obviously, the alternatives within the Pine Island Variation Area should have a far greater weight when comparing the overall effects of the project alternatives. Yet because a decisionmaker cannot see this disparity in effects using the relative merits graphics, he or she could choose a border crossing that may appear preferable when compared within its variation area, but that leads to substantially greater effects elsewhere on the route.

Simply put, the color-coded “stoplight motif” graphics are at best unhelpful—and at worst actively harmful—when applied to a project like the GNTL that contains numerous variation areas across more than 200 miles of transmission lines.

**2. Even within a variation area, the “stoplight motif” graphics do not shed any light on which route is preferable.**

Setting aside their lack of value for the project as a whole, the “stoplight motif” graphics frequently offer little guidance in choosing among alternatives within a variation area. A decisionmaker faced with a table containing numerous green, orange, and red boxes often has no principled reason to choose one variation over another. The result, again, is confusion and error.

To take just one example, Table 6-65 purports to compare the relative merits of five route variations in the Beltrami North Central Variation Area using the “stoplight motif.” Each column in the table represents a different route variation. The first column, for the Proposed Blue/Orange Route, contains 8 green squares, 2 orange squares, and 1 red square. The fourth column, representing Beltrami North Central Variation 3, contains 6 greens and 5 oranges. The decisionmaker is left to wonder whether it is better for a route to have no red squares, but more orange squares, or one red square and more green squares.

Similar quandaries abound in the relative merits tables. And the process only becomes more complicated if the decisionmaker wants to weigh certain effects more heavily than others, which would require comparing both rows and columns. Because the “stoplight motif” graphics do even not work on their own terms, they should be ignored or removed from the Final EIS.

**3. The methodology by which colors were chosen is inevitably arbitrary, and in any event not adequately explained.**

Perhaps most problematic of all, the method by which the colors in the “stoplight motif” graphics is completely obscure. Each of the graphics contains a footnote stating, in full: “Colors represent

0190-24 cont'd

0190-24  
Continued

least impacts (green), moderate impacts (orange), and greatest impacts (red) relative to the specific Factor.” No further explanation of how the colors were selected appears anywhere in the DEIS.

The footnote describing the method of selecting colors is inaccurate on its face. If green truly represented the “least impacts,” and red the “greatest impacts,” with respect to each factor, every row in every table would logically have one green square and one red square. But that is not the case. Very few of the rows have red squares, indicating that red does not actually identify the route variation with the “greatest impacts” for each routing factor. If the colors actually represent something more like low, moderate, and high impacts, the DEIS never says so.

To make matters worse, the color assignments in the relative merits graphics often appear to be incorrectly or arbitrarily assigned. These problems could be addressed to some degree on a case-by-case basis. But they reveal a larger methodological problem with the entire concept of the “stoplight motif” graphics. Without a clear, repeatable standard for assigning colors, the tables will remain inherently misleading. That is reason enough to remove them from the Final EIS entirely. At a bare minimum, the Final EIS should strongly caution the decisionmaker against relying on the standardless “stoplight motif” graphics without extensive reference to the more precise—and often more accurate—discussions of effects in the text.

**B. Because the colors that appear in the Chapter Six tables are often erroneous or arbitrary, Minnesota Power has created its own tables.**

Instead of suggesting changes to the “stoplight motif” graphics, Minnesota Power is offering its own version of the “Relative Merits Assessment” tables that appear throughout Chapter 6.<sup>87</sup> If such tables are going to be used, these versions are an improvement in several respects.

First, Minnesota Power’s Relative Merits Assessment tables include all of the routing factors described in the Minnesota Rules.<sup>88</sup> This creates a better picture of how the routing alternatives are similar, on the premise that a choice between alternatives generally should not hinge on a minor difference that appears more significant when some factors are omitted.

Second, Minnesota Power’s tables include numerical measurements and percentages wherever possible. This makes it easier to understand the degree to which one route alternative differs from another, and allows for small differences to be identified even where two routes receive the same color designation.

Third, Minnesota Power’s tables assign colors based on a logical, repeatable methodology. A route alternative is colored green where it would have minimal effects on a resource with the implementation of best management practices, such that no mitigation is required. Yellow means that the route could have minimal to moderate effects on the resource with best management practices, and mitigation is likely to be required. Red means that the route’s effects are moderate or greater, and that those effects cannot be mitigated. This methodology works for most of the routing factors and elements covered in the table.

<sup>87</sup> Because the Presidential Permit Border Crossing is the only feasible alternative in the Border Crossing Variation Area, Minnesota Power is not providing a revised graphic for that area.

<sup>88</sup> See Minn. R. 7850.4100.

0190-24 cont'd

0190-24  
Continued

Some routing factors that are not susceptible to the minimal-moderate-unmitigable system described in the previous paragraph. In such cases, Minnesota Power's tables assign colors in the following manner:

- For corridor sharing, Minnesota Power selected colors intended to indicate that increased transmission line corridor sharing typically has greater environmental benefits. Thus, green means corridor sharing of 90% or greater, yellow means corridor sharing greater than 10% but less than 90%, and red means corridor sharing of 10% or less. The exact percentages are available in Minnesota Power's table so the reader can tell exactly where a route alternative lies along this continuum.
- For costs, green represents the costs proposed in Minnesota Power's Certificate of Need application for a particular route segment, or anything less expensive. Yellow represents anything that costs up to 20% more than Minnesota Power's proposed costs. Red represents anything that costs more than 20% of what Minnesota Power proposed, because anything in excess of that threshold increases the risks of changes to ratepayer cost recovery.
- For electrical system reliability, a case-by-case determination of effects is necessary. Accordingly, green means that a route alternative would have no identifiable effect on system reliability, because it does not parallel one of the existing Manitoba-Minnesota tie lines. Yellow means that a route alternative could have moderate but acceptable effects on system reliability because it parallels one of the existing tie lines. Red means that a route alternative could have severe and unacceptable effects on system reliability because it parallels both of the existing tie lines.

By assigning colors based on an absolute scale, Minnesota Power's tables present a much more realistic picture of the GNTL Project's effects than the DEIS tables, which often use a different color for relatively small differences in effects. This allows the decisionmaker and the public to assess the relative merits of the routes as a whole, as opposed to the relative merits of each routing factor. This is a far less confusing way of distinguishing between the effects of different route alternatives, and illustrates that, for the most part, the environmental effects of the various route alternatives are not significantly different.

Minnesota Power does not expect the Final EIS to completely replace the tables that appear in the DEIS. Instead, Minnesota Power requests that (1) its tables be acknowledged in the Final EIS, and published in the appendix to the Final EIS that contains DEIS comments;<sup>89</sup> and (2) that the DOE and EERA review these alternative tables to determine whether the information they contain justifies changing any of the colors used in the DEIS.

<sup>89</sup> See 40 C.F.R. § 1503.4(b) ("All substantive comments received on the draft statement . . . should be attached to the final statement . . .").

0190-25  
 Revisions for the cost estimates provided by the Applicant are included in Chapters 4 and 6 of the EIS.

Minnesota Power's DEIS Cost Comments  
 Page 1 of 5

| Route Segment                         | Segment Length Reported in DEIS | Total Cost Reported in DEIS | Total Cost Provided by MP | Total Cost Latest Revision | Proposed Action | Comment   |
|---------------------------------------|---------------------------------|-----------------------------|---------------------------|----------------------------|-----------------|---|
| Border Crossing Proposed              | 25                              | \$29,012,219                | \$29,012,219              | \$29,012,219               | Okay            |   |
| Border Crossing Pine Creek Variation  | 25.7                            | \$29,292,118                | \$29,292,118              | \$29,292,118               | Okay            |   |
| Border Crossing Hwy 310 Variation     | 18.6                            | \$21,144,610                | \$21,144,610              | \$21,144,610               | Okay            |   |
| Border Crossing 500kV Variation       | 10.1                            | \$11,512,144                | \$11,512,144              | \$11,512,144               | Okay            |   |
| Border Crossing 230kV Variation       | 8.2                             | \$9,862,592                 | \$9,862,110               | \$9,862,110                | Update DEIS     | DEIS mistake (typo?)  |
| Roseau Lake WMA Proposed              | 30.7                            | \$33,247,089                | \$33,247,089              | \$33,247,089               | Okay            |   |
| Roseau Lake WMA Variation 1           | 44.1                            | \$57,086,075                | \$57,086,075              | \$57,086,075               | Okay            |   |
| Roseau Lake WMA Variation 2           | 37.5                            | \$46,162,144                | \$46,162,144              | \$46,162,144               | Okay            |   |
| Cedar Bend WMA Proposed               | 24.7                            | \$27,197,650                | \$27,197,650              | \$27,197,650               | Okay            |   |
| Cedar Bend WMA Variation              | 19.6                            | \$21,235,417                | \$21,265,417              | \$23,202,312               | Update DEIS     | Included Cedar Bend WMA Hop 1 to have a common endpoint (See Map #1)<br>Added \$660,000 to account for two 500 kV line crossings  |
| Beltrami North Proposed               | 16.5                            | \$18,984,370                | \$18,984,370              | \$18,984,370               | Okay            |   |
| Beltrami North Variation 1            | 15.8                            | \$18,411,668                | \$18,411,668              | \$19,591,668               | Update DEIS     | Added \$850,000 for a new 500 kV line crossing to have a common endpoint (See Map #2)<br>Added \$330,000 to account for one 500 kV line crossing  |
| Beltrami North Variation 2            | 19.7                            | \$24,571,721                | \$24,571,721              | \$24,571,721               | Okay            |   |
| Beltrami North Central Proposed       | 11.6                            | \$12,574,123                | \$12,574,123              | \$12,574,123               | Okay            | Can only be compared with Variations 1, 2, & 3 (See Map #3)   |
| Beltrami North Central Variation 1    | 13.7                            | \$13,708,602                | \$13,708,602              | \$14,368,602               | Update DEIS     | Can only be compared with Proposed Blue/Orange Route (See Map #3)<br>Added \$660,000 to account for two 500 kV line crossings   |
| Beltrami North Central Variation 2    | 12.6                            | \$14,478,550                | \$14,478,550              | \$14,478,550               | Okay            | Can only be compared with Proposed Blue/Orange Route (See Map #3)   |
| Beltrami North Central Variation 3    | 12.2                            | \$16,155,266                | \$16,155,266              | \$16,815,266               | Update DEIS     | Can only be compared with Proposed Blue/Orange Route (See Map #3)<br>Added \$660,000 to account for two 500 kV line crossings   |
| Beltrami North Central Proposed w/HOP | 15.1                            | N/A                         | \$18,235,175              | \$18,565,175               | Update DEIS     | Can only be compared with Variations 4 & 5<br>Added \$330,000 to account for one 500 kV line crossing   |
| Beltrami North Central Variation 4    | 13.5                            | \$17,168,969                | \$17,168,969              | \$17,498,969               | Update DEIS     | Can only be compared with Proposed Blue Route including "hop" (See Map #3)<br>Added \$330,000 to account for one 500 kV line crossing<br>Length is incorrect - should be 14.5 miles (includes Beltrami North Hop 3) |
| Beltrami North Central Variation 5    | 15                              | \$16,636,730                | \$16,636,730              | \$16,966,730               | Update DEIS     | Can only be compared with Proposed Blue Route including "hop" (See Map #3)<br>Added \$330,000 to account for one 500 kV line crossing   |
| Pine Island Blue Alternative          | 109.8                           | \$118,546,237               | N/A                       | \$118,876,237              | Update DEIS     | Added \$330,000 to account for one 500 kV line crossing   |
| Pine Island Orange Alternative        | 105.4                           | \$113,672,041               | N/A                       | \$113,672,041              | Okay            |   |
| Beltrami South Central Proposed       | 1.2                             | \$5,805,518                 | \$1,214,573               | \$1,214,573                | Update DEIS     | DEIS mistake (swapped with Beltrami South)  |
| Beltrami South Central Variation      | 1.7                             | \$9,925,396                 | \$3,440,123               | \$3,440,123                | Update DEIS     | DEIS mistake (swapped with Beltrami South)  |
| Beltrami South Proposed               | 5.6                             | \$1,214,573                 | \$5,805,518               | \$5,805,518                | Update DEIS     | DEIS mistake (swapped with Beltrami South Central)  |
| Beltrami South Variation              | 7.5                             | \$3,440,123                 | \$9,925,396               | \$9,925,396                | Update DEIS     | DEIS mistake (swapped with Beltrami South Central)  |
| North Black River Proposed            | 8.4                             | \$9,893,560                 | \$9,893,560               | \$9,893,560                | Okay            |   |
| North Black River Variation           | 9.2                             | \$9,240,164                 | \$9,240,164               | \$10,552,560               | Update DEIS     | MP refined this estimate slightly based on land cover information   |
| C2 Proposed                           | 32.8                            | \$35,769,239                | \$35,769,239              | \$35,769,239               | Okay            |   |
| C2 Variation                          | 46                              | \$54,466,435                | \$54,466,435              | \$54,466,435               | Okay            |   |
| J2 Proposed                           | 42.2                            | \$48,706,641                | \$48,706,641              | \$48,706,641               | Okay            |   |

0190-25

Minnesota Power's DEIS Cost Comments  
Page 2 of 5

| Route Segment                 | Segment Length Reported in DEIS | Total Cost Reported in DEIS | Total Cost Provided by MP | Total Cost Latest Revision | Proposed Action | Comment |
|-------------------------------|---------------------------------|-----------------------------|---------------------------|----------------------------|-----------------|---------|
| J2 Variation                  | 45.2                            | \$52,128,879                | \$52,128,879              | \$52,128,879               | Okay            |         |
| Northome Proposed             | 3.7                             | \$4,192,942                 | \$4,192,942               | \$4,192,942                | Okay            |         |
| Northome Variation            | 4                               | \$6,385,615                 | \$6,385,615               | \$6,385,615                | Okay            |         |
| Cutfoot Proposed              | 4.2                             | \$5,640,538                 | \$5,640,538               | \$5,640,538                | Okay            |         |
| Cutfoot Variation             | 4.8                             | \$6,222,257                 | \$6,222,257               | \$6,222,257                | Okay            |         |
| Effie Proposed Blue           | 41.1                            | \$46,649,600                | \$46,649,600              | \$46,649,600               | Okay            |         |
| Effie Proposed Orange         | 44.6                            | \$49,488,323                | N/A                       | \$49,488,323               | Okay            |         |
| Effie Variation               | 49.8                            | \$57,353,305                | \$57,353,305              | \$57,353,305               | Okay            |         |
| East Bear Lake Proposed       | 8.9                             | \$9,736,790                 | \$9,736,790               | \$9,736,790                | Okay            |         |
| East Bear Lake Variation      | 10.5                            | \$13,279,079                | \$13,279,079              | \$13,279,079               | Okay            |         |
| Balsam Proposed Blue          | 12.9                            | \$15,121,621                | \$15,121,621              | \$15,121,621               | Okay            |         |
| Balsam Proposed Orange        | 13.7                            | \$16,018,490                | \$16,018,490              | \$16,018,490               | Okay            |         |
| Balsam Variation              | 17.8                            | \$19,502,472                | \$19,502,472              | \$19,502,472               | Okay            |         |
| Dead Mans Pond Proposed       | 2.2                             | \$2,873,223                 | \$2,873,223               | \$2,873,223                | Okay            |         |
| Dead Mans Pond Variation      | 2.3                             | \$4,409,841                 | \$4,409,841               | \$4,409,841                | Okay            |         |
| Blackberry Blue Alternative   | 5.4                             | \$8,380,680                 | \$8,380,680               | \$8,380,680                | Okay            |         |
| Blackberry Orange Alternative | 6.1                             | \$10,148,060                | \$10,148,060              | \$10,148,060               | Okay            |         |

0190-25  
Continued

0190-26

The proposed routes and alternatives are described in Chapter 4. Alternatives discussed in the EIS were proposed during the scoping process and selected for inclusion in the EIS.

The following text is added to Section 2.8.3 of the EIS to address electrical system reliability: According to the Applicant, the electrical reliability impacts of establishing a parallel transmission line corridor depend primarily on the purpose and expected performance of the transmission lines. None of the alternatives that parallel existing corridors with 69 kV, 115 kV, or 230 kV transmission lines that do not connect Manitoba and the United States would impact electrical system reliability.

0190-26

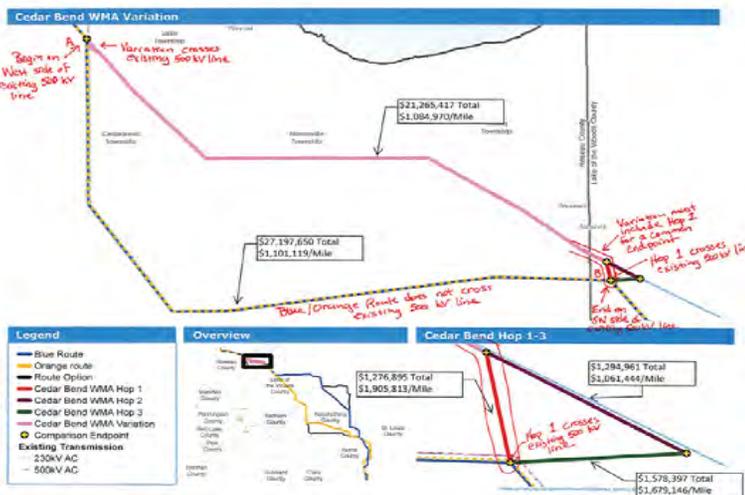
If the proposed Project parallels the existing 230 kV tie line corridor, the impact of a simultaneous, unexpected outage of the two facilities on electrical reliability would be minimal, but still notable because the lines would share a common purpose of transferring power from Manitoba to the United States. If the Proposed Project parallels the existing 500 kV tie line corridor, a simultaneous unexpected outage would have a greater impact on electrical system reliability because the transmission lines not only share a common load, but would also carry similar (and greater) amounts of power.

If there are three transmission lines (i.e., the proposed Project, 500 kV tie line, and 230 kV tie line) located in parallel corridors, a simultaneous unexpected outage of the Proposed Project and two tie lines could have the greatest impact to electrical reliability.

**Cedar Bend WMA Variation Area - Additional Comments on Cost & Electrical Reliability**

Because the Cedar Bend WMA Variation does not come to a common endpoint with the Proposed Blue/Orange Route, the cost & electrical reliability comparisons (and the other impact comparisons) are mischaracterized. As shown in Map #1 below, both the Proposed Route & the Variation begin at Point A, located on the west side of the existing 500 kV line. The Proposed Route ends at Point B, located on the south side of the existing 500 kV line, and never crosses the existing line between Point A and Point B. The Cedar Bend WMA Variation, as shown in the map and evaluated in the DEIS, ends at Point C, which is approximately 3700 feet north of Point B on the other side of the existing 500 kV line. For comparability purposes, the Variation must include "Cedar Bend WMA Hop 1" - which connects Point B and Point C - in order to reach a common endpoint with the Proposed Route. **Cost Impacts:** The total cost of the Cedar Bend WMA Variation as reported in the DEIS is approximately \$1.28 million low because it does not include Hop 1. **Reliability Impacts:** The Cedar Bend WMA Variation already includes one crossing of the existing 500 kV line where it diverges from the Proposed Route immediately east of Point A. Because the Variation does not include Hop 1, the second 500 kV line crossing needed to get to a common endpoint with the Proposed Route is not captured and the electrical reliability impact of the Cedar Bend WMA Variation is understated. The Variation also passes unacceptably close to existing substations.

MAP #1



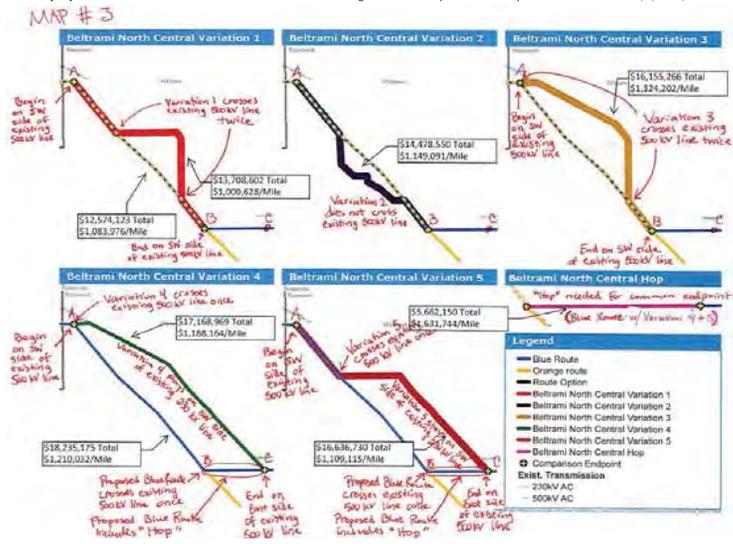


**Beltrami North Central Variation Area - Additional Comments on Cost & Electrical Reliability**

The Beltrami North Central Variation Area actually includes two different sets of variations, each with a common set of endpoints. Comparison of all five variations and the Proposed Blue/Orange Route mischaracterizes the cost & electrical reliability comparisons (and other impact comparisons as well). The Proposed Blue/Orange Route and Beltrami North Central variations 1-3 all share a common set of endpoints, identified as Point A and Point B on Map #3 below. Both endpoints are located on the southwest side of the existing 500 KV line. The Proposed Route and Variation 2 do not require crossing the existing 500 KV line. Variations 1 and 3 both require two crossings of the existing 500 KV line to connect Point A and Point B. The Proposed Blue Route, including the segment of Proposed Route identified as the "Beltrami North Central Hop" on Map #3 below, shares a common set of endpoints, identified as Point A and Point C, with Beltrami North Central Variations 4 and 5. The Proposed Route and the two variations all require one crossing of the existing 500 KV line. In order to reach Point C.

**Cost Impacts:** Segment costs should only be compared for routes with common endpoints. Variations 1-3 may be compared to the Proposed Blue/Orange Route, but variations 4 & 5 should only be compared to the Proposed Blue Route where it connects Point A and Point C.

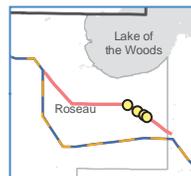
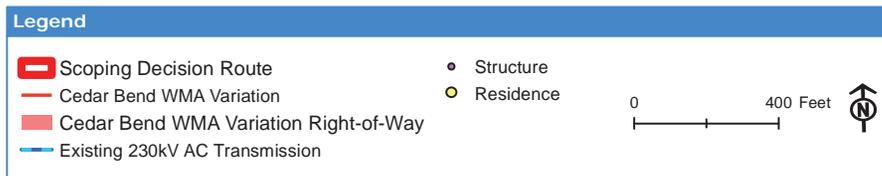
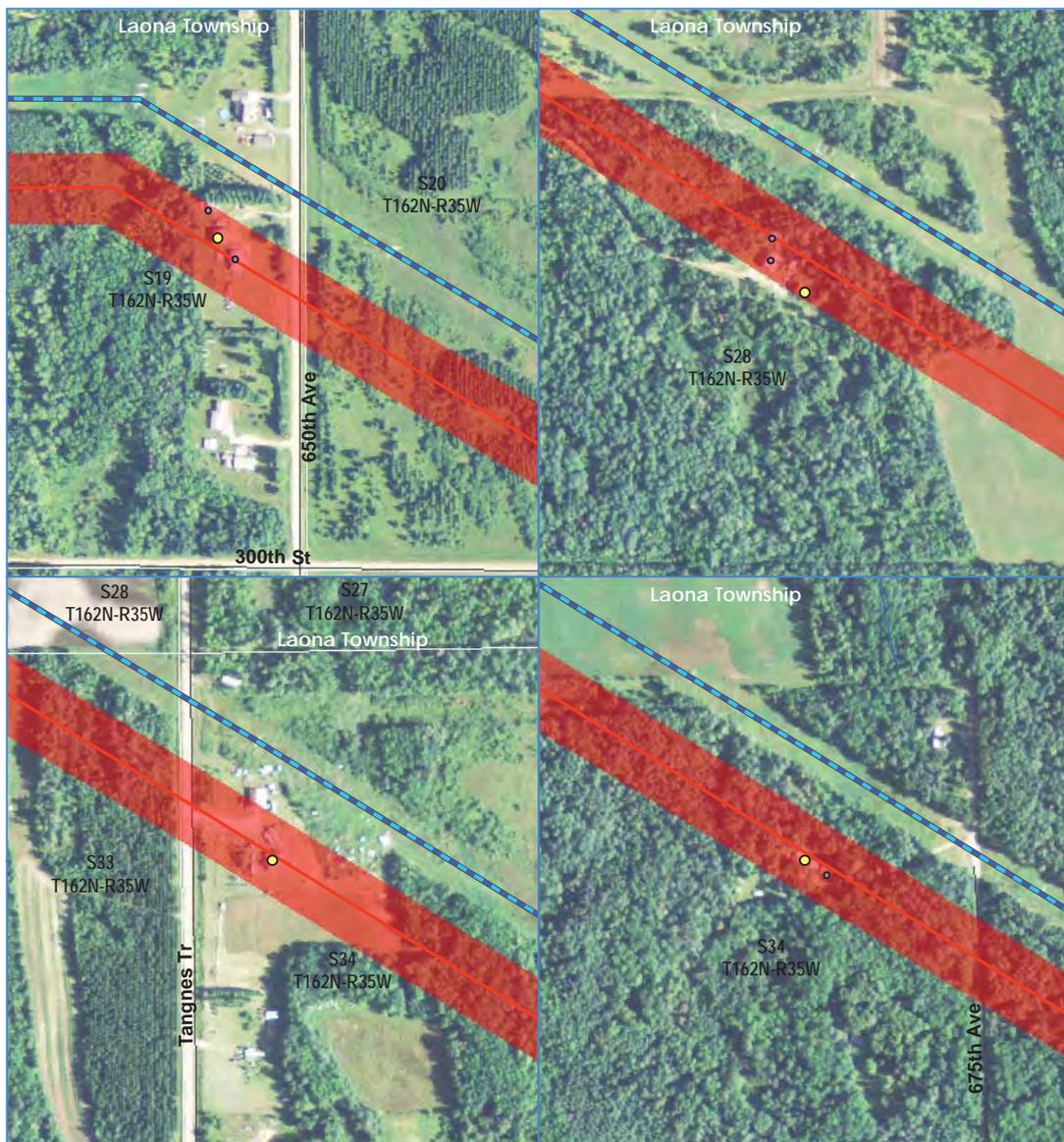
**Reliability Impacts:** Variations 1 & 3 necessitate additional 500 KV line crossings that are not required for the Proposed Route or variations 2, 4, and 5, but the impact of this is understated if a common set of endpoints is not used.



0190-26  
Continued



Potential Displacements  
Cedar Bend WMA Variation



Sources: ESRI, Minnesota DNR

\\mspe-gs-file\gsproj\large\Minneapolis\182035\map\_docs\CLIENT\DEIS\Displacements.mxd

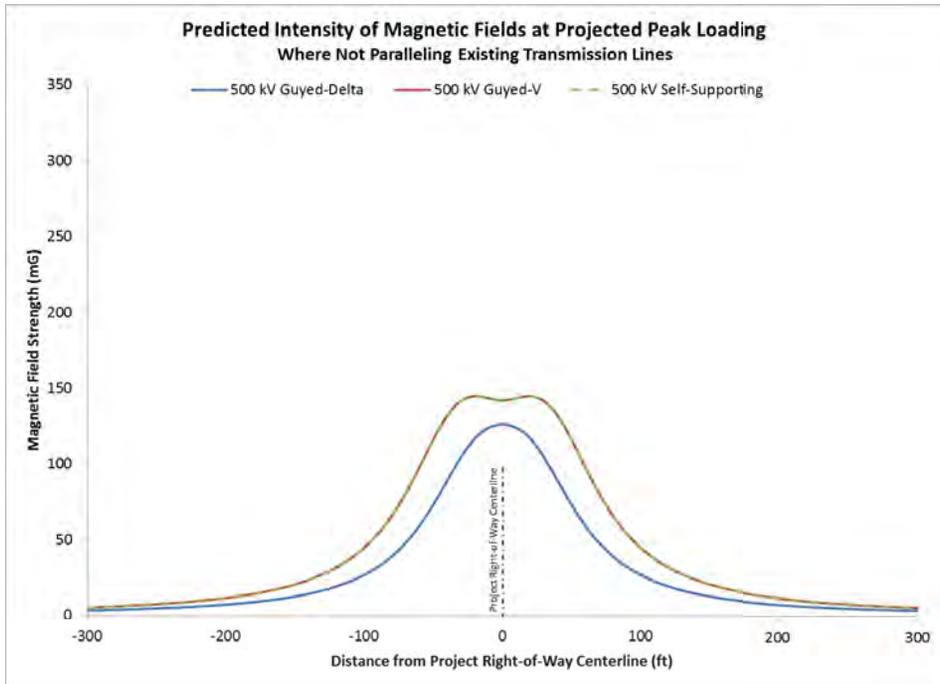
0190-27

These figures are associated with Comment 209-19 (page 24, lines 11-3). See the previous response to Comment 209-19 .

No changes are made to the EIS in response to this comment.

**Magnetic Field Simulation Results: Projected Peak Loading**

| Predicted Intensity of Magnetic Fields (mG) at Projected Peak Loading<br>Where Not Paralleling Existing Transmission Lines |              |                                      |      |      |       |       |       |       |       |      |      |     |
|--|--------------|--------------------------------------|------|------|-------|-------|-------|-------|-------|------|------|-----|
| Structure Type   | Line Current | Distance from Project ROW Centerline |      |      |       |       |       |       |       |      |      |     |
|  |              | -300                                 | -200 | -100 | -50   | -25   | 0     | 25    | 50    | 100  | 200  | 300 |
| 500 kV Guyed-Delta   | 1,024 A      | 3.2                                  | 7.2  | 26.8 | 73.1  | 111.2 | 126.2 | 111.2 | 73.1  | 26.8 | 7.2  | 3.2 |
| 500 kV Guyed-V   | 1,024 A      | 5.2                                  | 11.6 | 44.8 | 115.9 | 143.8 | 141.9 | 143.8 | 115.9 | 44.8 | 11.6 | 5.2 |
| 500 kV Self-Supporting   | 1,024 A      | 5.2                                  | 11.6 | 44.8 | 115.9 | 143.8 | 141.9 | 143.8 | 115.9 | 44.8 | 11.6 | 5.2 |



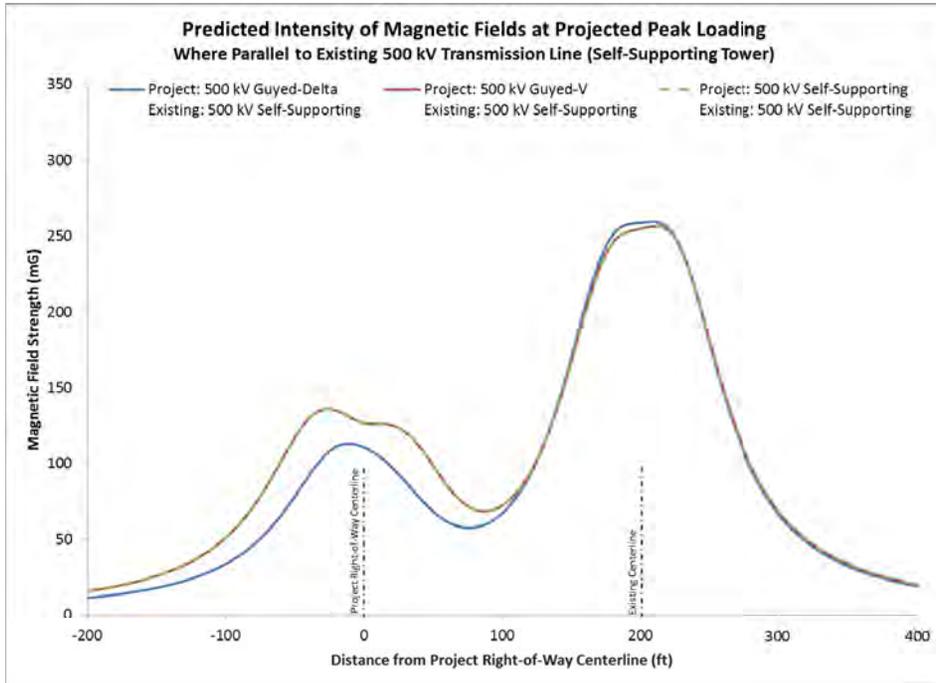
0190-28  
 0190-28 Appendix H and Table 5-4 and Appendix I and Tables 5-20 to 5-22 of the EIS are updated with the analysis provided by the Applicant.

**Magnetic Field Simulation Results: Projected Peak Loading**

0190-28 cont'd

0190-28  
 Continued

| Predicted Intensity of Magnetic Fields (mG) at Projected Peak Loading<br>Where Parallel to Existing 500 kV Transmission Line (Self-Supporting Tower) |              | Distance from Project ROW Centerline |      |       |       |       |       |      |      |       |      |      |  |
|--|--------------|--------------------------------------|------|-------|-------|-------|-------|------|------|-------|------|------|--|
| Structure Type   | Line Voltage | Distance from Project ROW Centerline |      |       |       |       |       |      |      |       |      |      |  |
|  |              | -200                                 | -100 | -50   | -25   | 0     | 25    | 50   | 100  | 200   | 300  | 400  |  |
| Project: 500 kV Guyed-Delta  | 1,024 A      | 11.5                                 | 33.8 | 78.5  | 108.2 | 110.8 | 92.9  | 68.3 | 67.4 | 258.8 | 66.9 | 18.8 |  |
| Existing: 500 kV Self-Supporting   | 1,897 A      |                                      |      |       |       |       |       |      |      |       |      |      |  |
| Project: 500 kV Guyed-V  | 1,024 A      | 15.9                                 | 51.1 | 117.2 | 136.1 | 126.6 | 123.7 | 98.5 | 72.4 | 254.8 | 68.8 | 19.9 |  |
| Existing: 500 kV Self-Supporting   | 1,897 A      |                                      |      |       |       |       |       |      |      |       |      |      |  |
| Project: 500 kV Self-Supporting  | 1,024 A      | 15.9                                 | 51.1 | 117.2 | 136.1 | 126.6 | 123.7 | 98.5 | 72.4 | 254.8 | 68.8 | 19.9 |  |
| Existing: 500 kV Self-Supporting   | 1,897 A      |                                      |      |       |       |       |       |      |      |       |      |      |  |



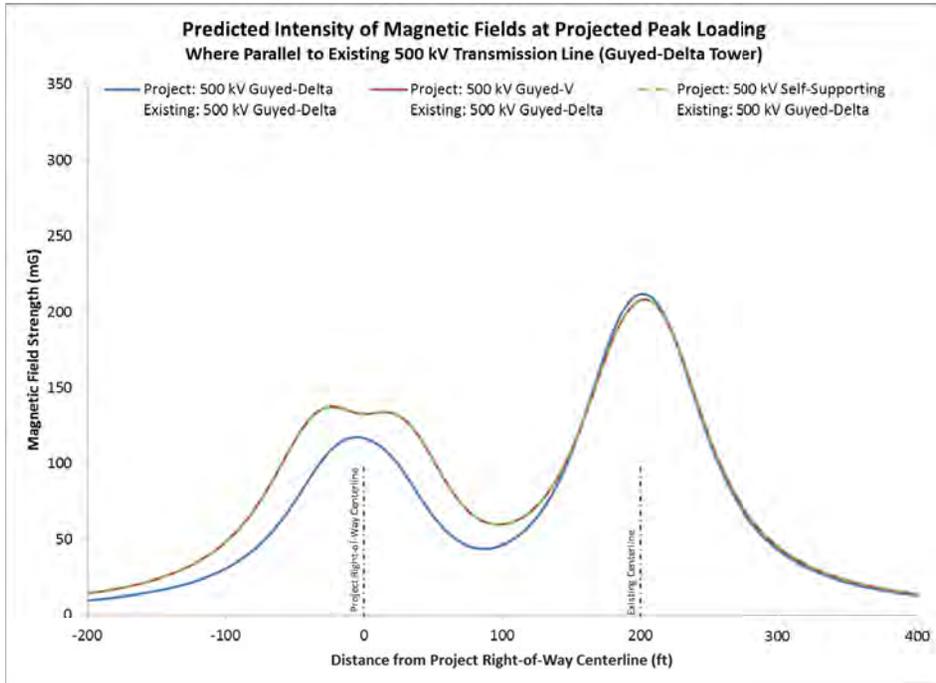
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Magnetic Field Simulation Results: Projected Peak Loading**

0190-28 cont'd

0190-28  
 Continued

| Predicted Intensity of Magnetic Fields (mG) at Projected Peak Loading<br>Where Parallel to Existing 500 kV Transmission Line (Guyed-Delta Tower) |                    | Distance from Project ROW Centerline                        |                    |       |       |       |       |       |      |       |      |       |      |
|--|--------------------|---|--------------------|-------|-------|-------|-------|-------|------|-------|------|-------|------|
| Structure Type   | Line Voltage       | -200  | -100               | -50   | -25   | 0     | 25    | 50    | 100  | 200   | 300  | 400   |      |
|  |                    | Project: 500 kV Guyed-Delta<br>Existing: 500 kV Guyed-Delta | 1,024 A<br>1,897 A | 9.9   | 30.8  | 75.1  | 108.1 | 116.7 | 98.9 | 65.3  | 46.4 | 211.7 | 43.0 |
| Project: 500 kV Guyed-V<br>Existing: 500 kV Guyed-Delta  | 1,024 A<br>1,897 A | 14.2  | 48.3               | 115.3 | 137.4 | 132.7 | 131.5 | 102.4 | 59.8 | 207.6 | 44.9 | 13.6  |      |
| Project: 500 kV Self-Supporting<br>Existing: 500 kV Guyed-Delta  | 1,024 A<br>1,897 A | 14.2  | 48.3               | 115.3 | 137.4 | 132.7 | 131.5 | 102.4 | 59.8 | 207.6 | 44.9 | 13.6  |      |



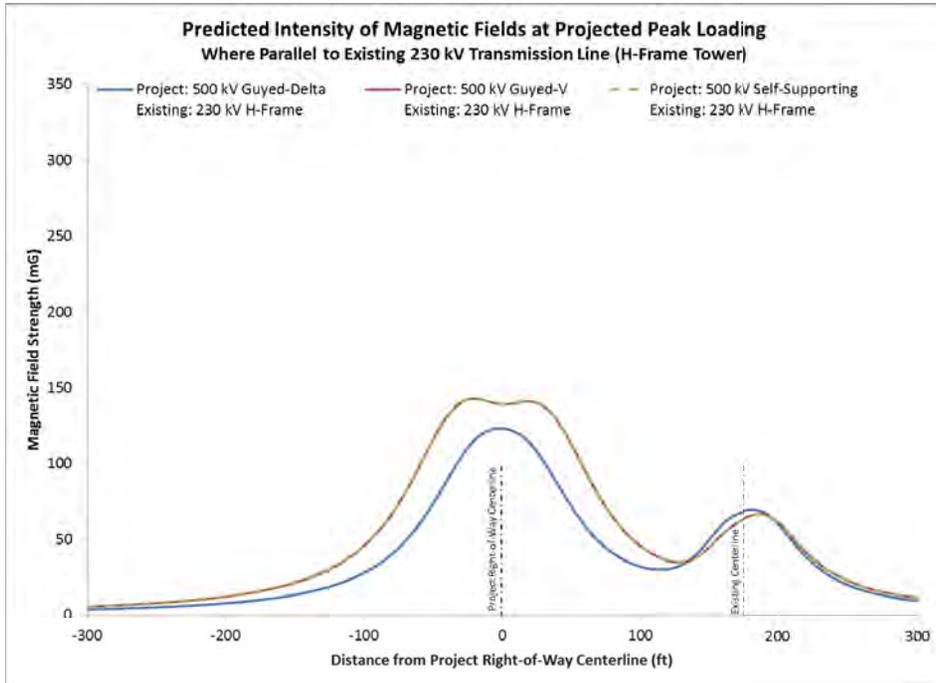
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Magnetic Field Simulation Results: Projected Peak Loading**

0190-28 cont'd

0190-28  
 Continued

| Predicted Intensity of Magnetic Fields (mG) at Projected Peak Loading<br>Where Parallel to Existing 230 kV Transmission Line (H-Frame Tower) |                  |                                      |      |      |       |       |       |       |       |      |      |      |
|--|------------------|--------------------------------------|------|------|-------|-------|-------|-------|-------|------|------|------|
| Structure Type   | Line Voltage     | Distance from Project ROW Centerline |      |      |       |       |       |       |       |      |      |      |
|  |                  | -300                                 | -200 | -100 | -50   | -25   | 0     | 25    | 50    | 100  | 200  | 300  |
| Project: 500 kV Guyed-Delta<br>Existing: 230 kV H-Frame  | 1,024 A<br>434 A | 3.7                                  | 7.9  | 27.9 | 73.8  | 110.4 | 123.3 | 107.7 | 71.5  | 32.0 | 60.1 | 9.1  |
| Project: 500 kV Guyed-V<br>Existing: 230 kV H-Frame  | 1,024 A<br>434 A | 5.6                                  | 12.3 | 45.7 | 116.0 | 142.3 | 139.0 | 140.0 | 112.3 | 45.5 | 61.4 | 11.1 |
| Project: 500 kV Self-Supporting<br>Existing: 230 kV H-Frame  | 1,024 A<br>434 A | 5.6                                  | 12.3 | 45.7 | 116.0 | 142.3 | 139.0 | 140.0 | 112.3 | 45.5 | 61.4 | 11.1 |



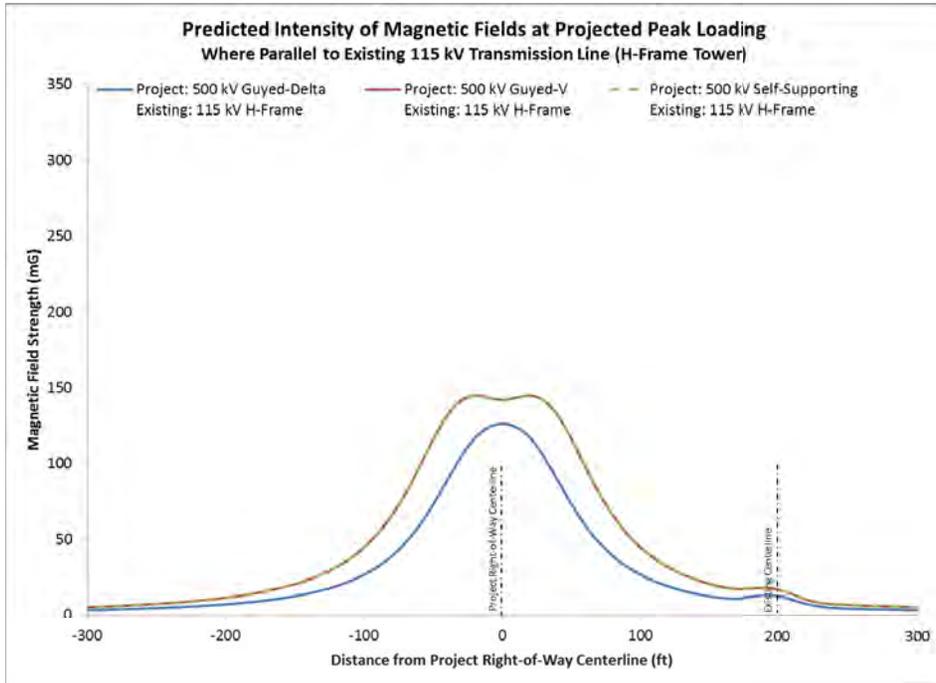
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Magnetic Field Simulation Results: Projected Peak Loading**

0190-28 cont'd

0190-28  
 Continued

| Predicted Intensity of Magnetic Fields (mG) at Projected Peak Loading<br>Where Parallel to Existing 115 kV Transmission Line (H-Frame Tower) |                 |                                      |      |      |       |       |       |       |       |      |      |     |
|--|-----------------|--------------------------------------|------|------|-------|-------|-------|-------|-------|------|------|-----|
| Structure Type   | Line Voltage    | Distance from Project ROW Centerline |      |      |       |       |       |       |       |      |      |     |
|  |                 | -300                                 | -200 | -100 | -50   | -25   | 0     | 25    | 50    | 100  | 200  | 300 |
| Project: 500 kV Guyed-Delta<br>Existing: 115 kV H-Frame  | 1,024 A<br>32 A | 3.2                                  | 7.2  | 26.8 | 73.0  | 111.2 | 126.3 | 111.3 | 73.1  | 26.7 | 12.4 | 2.9 |
| Project: 500 kV Guyed-V<br>Existing: 115 kV H-Frame  | 1,024 A<br>32 A | 5.2                                  | 11.6 | 44.7 | 115.9 | 143.9 | 142.0 | 143.9 | 116.0 | 44.7 | 16.7 | 4.8 |
| Project: 500 kV Self-Supporting<br>Existing: 115 kV H-Frame  | 1,024 A<br>32 A | 5.2                                  | 11.6 | 44.7 | 115.9 | 143.9 | 142.0 | 143.9 | 116.0 | 44.7 | 16.7 | 4.8 |



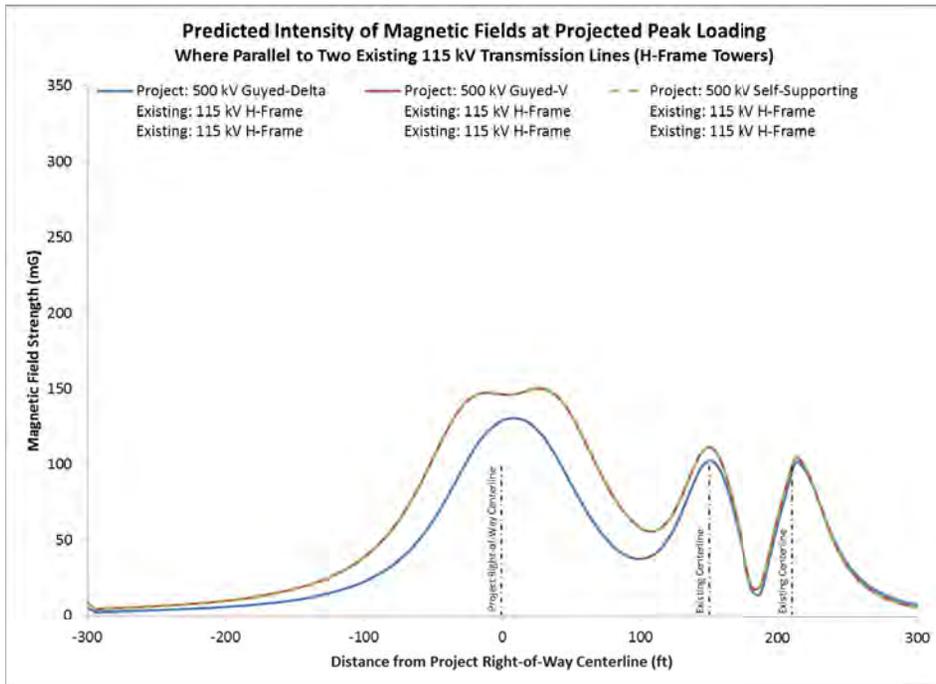
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Magnetic Field Simulation Results: Projected Peak Loading**

0190-28 cont'd

0190-28  
 Continued

| Predicted Intensity of Magnetic Fields (mG) at Projected Peak Loading<br>Where Parallel to Two Existing 115 kV Transmission Lines (H-Frame Towers) |              |                                      |      |      |       |       |       |       |       |      |      |     |
|--|--------------|--------------------------------------|------|------|-------|-------|-------|-------|-------|------|------|-----|
| Structure Type   | Line Voltage | Distance from Project ROW Centerline |      |      |       |       |       |       |       |      |      |     |
|  |              | -300                                 | -200 | -100 | -50   | -25   | 0     | 25    | 50    | 100  | 200  | 300 |
| Project: 500 kV Guyed-Delta  | 1,024 A      |                                      |      |      |       |       |       |       |       |      |      |     |
| Existing: 115 kV H-Frame   | 536 A        | 5.3                                  | 5.9  | 22.6 | 63.0  | 103.2 | 128.9 | 123.1 | 86.4  | 37.5 | 60.7 | 7.7 |
| Existing: 115 kV H-Frame   | 536 A        |                                      |      |      |       |       |       |       |       |      |      |     |
| Project: 500 kV Guyed-V  | 1,024 A      |                                      |      |      |       |       |       |       |       |      |      |     |
| Existing: 115 kV H-Frame   | 536 A        | 9.1                                  | 10.1 | 38.8 | 104.3 | 142.3 | 146.4 | 150.1 | 132.2 | 58.0 | 65.4 | 5.8 |
| Existing: 115 kV H-Frame   | 536 A        |                                      |      |      |       |       |       |       |       |      |      |     |
| Project: 500 kV Self-Supporting  | 1,024 A      |                                      |      |      |       |       |       |       |       |      |      |     |
| Existing: 115 kV H-Frame   | 536 A        | 9.1                                  | 10.1 | 38.8 | 104.3 | 142.3 | 146.4 | 150.1 | 132.2 | 58.0 | 65.4 | 5.8 |
| Existing: 115 kV H-Frame   | 536 A        |                                      |      |      |       |       |       |       |       |      |      |     |



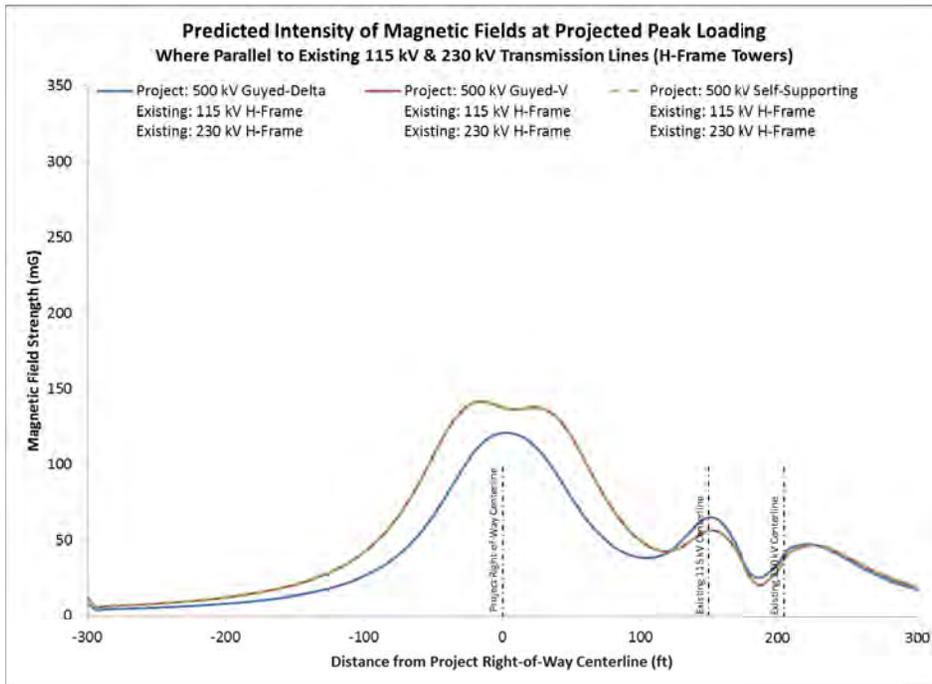
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Magnetic Field Simulation Results: Projected Peak Loading**

0190-28 cont'd

0190-28  
 Continued

| Predicted Intensity of Magnetic Fields (mG) at Projected Peak Loading<br>Where Parallel to Existing 115 kV & 230 kV Transmission Lines (H-Frame Towers) |              |                                      |      |      |       |       |       |       |       |      |      |      |
|---|--------------|--------------------------------------|------|------|-------|-------|-------|-------|-------|------|------|------|
| Structure Type  | Line Voltage | Distance from Project ROW Centerline |      |      |       |       |       |       |       |      |      |      |
|   |              | -300                                 | -200 | -100 | -50   | -25   | 0     | 25    | 50    | 100  | 200  | 300  |
| Project: 500 kV Guyed-Delta   | 1,024 A      |                                      |      |      |       |       |       |       |       |      |      |      |
| Existing: 115 kV H-Frame  | 557 A        | 8.3                                  | 8.1  | 26.3 | 66.1  | 102.4 | 120.8 | 110.8 | 77.9  | 38.4 | 34.4 | 17.7 |
| Existing: 230 kV H-Frame  | 601 A        |                                      |      |      |       |       |       |       |       |      |      |      |
| Project: 500 kV Guyed-V   | 1,024 A      |                                      |      |      |       |       |       |       |       |      |      |      |
| Existing: 115 kV H-Frame  | 557 A        | 12.1                                 | 12.2 | 42.0 | 105.5 | 138.7 | 137.6 | 137.6 | 118.2 | 49.5 | 30.0 | 19.6 |
| Existing: 230 kV H-Frame  | 601 A        |                                      |      |      |       |       |       |       |       |      |      |      |
| Project: 500 kV Self-Supporting   | 1,024 A      |                                      |      |      |       |       |       |       |       |      |      |      |
| Existing: 115 kV H-Frame  | 557 A        | 12.1                                 | 12.2 | 42.0 | 105.5 | 138.7 | 137.6 | 137.6 | 118.2 | 49.5 | 30.0 | 19.6 |
| Existing: 230 kV H-Frame  | 601 A        |                                      |      |      |       |       |       |       |       |      |      |      |



[Simulation assumes that Project ROW is adjacent to existing line ROW]

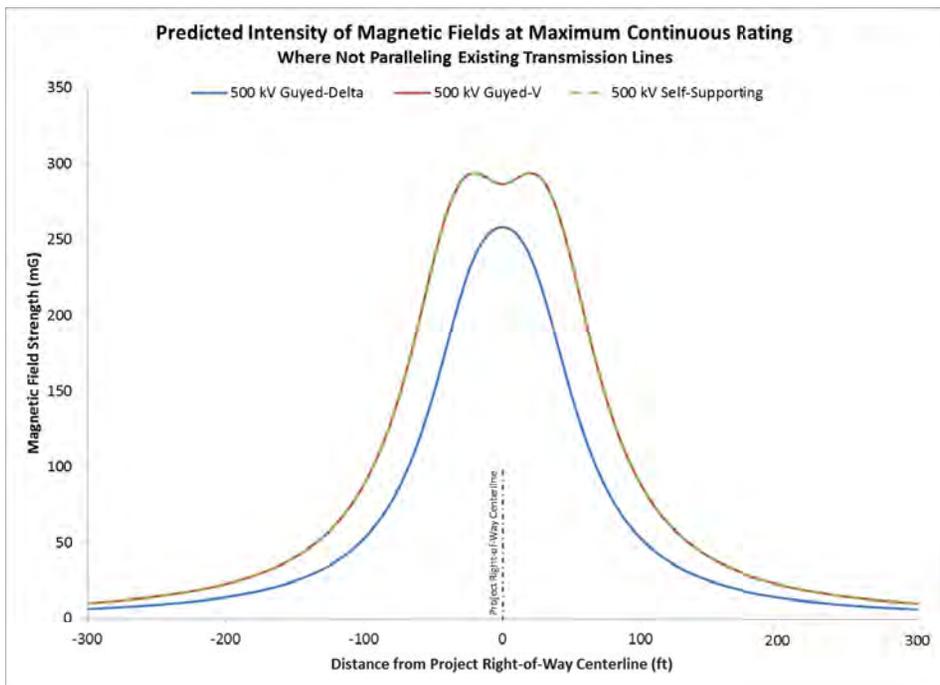
**Magnetic Field Simulation Results: Max Continuous Rating**

0190-28 cont'd

0190-28  
 Continued

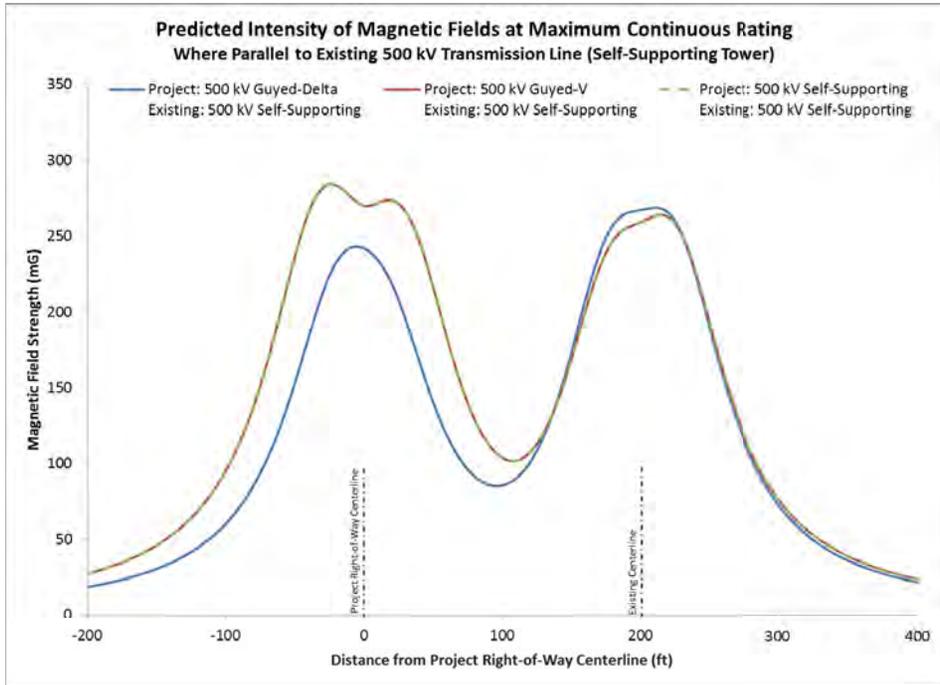
**Predicted Intensity of Magnetic Fields (mG) at Maximum Continuous Rating  
 Where Not Paralleling Existing Transmission Lines**

| Structure Type         | Line Current | Distance from Project ROW Centerline |      |      |       |       |       |       |       |      |      |      |
|------------------------|--------------|--------------------------------------|------|------|-------|-------|-------|-------|-------|------|------|------|
|                        |              | -300                                 | -200 | -100 | -50   | -25   | 0     | 25    | 50    | 100  | 200  | 300  |
| 500 kV Guyed-Delta     | 2,000 A      | 6.3                                  | 14.1 | 52.9 | 147.3 | 227.2 | 258.1 | 227.2 | 147.3 | 52.9 | 14.1 | 6.3  |
| 500 kV Guyed-V         | 2,000 A      | 10.1                                 | 22.8 | 88.5 | 235.0 | 292.5 | 286.2 | 292.5 | 235.0 | 88.5 | 22.8 | 10.1 |
| 500 kV Self-Supporting | 2,000 A      | 10.1                                 | 22.8 | 88.5 | 235.0 | 292.5 | 286.2 | 292.5 | 235.0 | 88.5 | 22.8 | 10.1 |



**Magnetic Field Simulation Results: Max Continuous Rating**

| Predicted Intensity of Magnetic Fields (mG) at Maximum Continuous Rating<br>Where Parallel to Existing 500 kV Transmission Line (Self-Supporting Tower) |              |                                      |      |       |       |       |       |       |       |       |      |      |
|---|--------------|--------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|------|------|
| Structure Type  | Line Voltage | Distance from Project ROW Centerline |      |       |       |       |       |       |       |       |      |      |
|   |              | -200                                 | -100 | -50   | -25   | 0     | 25    | 50    | 100   | 200   | 300  | 400  |
| Project: 500 kV Guyed-Delta   | 2,000 A      | 18.6                                 | 60.3 | 153.0 | 223.8 | 241.7 | 207.7 | 140.2 | 85.6  | 267.1 | 72.9 | 21.4 |
| Existing: 500 kV Self-Supporting  | 2,000 A      |                                      |      |       |       |       |       |       |       |       |      |      |
| Project: 500 kV Guyed-V   | 2,000 A      | 27.3                                 | 95.2 | 236.4 | 284.1 | 269.9 | 271.3 | 216.1 | 103.9 | 259.1 | 76.6 | 23.6 |
| Existing: 500 kV Self-Supporting  | 2,000 A      |                                      |      |       |       |       |       |       |       |       |      |      |
| Project: 500 kV Self-Supporting   | 2,000 A      | 27.3                                 | 95.2 | 236.4 | 284.1 | 269.9 | 271.3 | 216.1 | 103.9 | 259.1 | 76.6 | 23.6 |
| Existing: 500 kV Self-Supporting  | 2,000 A      |                                      |      |       |       |       |       |       |       |       |      |      |



[Simulation assumes that Project ROW is adjacent to existing line ROW]

0190-28  
 Continued

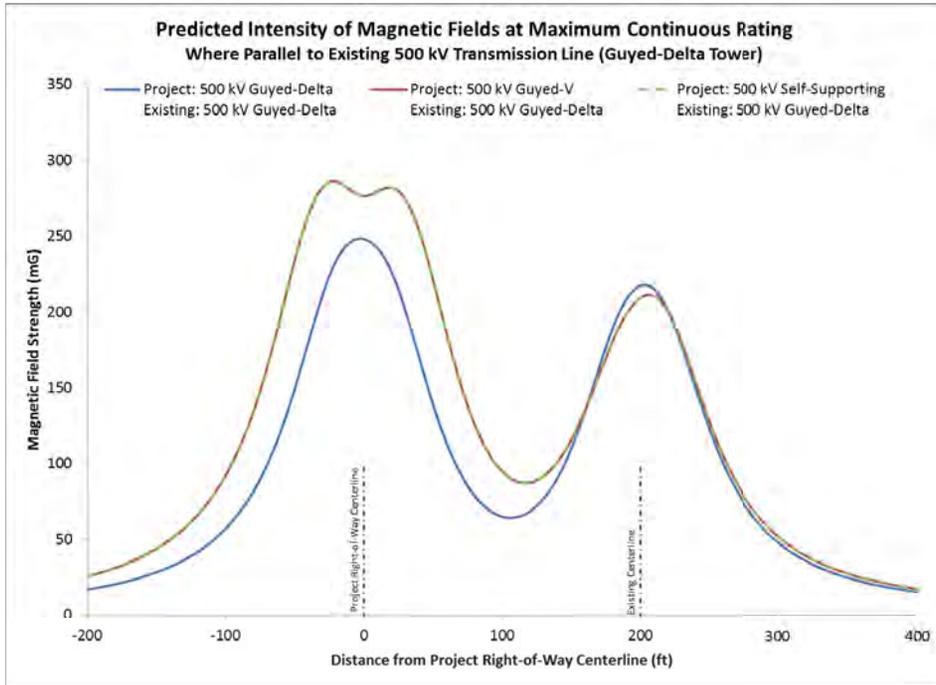
**Magnetic Field Simulation Results: Max Continuous Rating**

0190-28 cont'd

0190-28  
 Continued

**Predicted Intensity of Magnetic Fields (mG) at Maximum Continuous Rating  
 Where Parallel to Existing 500 kV Transmission Line (Guyed-Delta Tower)**

| Structure Type                  | Line Voltage | Distance from Project ROW Centerline |      |       |       |       |       |       |      |       |      |      |
|---------------------------------|--------------|--------------------------------------|------|-------|-------|-------|-------|-------|------|-------|------|------|
|                                 |              | -200                                 | -100 | -50   | -25   | 0     | 25    | 50    | 100  | 200   | 300  | 400  |
| Project: 500 kV Guyed-Delta     | 2,000 A      | 16.9                                 | 57.2 | 149.4 | 223.8 | 248.0 | 214.3 | 138.5 | 64.9 | 217.3 | 47.9 | 14.9 |
| Existing: 500 kV Guyed-Delta    | 2,000 A      | 16.9                                 | 57.2 | 149.4 | 223.8 | 248.0 | 214.3 | 138.5 | 64.9 | 217.3 | 47.9 | 14.9 |
| Project: 500 kV Guyed-V         | 2,000 A      | 25.5                                 | 92.3 | 234.2 | 285.5 | 276.2 | 279.5 | 220.5 | 94.6 | 209.4 | 51.7 | 16.9 |
| Existing: 500 kV Guyed-Delta    | 2,000 A      | 25.5                                 | 92.3 | 234.2 | 285.5 | 276.2 | 279.5 | 220.5 | 94.6 | 209.4 | 51.7 | 16.9 |
| Project: 500 kV Self-Supporting | 2,000 A      | 25.5                                 | 92.3 | 234.2 | 285.5 | 276.2 | 279.5 | 220.5 | 94.6 | 209.4 | 51.7 | 16.9 |
| Existing: 500 kV Guyed-Delta    | 2,000 A      | 25.5                                 | 92.3 | 234.2 | 285.5 | 276.2 | 279.5 | 220.5 | 94.6 | 209.4 | 51.7 | 16.9 |



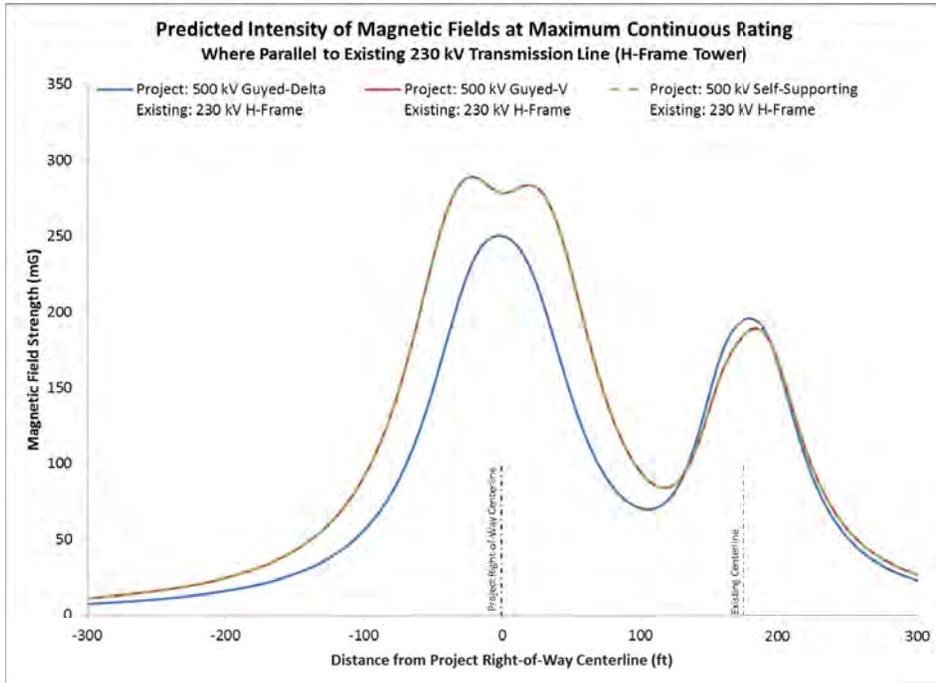
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Magnetic Field Simulation Results: Max Continuous Rating**

0190-28 cont'd

0190-28  
 Continued

| Predicted Intensity of Magnetic Fields (mG) at Maximum Continuous Rating<br>Where Parallel to Existing 230 kV Transmission Line (H-Frame Tower) |                    |                                      |      |      |       |       |       |       |       |      |       |      |
|---|--------------------|--------------------------------------|------|------|-------|-------|-------|-------|-------|------|-------|------|
| Structure Type  | Line Voltage       | Distance from Project ROW Centerline |      |      |       |       |       |       |       |      |       |      |
|   |                    | -300                                 | -200 | -100 | -50   | -25   | 0     | 25    | 50    | 100  | 200   | 300  |
| Project: 500 kV Guyed-Delta<br>Existing: 230 kV H-Frame   | 2,000 A<br>1,198 A | 7.5                                  | 16.0 | 56.0 | 149.5 | 225.2 | 250.1 | 217.7 | 143.6 | 70.4 | 165.7 | 22.6 |
| Project: 500 kV Guyed-V<br>Existing: 230 kV H-Frame   | 2,000 A<br>1,198 A | 11.3                                 | 24.6 | 91.3 | 235.3 | 288.3 | 278.2 | 281.9 | 225.4 | 94.2 | 167.9 | 26.5 |
| Project: 500 kV Self-Supporting<br>Existing: 230 kV H-Frame   | 2,000 A<br>1,198 A | 11.3                                 | 24.6 | 91.3 | 235.3 | 288.3 | 278.2 | 281.9 | 225.4 | 94.2 | 167.9 | 26.5 |



[Simulation assumes that Project ROW is adjacent to existing line ROW]

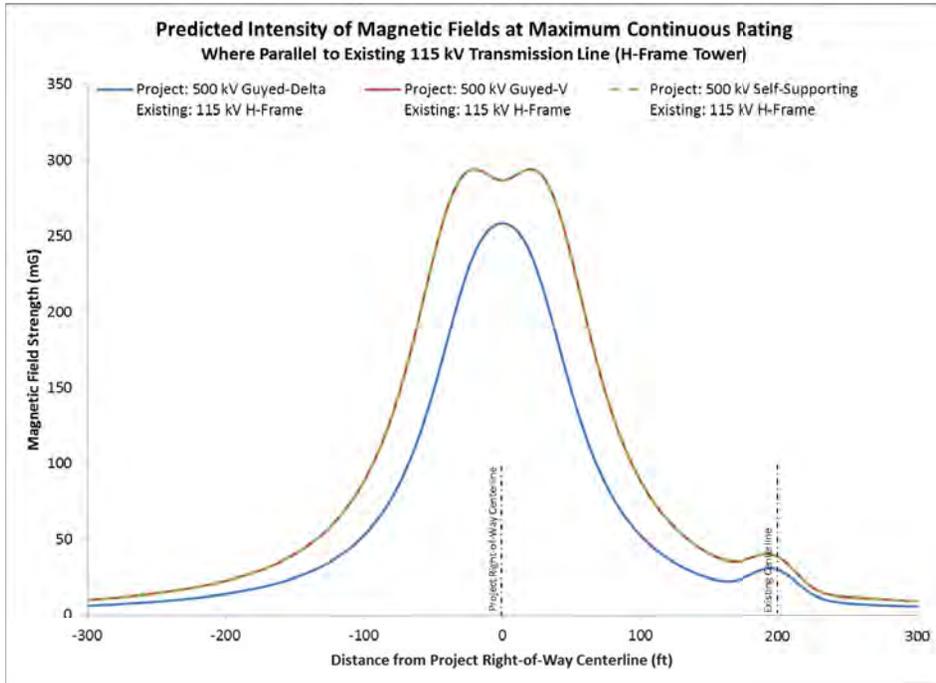
**Magnetic Field Simulation Results: Max Continuous Rating**

0190-28 cont'd

0190-28  
 Continued

**Predicted Intensity of Magnetic Fields (mG) at Maximum Continuous Rating  
 Where Parallel to Existing 115 kV Transmission Line (H-Frame Tower)**

| Structure Type  | Line Voltage<br>Current | Distance from Project ROW Centerline |      |      |       |       |       |       |       |      |      |     |
|---|-------------------------|--------------------------------------|------|------|-------|-------|-------|-------|-------|------|------|-----|
|   |                         | -300                                 | -200 | -100 | -50   | -25   | 0     | 25    | 50    | 100  | 200  | 300 |
| Project: 500 kV Guyed-Delta<br>Existing: 115 kV H-Frame     | 2,000 A<br>96 A         | 6.3                                  | 14.1 | 52.8 | 147.2 | 227.3 | 258.4 | 227.5 | 147.4 | 52.5 | 29.9 | 5.4 |
| Project: 500 kV Guyed-V<br>Existing: 115 kV H-Frame         | 2,000 A<br>96 A         | 10.1                                 | 22.7 | 88.5 | 235.0 | 292.7 | 286.5 | 292.9 | 235.3 | 88.3 | 38.3 | 9.0 |
| Project: 500 kV Self-Supporting<br>Existing: 115 kV H-Frame | 2,000 A<br>96 A         | 10.1                                 | 22.7 | 88.5 | 235.0 | 292.7 | 286.5 | 292.9 | 235.3 | 88.3 | 38.3 | 9.0 |



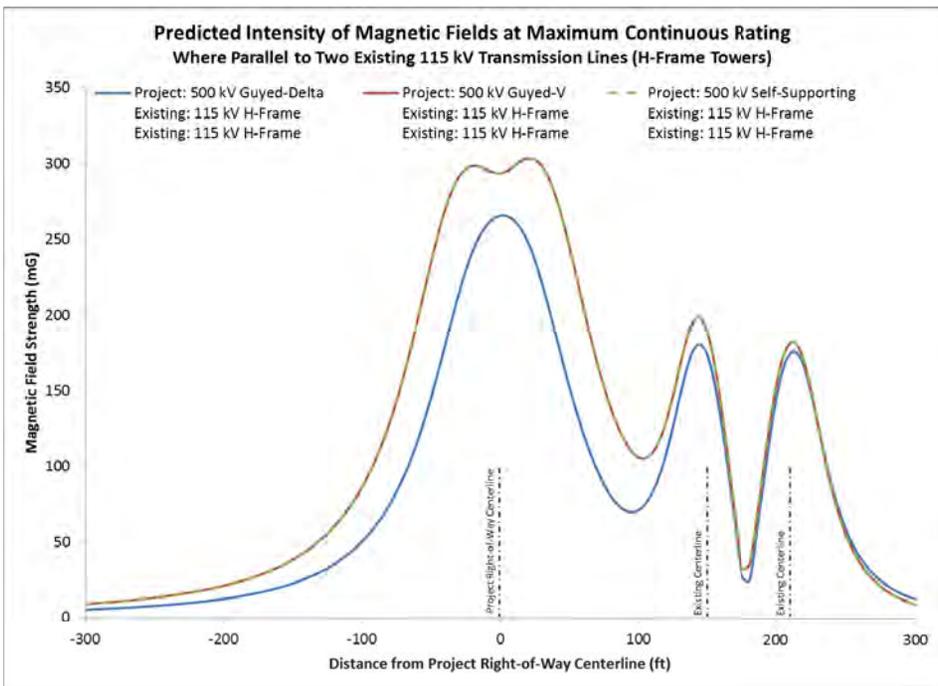
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Magnetic Field Simulation Results: Max Continuous Rating**

0190-28 cont'd

0190-28  
 Continued

| Predicted Intensity of Magnetic Fields (mG) at Maximum Continuous Rating<br>Where Parallel to Two Existing 115 kV Transmission Lines (H-Frame Towers) |                           |                                      |      |      |       |       |       |       |       |       |       |      |
|---|---------------------------|--------------------------------------|------|------|-------|-------|-------|-------|-------|-------|-------|------|
| Structure Type  | Line Voltage              | Distance from Project ROW Centerline |      |      |       |       |       |       |       |       |       |      |
|   |                           | -300                                 | -200 | -100 | -50   | -25   | 0     | 25    | 50    | 100   | 200   | 300  |
| Project: 500 kV Guyed-Delta<br>Existing: 115 kV H-Frame<br>Existing: 115 kV H-Frame   | 2,000 A<br>929 A<br>929 A | 5.3                                  | 12.6 | 50.4 | 145.7 | 229.4 | 265.5 | 235.9 | 151.9 | 71.2  | 143.0 | 12.6 |
| Project: 500 kV Guyed-V<br>Existing: 115 kV H-Frame<br>Existing: 115 kV H-Frame   | 2,000 A<br>929 A<br>929 A | 9.1                                  | 21.3 | 86.3 | 235.1 | 296.4 | 293.6 | 302.5 | 244.5 | 105.8 | 152.0 | 9.1  |
| Project: 500 kV Self-Supporting<br>Existing: 115 kV H-Frame<br>Existing: 115 kV H-Frame   | 2,000 A<br>929 A<br>929 A | 9.1                                  | 21.3 | 86.3 | 235.1 | 296.4 | 293.6 | 302.5 | 244.5 | 105.8 | 152.0 | 9.1  |



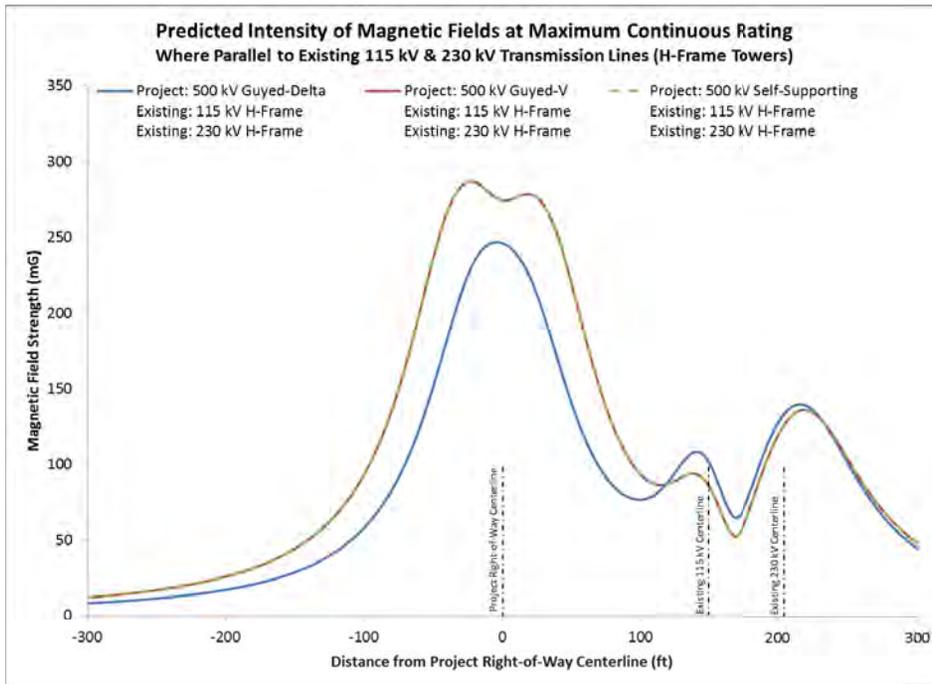
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Magnetic Field Simulation Results: Max Continuous Rating**

0190-28 cont'd

0190-28  
 Continued

| Predicted Intensity of Magnetic Fields (mG) at Maximum Continuous Rating<br>Where Parallel to Existing 115 kV & 230 kV Transmission Lines (H-Frame Towers) |              |                                      |      |      |       |       |       |       |       |      |       |      |
|--|--------------|--------------------------------------|------|------|-------|-------|-------|-------|-------|------|-------|------|
| Structure Type   | Line Voltage | Distance from Project ROW Centerline |      |      |       |       |       |       |       |      |       |      |
|  |              | -300                                 | -200 | -100 | -50   | -25   | 0     | 25    | 50    | 100  | 200   | 300  |
| Project: 500 kV Guyed-Delta  | 2,000 A      |                                      |      |      |       |       |       |       |       |      |       |      |
| Existing: 115 kV H-Frame   | 804 A        | 8.3                                  | 17.2 | 58.1 | 151.4 | 224.8 | 246.1 | 212.1 | 140.2 | 76.7 | 127.5 | 44.8 |
| Existing: 230 kV H-Frame   | 1,753 A      |                                      |      |      |       |       |       |       |       |      |       |      |
| Project: 500 kV Guyed-V  | 2,000 A      |                                      |      |      |       |       |       |       |       |      |       |      |
| Existing: 115 kV H-Frame   | 804 A        | 12.1                                 | 25.9 | 93.3 | 236.0 | 286.6 | 274.3 | 276.2 | 219.1 | 93.3 | 119.3 | 48.3 |
| Existing: 230 kV H-Frame   | 1,753 A      |                                      |      |      |       |       |       |       |       |      |       |      |
| Project: 500 kV Self-Supporting  | 2,000 A      |                                      |      |      |       |       |       |       |       |      |       |      |
| Existing: 115 kV H-Frame   | 804 A        | 12.1                                 | 25.9 | 93.3 | 236.0 | 286.6 | 274.3 | 276.2 | 219.1 | 93.3 | 119.3 | 48.3 |
| Existing: 230 kV H-Frame   | 1,753 A      |                                      |      |      |       |       |       |       |       |      |       |      |



[Simulation assumes that Project ROW is adjacent to existing line ROW]

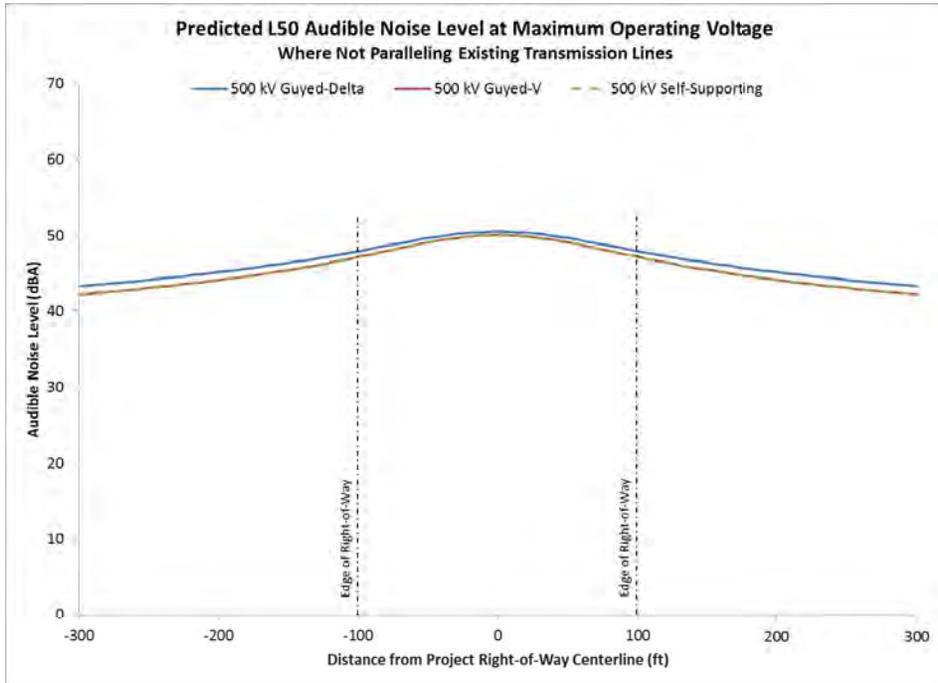
**Audible Noise Simulation Results**

0190-28 cont'd

0190-28  
Continued

**Predicted L50 Audible Noise Level (dBA) at Maximum Operating Voltage  
Where Not Paralleling Existing Transmission Lines**

| Structure Type         | Line Voltage | Distance from Project ROW Centerline |      |      |      |      |      |      |      |      |      |      |
|------------------------|--------------|--------------------------------------|------|------|------|------|------|------|------|------|------|------|
|                        |              | -300                                 | -200 | -100 | -50  | -25  | 0    | 25   | 50   | 100  | 200  | 300  |
| 500 kV Guyed-Delta     | 550 kV       | 43.3                                 | 45.2 | 47.9 | 49.7 | 50.3 | 50.5 | 50.3 | 49.7 | 47.9 | 45.2 | 43.3 |
| 500 kV Guyed-V         | 550 kV       | 42.2                                 | 44.1 | 47.2 | 49.1 | 49.8 | 50.1 | 49.8 | 49.1 | 47.2 | 44.1 | 42.2 |
| 500 kV Self-Supporting | 550 kV       | 42.2                                 | 44.1 | 47.2 | 49.1 | 49.8 | 50.1 | 49.8 | 49.1 | 47.2 | 44.1 | 42.2 |

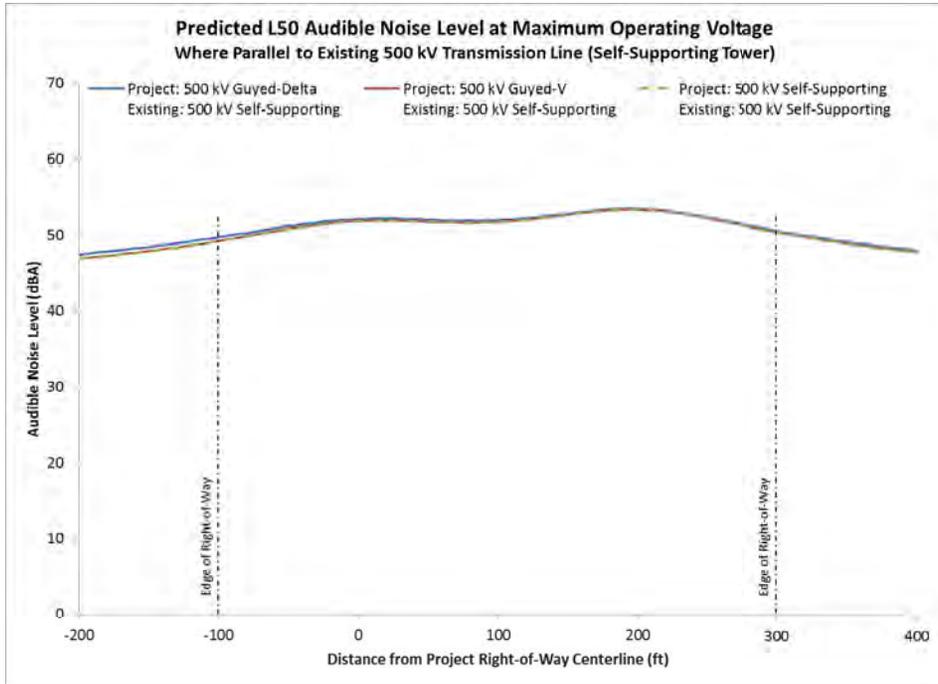


**Audible Noise Simulation Results**

0190-28 cont'd

0190-28  
Continued

| Predicted L50 Audible Noise Level (dBA) at Maximum Operating Voltage<br>Where Parallel to Existing 500 kV Transmission Line (Self-Supporting Tower) |              | Distance from Project ROW Centerline |      |      |      |      |      |      |      |      |      |      |
|---|--------------|--------------------------------------|------|------|------|------|------|------|------|------|------|------|
| Structure Type  | Line Voltage | Distance from Project ROW Centerline |      |      |      |      |      |      |      |      |      |      |
|   |              | -200                                 | -100 | -50  | -25  | 0    | 25   | 50   | 100  | 200  | 300  | 400  |
| Project: 500 kV Guyed-Delta   | 550 kV       | 47.4                                 | 49.7 | 51.2 | 51.8 | 52.1 | 52.2 | 52.0 | 52.0 | 53.4 | 50.5 | 47.9 |
| Existing: 500 kV Self-Supporting  | 550 kV       | 47.4                                 | 49.7 | 51.2 | 51.8 | 52.1 | 52.2 | 52.0 | 52.0 | 53.4 | 50.5 | 47.9 |
| Project: 500 kV Guyed-V   | 550 kV       | 46.9                                 | 49.2 | 50.8 | 51.4 | 51.8 | 51.9 | 51.7 | 51.7 | 53.4 | 50.4 | 47.7 |
| Existing: 500 kV Self-Supporting  | 550 kV       | 46.9                                 | 49.2 | 50.8 | 51.4 | 51.8 | 51.9 | 51.7 | 51.7 | 53.4 | 50.4 | 47.7 |
| Project: 500 kV Self-Supporting   | 550 kV       | 46.9                                 | 49.2 | 50.8 | 51.4 | 51.8 | 51.9 | 51.7 | 51.7 | 53.4 | 50.4 | 47.7 |
| Existing: 500 kV Self-Supporting  | 550 kV       | 46.9                                 | 49.2 | 50.8 | 51.4 | 51.8 | 51.9 | 51.7 | 51.7 | 53.4 | 50.4 | 47.7 |



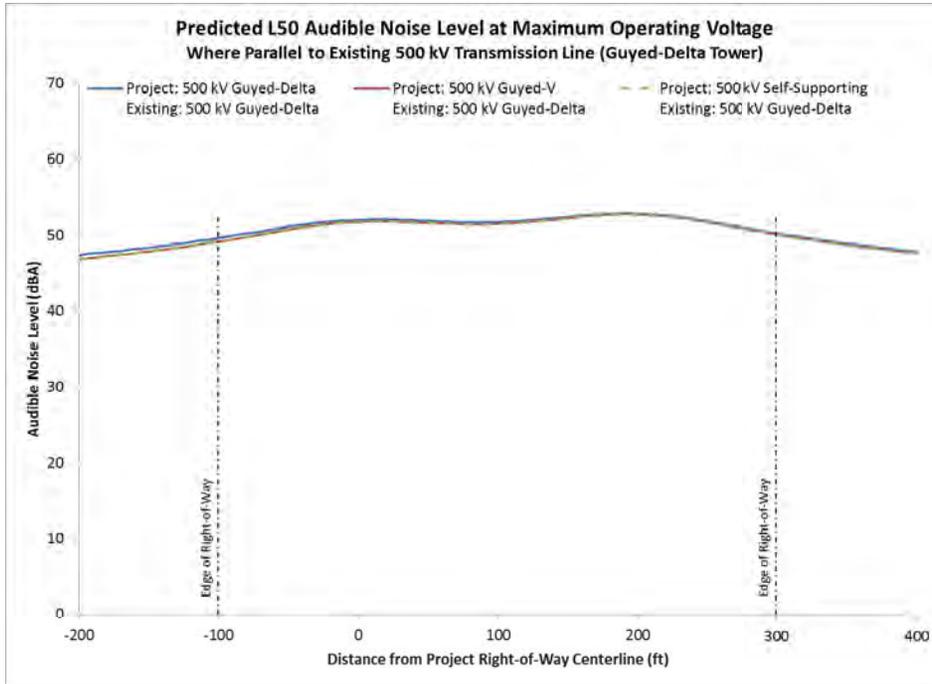
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Audible Noise Simulation Results**

0190-28 cont'd

0190-28  
Continued

| Predicted L50 Audible Noise Level (dBA) at Maximum Operating Voltage<br>Where Parallel to Existing 500 kV Transmission Line (Guyed-Delta Tower) |              |                                      |      |      |      |      |      |      |      |      |      |      |
|---|--------------|--------------------------------------|------|------|------|------|------|------|------|------|------|------|
| Structure Type  | Line Voltage | Distance from Project ROW Centerline |      |      |      |      |      |      |      |      |      |      |
|   |              | -200                                 | -100 | -50  | -25  | 0    | 25   | 50   | 100  | 200  | 300  | 400  |
| Project: 500 kV Guyed-Delta   | 550 kV       | 47.3                                 | 49.6 | 51.1 | 51.7 | 52.0 | 52.0 | 51.9 | 51.7 | 52.8 | 50.2 | 47.8 |
| Existing: 500 kV Guyed-Delta  | 550 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Project: 500 kV Guyed-V   | 550 kV       | 46.8                                 | 49.1 | 50.7 | 51.4 | 51.7 | 51.8 | 51.6 | 51.5 | 52.7 | 50.1 | 47.6 |
| Existing: 500 kV Guyed-Delta  | 550 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Project: 500 kV Self-Supporting   | 550 kV       | 46.8                                 | 49.1 | 50.7 | 51.4 | 51.7 | 51.8 | 51.6 | 51.5 | 52.7 | 50.1 | 47.6 |
| Existing: 500 kV Guyed-Delta  | 550 kV       |                                      |      |      |      |      |      |      |      |      |      |      |



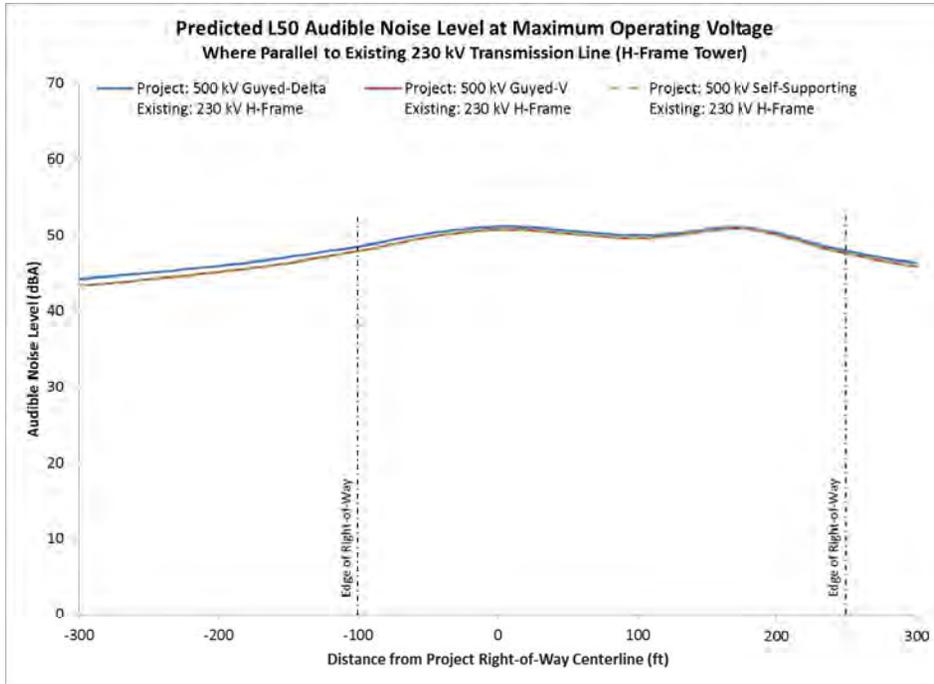
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Audible Noise Simulation Results**

0190-28 cont'd

0190-28  
Continued

| Predicted L50 Audible Noise Level (dBA) at Maximum Operating Voltage<br>Where Parallel to Existing 230 kV Transmission Line (H-Frame Tower) |                  |                                      |      |      |      |      |      |      |      |      |      |      |
|---|------------------|--------------------------------------|------|------|------|------|------|------|------|------|------|------|
| Structure Type  | Line Voltage     | Distance from Project ROW Centerline |      |      |      |      |      |      |      |      |      |      |
|   |                  | -300                                 | -200 | -100 | -50  | -25  | 0    | 25   | 50   | 100  | 200  | 300  |
| Project: 500 kV Guyed-Delta<br>Existing: 230 kV H-Frame   | 550 kV<br>253 kV | 44.2                                 | 45.9 | 48.5 | 50.2 | 50.8 | 51.1 | 51.0 | 50.6 | 50.0 | 50.3 | 46.3 |
| Project: 500 kV Guyed-V<br>Existing: 230 kV H-Frame   | 550 kV<br>253 kV | 43.4                                 | 45.1 | 47.9 | 49.7 | 50.4 | 50.7 | 50.6 | 50.2 | 49.6 | 50.1 | 45.9 |
| Project: 500 kV Self-Supporting<br>Existing: 230 kV H-Frame   | 550 kV<br>253 kV | 43.4                                 | 45.1 | 47.9 | 49.7 | 50.4 | 50.7 | 50.6 | 50.2 | 49.6 | 50.1 | 45.9 |



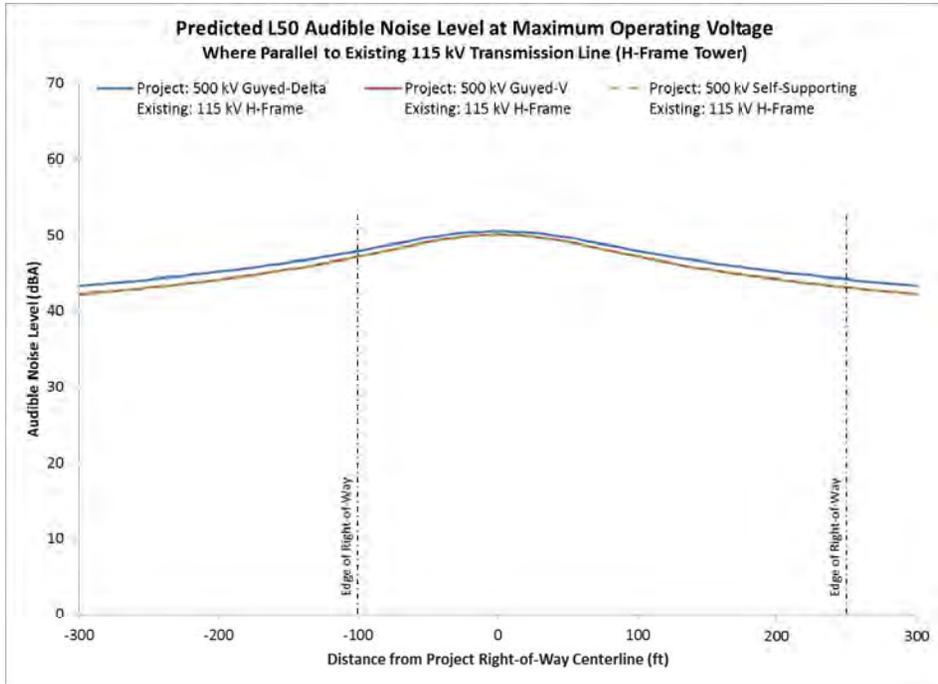
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Audible Noise Simulation Results**

0190-28 cont'd

0190-28  
Continued

| Predicted L50 Audible Noise Level (dBA) at Maximum Operating Voltage<br>Where Parallel to Existing 115 kV Transmission Line (H-Frame Tower) |                  | Distance from Project ROW Centerline |      |      |      |      |      |      |      |      |      |      |
|---|------------------|--------------------------------------|------|------|------|------|------|------|------|------|------|------|
| Structure Type  | Line Voltage     | Distance from Project ROW Centerline |      |      |      |      |      |      |      |      |      |      |
|   |                  | -300                                 | -200 | -100 | -50  | -25  | 0    | 25   | 50   | 100  | 200  | 300  |
| Project: 500 kV Guyed-Delta<br>Existing: 115 kV H-Frame   | 550 kV<br>127 kV | 43.3                                 | 45.2 | 47.9 | 49.7 | 50.3 | 50.5 | 50.3 | 49.7 | 47.9 | 45.2 | 43.3 |
| Project: 500 kV Guyed-V<br>Existing: 115 kV H-Frame   | 550 kV<br>127 kV | 42.2                                 | 44.1 | 47.2 | 49.1 | 49.8 | 50.1 | 49.8 | 49.1 | 47.2 | 44.2 | 42.2 |
| Project: 500 kV Self-Supporting<br>Existing: 115 kV H-Frame   | 550 kV<br>127 kV | 42.2                                 | 44.1 | 47.2 | 49.1 | 49.8 | 50.1 | 49.8 | 49.1 | 47.2 | 44.2 | 42.2 |

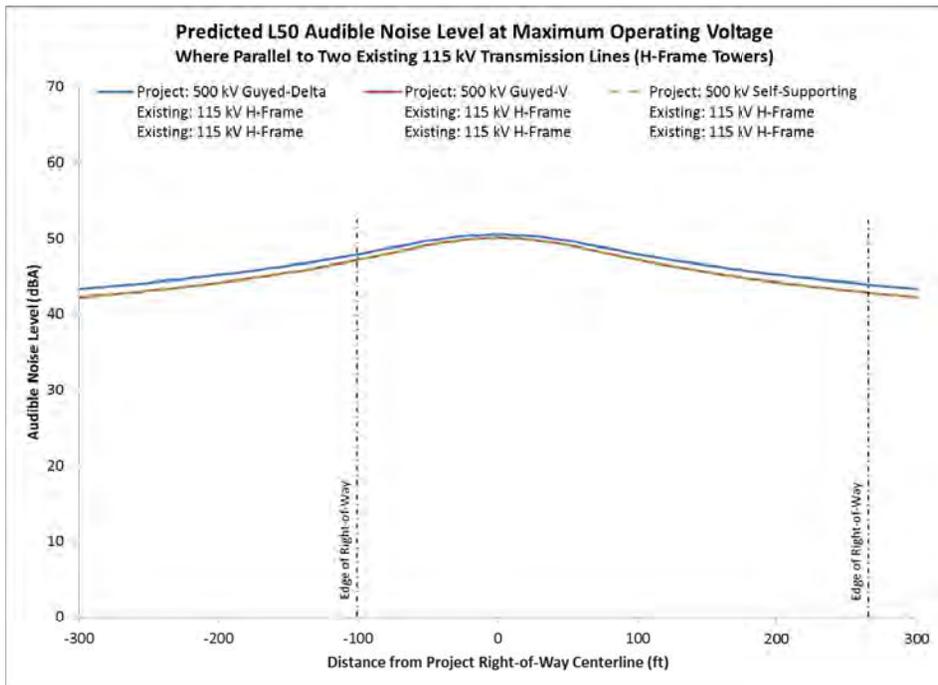


[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Audible Noise Simulation Results**

0190-28 cont'd  
Continued

| Predicted L50 Audible Noise Level (dBA) at Maximum Operating Voltage<br>Where Parallel to Two Existing 115 kV Transmission Lines (H-Frame Towers) |              |                                      |      |      |      |      |      |      |      |      |      |      |
|---|--------------|--------------------------------------|------|------|------|------|------|------|------|------|------|------|
| Structure Type  | Line Voltage | Distance from Project ROW Centerline |      |      |      |      |      |      |      |      |      |      |
|   |              | -300                                 | -200 | -100 | -50  | -25  | 0    | 25   | 50   | 100  | 200  | 300  |
| Project: 500 kV Guyed-Delta   | 550 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Existing: 115 kV H-Frame  | 127 kV       | 43.3                                 | 45.2 | 47.9 | 49.7 | 50.3 | 50.5 | 50.3 | 49.7 | 47.9 | 45.2 | 43.3 |
| Existing: 115 kV H-Frame  | 127 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Project: 500 kV Guyed-V   | 550 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Existing: 115 kV H-Frame  | 127 kV       | 42.2                                 | 44.1 | 47.2 | 49.1 | 49.8 | 50.1 | 49.8 | 49.1 | 47.2 | 44.2 | 42.2 |
| Existing: 115 kV H-Frame  | 127 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Project: 500 kV Self-Supporting   | 550 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Existing: 115 kV H-Frame  | 127 kV       | 42.2                                 | 44.1 | 47.2 | 49.1 | 49.8 | 50.1 | 49.8 | 49.1 | 47.2 | 44.2 | 42.2 |
| Existing: 115 kV H-Frame  | 127 kV       |                                      |      |      |      |      |      |      |      |      |      |      |



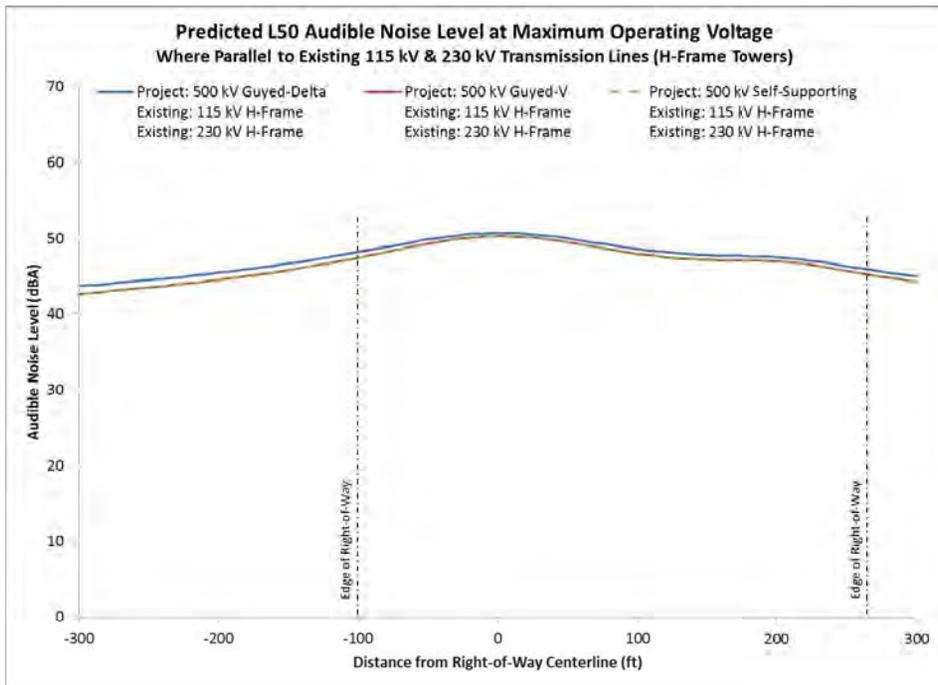
[Simulation assumes that Project ROW is adjacent to existing line ROW]

**Audible Noise Simulation Results**

0190-28 cont'd

0190-28  
Continued

| Predicted L50 Audible Noise Level (dBA) at Maximum Operating Voltage<br>Where Parallel to Existing 115 kV & 230 kV Transmission Lines (H-Frame Towers) |              |                                      |      |      |      |      |      |      |      |      |      |      |
|--|--------------|--------------------------------------|------|------|------|------|------|------|------|------|------|------|
| Structure Type   | Line Voltage | Distance from Project ROW Centerline |      |      |      |      |      |      |      |      |      |      |
|  |              | -300                                 | -200 | -100 | -50  | -25  | 0    | 25   | 50   | 100  | 200  | 300  |
| Project: 500 kV Guyed-Delta  | 550 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Existing: 115 kV H-Frame   | 127 kV       | 43.7                                 | 45.5 | 48.2 | 49.9 | 50.5 | 50.7 | 50.5 | 50.0 | 48.6 | 47.5 | 45.0 |
| Existing: 230 kV H-Frame   | 253 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Project: 500 kV Guyed-V  | 550 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Existing: 115 kV H-Frame   | 127 kV       | 42.6                                 | 44.5 | 47.4 | 49.3 | 50.0 | 50.3 | 50.1 | 49.5 | 47.9 | 47.0 | 44.3 |
| Existing: 230 kV H-Frame   | 253 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Project: 500 kV Self-Supporting  | 550 kV       |                                      |      |      |      |      |      |      |      |      |      |      |
| Existing: 115 kV H-Frame   | 127 kV       | 42.6                                 | 44.5 | 47.4 | 49.3 | 50.0 | 50.3 | 50.1 | 49.5 | 47.9 | 47.0 | 44.3 |
| Existing: 230 kV H-Frame   | 253 kV       |                                      |      |      |      |      |      |      |      |      |      |      |



[Simulation assumes that Project ROW is adjacent to existing line ROW]



## MEMORANDUM

---

DATE: April 6, 2015

---

To: Julie Smith, DOE  
Bill Storm, DOC

---

C: Cheryl Feigum, Barr

---

FROM: Lydia Nelson

---

SUBJECT: Jim Atkinson & David Moeller

---

Response to Request for Information (RFI) – Substation Noise

---

0190-29  
Appendix H and Table 5-5 of the EIS are updated with the analysis provided by the Applicant.

### Substation Noise

Following is a response to RFI dated 2/27/15

#### Request:

Does MN power now know or have an idea of the equipment that would be installed [at the Iron Range Substation]? Or typical equipment? A preliminary look at the range of noise emission related to such equipment and that expected at the station is helpful in the draft document.

#### Response:

As noted in the Application, the dominant noise sources at substations are power transformers. Devices similar to transformers, such as transmission-level reactors, also generate similar levels of audible noise. At the time the Application was written, the exact size, number, and location of Project transformers and other substation equipment had not yet been determined by electrical design optimization studies. Therefore, it was not appropriate at that time to provide a substation audible noise analysis.

Since the Application was submitted in April 2014, electrical design optimization studies have concluded, recommendations have been provided, and engineering is proceeding based on the recommended size and number of Project transformers and other substation equipment from the electrical studies. Based on these recommendations, Minnesota Power anticipates that the predominant noise emitters from the Iron Range 500/230 kV Substation will include a single 1200 MVA 500/230 kV transformer bank and two 150 MVA 500 kV shunt reactors. The 500/230 kV transformer bank will consist of three single phase 400 MVA transformers and a spare phase of the same size that will not normally carry load. At this time, a final general arrangement and site plan for the Iron Range 500/230 kV Substation is not available, so the exact location of the transformer and reactor banks has not yet been determined. Given the limited information available at this time, it is still not appropriate to provide a detailed substation audible noise assessment. However, Minnesota Power provides the following simplified and conservative substation noise assessment, based on the best available information at this time:

The four transformers were modeled as a single point source at their estimated position on the property, approximately midpoint in the substation based on the preliminary site plan shown in Figure 1. A single point source was modeled for the two reactors at their estimated position, at the northern fence line in the substation based on the preliminary site plan shown in Figure 1. The site plan shown in Figure 1 is the best information available at this time about the substation arrangement and location on the property, but is subject to change based on several site-specific engineering factors. Transformer noise levels were calculated using the Electric Power Plant Environmental Noise Guide (EPPENG). These values were compared to feedback received directly from transformer manufacturers for a transformer of comparable size and design characteristics and were found to be higher. The decision to use the higher transformer noise levels from the EPPENG provides a more conservative analysis. Reactor noise levels were estimated using the National



MEMORANDUM

0190-29 cont'd

0190-29  
Continued

Electrical Manufacturer's Association (NEMA) Standard TR1 Table 0-2, which provides guidance to manufacturers pertaining to the maximum allowable noise level that equipment must be designed to operate within. Other noise sources in the area, such as wind and traffic, and obstacles in the propagation path, such as fencing, other equipment and firewalls, were ignored.

The two nearest residences were considered for the analysis, as shown in Figure 2.

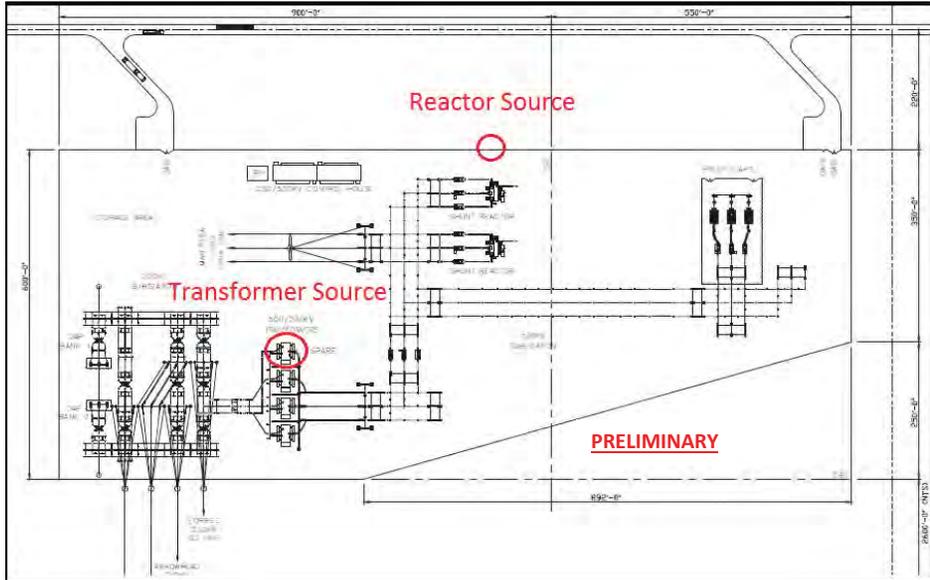


Figure 1: Point Source Locations



Figure 2: Noise Receptors

MEMORANDUM

0190-29 cont'd

The calculated project-related noise levels for the two receptor locations shown in Figure 2 are given in Tables 1 and 2.

0190-29  
 Continued

**Table 1: Calculated Noise Levels for Northern Receptor**

| Range of noise emissions from the transformers (SPL @ 3ft, dBA) |    | Noise emissions from the reactors (SPL @ 6ft., dBA) | Transformers at 1,120 ft. (dBA) | Reactors at 1,155 ft. (dBA) | Overall SPL at the residence immediately North of the substation (dBA) |
|---|----|---|---------------------------------|-----------------------------|--|
| Low   | 82 | 90  | 30                              | 44                          | 44   |
| High  | 92 | 90  | 40                              | 44                          | 46   |

**Table 2: Calculated Noise Levels for Northeastern Receptor**

| Range of noise emissions from the transformers (SPL @ 3ft., dBA) |    | Noise emissions from the reactors (SPL @ 6ft., dBA) | Transformers at 1,700 ft. (dBA) | Reactors at 1,100 ft. (dBA) | Overall SPL at the residence Northeast of the substation (dBA) |
|--|----|---|---------------------------------|-----------------------------|--|
| Low  | 82 | 90  | 27                              | 45                          | 45   |
| High   | 92 | 90  | 37                              | 45                          | 45   |

Analysis results show that the calculated noise levels are expected to comply with the Minnesota Pollution Control Agency (MPCA) 50 dBA nighttime limit at both of the receptor locations based on the assumptions used to perform this assessment. As noted, this is a simplified assessment based on the dominant noise sources in the Iron Range 500/230 kV Substation and neglecting other noise influences in the area. If the size of the equipment or the general arrangement and site plan for the Iron Range 500/230 kV Substation vary from the assumptions used to calculate the noise levels discussed above, the noise impact of the substation on the surrounding environment, including the noise receptors analyzed in this assessment, will change.



**COPY**

Justice  
Legal Services Branch  
Civil Law Division  
Room 730 Woodsworth Building  
405 Broadway  
Winnipeg MB R3C 3L6

In reply, please refer to:  
**Gord Hannon**  
General Counsel

Phone: (204) 945-0242  
Fax: (204) 948-2244  
Gord.Hannon@gov.mb.ca  
File No: NR04D0 (429)

June 2, 2015

Administrative Law Judge Ann O'Reilly  
Office of Administrative Hearings  
600 N. Robert Street  
St. Paul, MN 55164

**RECEIVED**  
JUN 04 2015  
MINNESOTA PUBLIC  
UTILITIES COMMISSION

Dear Madam:

**Re:** Canadian and Provincial Permitting of the Manitoba Minnesota  
Transmission Project  
OAH Docket No. 65-2500-31367  
MPUC Docket No. E-015/TL-14-21

Please find enclosed Manitoba Justice's comments to the Minnesota Public Utilities Commission E-Docket Number E-015/TL-14-21, in the Matter of the Application of Minnesota Power for a Route Permit for the Great Northern Transmission Line Project in Roseau, Lake of the Woods, Beltrami, Koochiching and Itasca Counties. Please include our comments in the above-referenced record.

Yours truly,

Gordon E. Hannon  
General Counsel

c. Dan Wolf, Executive Secretary, Minnesota Public Utilities Commission ✓



**Justice**

Legal Services Branch  
Civil Law Division  
Room 730 Woodsworth Building  
405 Broadway  
Winnipeg MB R3C 3L6

In reply, please refer to:  
**Gord Hannon**  
**General Counsel**

Phone: (204) 945-0242  
Fax: (204) 948-2244  
[Gord.Hannon@gov.mb.ca](mailto:Gord.Hannon@gov.mb.ca)  
File No: NR04D0 (429)

June 2, 2015

Administrative Law Judge Ann O'Reilly  
Office of Administrative Hearings  
600 N. Robert Street  
St. Paul, MN 55164

Dear Madam:

**Re:** Canadian and Provincial Permitting of the Manitoba Minnesota  
Transmission Project  
OAH Docket No. 65-2500-31367  
MPUC Docket No. E-015/TL-14-21

---

Through representatives of Manitoba Hydro, representatives of the Government of Manitoba have been informed of regulatory developments regarding Minnesota Power's application for a route permit that would allow the construction of the Great Northern Transmission Line, the United States portion of a proposed new International Power Line ("IPL"), that would connect with the Manitoba Minnesota Transmission Project ("the Project") at the Canada-United States Border.

On behalf of the Government of Manitoba, this letter is being submitted for filing on the public record and to inform the Administrative Law Judge, Minnesota Department of Commerce – Energy Environmental Review and Analysis Division and Minnesota Public Utilities Commission about these issues:

- (I) Canadian federal and Manitoba provincial legal regime and regulatory processes for authorizing an International Transmission Line;
- (II) an overview of the regulatory processes in Canada to date;
- (III) the required steps to complete the regulatory processes in Canada; and
- (IV) coordination with United States and Minnesota regulatory processes.

As a representative of the Government of Manitoba we can advise particularly of the Manitoba Government understanding of Manitoba provincial regulatory processes. However, the federal National Energy Board ("the NEB") has Canadian federal regulatory responsibilities under federal law because of the international nature of the

IPL. Manitoba is working with the NEB to coordinate the provincial and federal regulatory processes.

**I. Canadian Federal and Provincial Legal Regime and Regulatory Processes for Authorizing an International Transmission Line**

**A. Overview**

Under Canada's *Constitution Act, 1867*, laws in relation to international power lines are matters of exclusive federal jurisdiction. This jurisdiction has been exercised by the enactment by Canadian Parliament of the *National Energy Board Act* and the provisions of the *Canadian Environmental Assessment Act, 2012* relating to IPLs.

Provincial legislation applies to the use and allocation of Crown (public) land in Manitoba for the line in Manitoba.

Generally, intra-provincial power transmission lines are subject to environmental assessment and licensing under *The Environment Act* of Manitoba. *The Environment Act* provides a regime of environmental assessment and licensing of projects or developments of defined classes. Transmission lines greater than 230 kV are considered Class 3 developments under the Classes of Development Regulation made under *The Environment Act* and are thus subject to the highest level of environmental assessment under Manitoba legislation. All documents filed in the environmental assessment process are filed on a public registry. The Environmental Impact Statement is open to public comments which are considered in the decision-making process.

Federal legislation allows for the involvement of provincial authorities and processes, including the assessment of the environmental impacts of IPLs, under certain circumstances. A common feature of both federal and provincial environmental review processes is the requirement for an applicant to conduct a public engagement program ("PEP") regarding the project, including the proposed route of an IPL, and its potential socio-economic and environmental impacts as part of its environmental assessment of the project prior to filing an application for licenses and authorizations.

The regulatory practice in Manitoba is that government authorities do not formally engage in public consultations about projects of this type. Government decision makers do not generally engage directly in public consultation: public input is provided through the proponent's public engagement program and through comments on the public registry. In some cases, however, a public hearing may be commissioned by the minister of Conservation and Water Stewardship before the Clean Environment Commission, for the Commission to provide advice to decision makers respecting a proposed development.

The Government of Manitoba engages directly in consultations with Aboriginal peoples about potential adverse effects of the project on the exercise of Aboriginal or treaty rights recognized pursuant to section 35 of the *Constitution Act, 1982*.

**B. Canadian Federal law**

**1. *National Energy Board Act, R.S.C., 1985, c. N-7***

The responsibility for regulating the construction and operation of IPLs rests with the National Energy Board of Canada pursuant to the *National Energy Board Act, R.S.C., 1985, c. N-7*. In accordance with Section 58.1 of the *National Energy Board Act*, authorization is required to construct or operate an IPL. The National Energy Board Electricity Regulations, SOR/97-130 set out a comprehensive list of information requirements for inclusion in an application to be filed with the NEB for an authorization of an IPL. The NEB Electricity Filing Manual provides additional extensive detail and guidance on the expectations for the content of an application. Both the regulations and the Filing Manual identify the need for an application to contain: an identification of a single proposed route and border crossing point for the IPL; an environmental and socio-economic assessment of the IPL; and a description of the Public Engagement Program that has been undertaken by the applicant. Upon the filing of an application, the NEB's authority is limited under Section 58.11 of the Act to either issuing a permit authorizing the IPL or recommending and issuing a certificate for the IPL. There is no authority for NEB to determine an alternate route for an IPL.

Notwithstanding federal jurisdiction over IPLs, Sections 58.17 and 58.2 of the Act allow for the application of provincial laws to certain matters relating to IPLs, including environmental assessment, where an Order in Council is issued by the government of the province where the IPL is located. While the NEB allows for a provincial environmental review process, and while the NEB is also under a duty to seek to avoid the duplication of measures undertaken by a province in respect of an IPL, the NEB is prohibited from delegating its decision-making authority regarding the environmental impacts of an IPL under federal environmental legislation, as discussed below.

**2. *Canadian Environmental Assessment Act, 2012, S.C. 2012, c. 19, s. 52***

The construction, operation and decommissioning of a new electrical transmission line with a voltage of 345 kV or more and requiring 75 km or more of new right of way in totality is considered a Designated Project pursuant s. 39 of the Schedule to the *Regulation Designating Physical Activities* SOR/2012-147 under the *Canadian Environmental Assessment Act, 2012, S.C. 2012, c. 19, s. 52 (CEAA, 2012)*.

Pursuant to paragraph 15(b) of *CEAA, 2012*, the NEB is a "Responsible Authority" for a "Designated Project" regulated under the *National Energy Board Act*. As part of its responsibilities, the NEB must ensure that an environmental assessment has been performed by the applicant pursuant to *CEAA, 2012* and must determine whether the IPL is likely to cause significant adverse environmental effects.

C. Provincial law

1. ***The Crown Corporations Public Review and Accountability Act, C.C.S.M. c. P336 and The Public Utilities Board Act, C.C.S.M. c. P280***

The Public Utilities Board of Manitoba ("the PUB") has jurisdiction over Manitoba Hydro's retail electricity rates in accordance with Section 26 of *The Crown Corporations Public Review and Accountability Act* and *The Public Utilities Board Act*. Although the PUB does not have the specific authority to review Manitoba Hydro's capital projects, the PUB can be assigned additional duties by order of the Lieutenant Governor in Council.

Manitoba Order in Council 128/2013 was issued on April 17, 2013 under the authority of section 107 of *The Public Utilities Board Act* requiring a panel of the Public Utilities Board of Manitoba to conduct a "Needs For and Alternatives To" ("NFAT") review of Manitoba Hydro's preferred development plan, including the construction of a new 500 kV IPL and to make a recommendation to the Government of Manitoba as to whether construction of the new IPL should go forward.

2. ***The Environment Act, C.C.S.M. c. E125***

The construction of electrical transmission lines greater than 230 kV and associated facilities is considered a Class 3 Development pursuant to the Classes of Development Regulation M.R. 164/88, made under *The Environment Act* and is subject to licensing under Section 12 of *The Environment Act*. The Licensing Procedures Regulation, M.R. 163/88 made under the Act outlines the process to be used and the information requirements for proposals under the Act. Subsection 1(1) of this Regulation requires the submission of a proposal that contains the location of the proposed development and a description of the environmental and socio-economic impacts of the development. A full, detailed assessment of the impacts for the proposed development is limited to the single proposed route and associated infrastructure. While alternative routes are included in the proposal, they are included only for comparison purposes to demonstrate why the single proposed route was selected. The proposal will not include detailed environmental or social-economic impacts of these alternatives. Should the proposed route be rejected in this process, an alternative route is not chosen by the regulator.

*The Environment Act* process includes an opportunity for public comments through a public registry maintained by Manitoba Conservation and Water Stewardship

3. ***The Crown Lands Act, C.C.S.M. c. C.340***

Publicly-owned lands in Canada are considered to be "Crown lands", administered and controlled on behalf of the Crown. Under Canada's constitution Crown lands are generally administered and controlled by the provinces. The use and allocation of Crown

lands in Manitoba is governed by *The Crown Lands Act*. That Act provides the legislative authority for the provincial government to allocate or grant rights in provincial Crown land in Manitoba. Authorizations for the use of any Crown land for the IPL in Manitoba will be required to be granted under *The Crown Lands Act*.

#### **4. The *Constitution Act, 1982* and Consultation by the Government with Aboriginal Peoples**

Subsections 35(1) and (2) of the *Constitution Act, 1982* state:

##### Recognition of existing aboriginal and treaty rights

35. (1) The existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed.

##### Definition of "aboriginal peoples of Canada"

(2) In this Act, "aboriginal peoples of Canada" includes the Indian, Inuit and Métis peoples of Canada.

The *Constitution Act, 1982* is part of the constitution of Canada and applies to federal and provincial government action. In accordance with governing case law interpreting s. 35, including leading Supreme Court of Canada cases *Haida Nation v. British Columbia (Minister of Forests)*, [2004] 3 S.C.R. 511, 2004 SCC 73 and *Mikisew Cree First Nation v. Canada (Minister of Canadian Heritage)* [2005] 3 S.C.R. 388, 2005 SCC 69, it is settled law in Canada that the Crown (federal and provincial governments within the scope of their responsibilities) has a duty to consult with Aboriginal peoples about any decision or action that might affect the exercise of Aboriginal rights or treaty rights of the Aboriginal peoples and to attempt in good faith to address or accommodate concerns expressed by the Aboriginal peoples about those effects before making the decision or taking the action.

The Government of Manitoba has developed an Interim Provincial Policy for Crown Consultation with First Nations, Métis Communities and Other Aboriginal Communities as a general statement of the approach of the Government to meeting its duty of consultation with Aboriginal peoples. The Government is committed to completing consultation processes with potentially-affected Aboriginal communities. In order to determine the communities potentially affected an initial assessment of the consultation requirements is undertaken by the Government based on the route of the proposed project. Consultation is being planned based on the identified proposed route in Manitoba.

#### **II. An Overview of the Regulatory Processes to Date**

The need for and justification for the Project has already been confirmed by the Public Utilities Board of Manitoba as a result of the NFAT review process conducted between June 2013 and May 2014. The PUB issued a final report to the Manitoba Government

on the NFAT process in June 2014. The NFAT review process commenced with the filing of Manitoba Hydro's proposal and rationale, followed by two rounds of written information requests, the filing of evidence by interveners, one further round of information requests, and finally a hearing held from March 3 to May 26, 2014. The NFAT review included the appointment of independent expert consultants to examine Manitoba Hydro's plans. Those experts filed reports on their findings and testified at the NFAT hearing.

The PUB final report recommended that Manitoba Hydro be given approval to proceed with the construction of the proposed 500 kV Manitoba Minnesota transmission line. On December 10, 2014, Order in Council 545/2014 was issued by the Government of Manitoba under *The Manitoba Hydro Act* authorizing Manitoba Hydro to proceed with all actions necessary to construct and operate the new transmission line.

Manitoba Order in Council No. 00386/2013 has also been issued under the authority of the *National Energy Board Act* designating the Manitoba Minister of Conservation and Water Stewardship as the provincial regulatory agency for the proposed IPL. This allows for the provincial environmental assessment and licensing process under *The Environment Act* to apply to the portion of the line in Manitoba.

It is our understanding that Manitoba Hydro has considered several different alternative routes for the Project over the last few years and conducted a Public Engagement Process that included consideration of these alternative routes. Based upon the outcome of that Public Engagement Process and a detailed route selection process conducted with the assistance of several external consultants, Manitoba Hydro has selected a specific proposed route. That route ends at a border crossing that was determined after several months of analysis and in-depth discussion with Minnesota Power. The crossing selected was considered to be in the best interests of the overall project and acceptable to both parties.

It is our understanding that Manitoba Hydro will be filing an application with the NEB for approval of a specific final preferred route with an identified associated border crossing, consistent with Canadian legal requirements.

We understand that three pre-application meetings have been held with the NEB providing information regarding the scope of the Project and the intended authorizations that will be sought once the application is filed. As described below, the NEB was also provided with Manitoba Hydro's draft Scoping Document.

Several meetings have also been held with representatives of Manitoba Conservation and Water Stewardship with respect to scope of environmental assessment, including the Public Engagement Program. On November 21, 2014, Manitoba Hydro filed an Environment Act Proposal with MCWS for a Class 3 Development under subsections 12(1) and 12(3) of *The Environment Act*, and provided a draft Scoping Document that outlines the proposed contents of an Environmental Impact Statement (EIS) for the Manitoba-Minnesota Transmission Project that describes the various environmental

components that will be studied. Included in that draft Scoping Document was a map of the final preferred route that identified the selected border crossing.

Pursuant to subsection 12(4) of *The Environment Act*, MCWS posted the filed documents on a public registry, and provided an opportunity for public/stakeholder comment until February 25, 2015. The public registry is available on-line at: <http://www.gov.mb.ca/conservation/eal/registries/5750mbhydrombminnesota/index.html>

Also pursuant to subsection 12(4) of *The Environment Act*, the Proposal was provided for analysis to the Technical Advisory Committee (TAC), made up of experts from several different provincial departments, including the wildlife branch, heritage branch, and fisheries branch, of the preferred route and associated border crossing. Comments from various departments have already been received.

### III. The Required Steps to Complete the Regulatory Processes in Canada

It is anticipated that the current round of public engagement by Manitoba Hydro will be completed by summer 2015 and Manitoba Hydro will file its Environmental Impact Statement with Manitoba Conservation and Water Stewardship shortly after that pursuant to subsection 12(5) of *The Environment Act*.

An application will subsequently be filed with NEB. The NEB application and the EIS filed under the Environment Act will both seek approval for the single proposed route and the selected border crossing.

Public notification of the NEB application will be made and an opportunity for interested parties to file written comments with NEB will be specified in the notice. Manitoba Hydro will then have an opportunity to file written responses to any comments.

Once the EIS is filed, MCWS, coordinating with the NEB, will then begin its assessment of the Project and the EIS in accordance with subsection 12(5) of *The Environment Act*. Public consultations conducted by Manitoba Hydro are taken into consideration by MCWS when conducting its assessment. A public hearing before the Manitoba Clean Environment Commission may also be ordered under clause 12(5)(e) and subsection 12(6) of that Act. The NEB also has jurisdiction to order a public hearing under section 24 of the *National Energy Board Act*. As such, there could possibly be a joint public hearing or two separate hearings.

The provincial Technical Advisory Committee also conducts an extensive review of submitted EIS documents and provides written information requests to Manitoba Hydro that must be satisfied as part of the process. This may be done in advance of the public hearing or concurrently. Again, that review is based upon the single proposed route and selected border crossing.

Independent of the environmental assessment process, including any public hearings is the Crown consultation process with Aboriginal communities referred to above. The

consultations will involve consideration of the single proposed route and selected border crossing.

**IV. Coordination with United States and Minnesota Regulatory Processes**

It is our understanding from Manitoba Hydro that the Minnesota Department of Commerce – Energy Environmental Review and Analysis Division and Minnesota Public Utilities Commission have issued an environmental scoping document that includes multiple alternative border crossings in addition to the border crossing associated with the Preferred Route. It is further our understanding that these additional border crossings are not included in Minnesota Power’s application for a Presidential Permit.

Any decision by the Minnesota Department of Commerce, Energy Environmental Review and Analysis Division, or Minnesota Public Utilities Commission that would require a border crossing other than the selected border crossing included in the Canadian, Provincial and Presidential Permit review process will require the filing of new or amended applications containing a different proposed route. Manitoba Hydro advises that the filing of new or amended proposals with MCWS, or a new or amended application to the NEB, would require significant new studies to address the change in route to a different border crossing as part of the regulatory process in Canada. Manitoba Hydro also advises that it would be very unlikely that the necessary studies and the regulatory process would be completed in time to meet the proposed 2020 in-service date. As the agreements between Manitoba Hydro and Minnesota Power require a 2020 in-service date, the project may therefore be jeopardized.

Yours truly,



Gordon E. Hannon  
General Counsel

c. Dan Wolf, Executive Secretary, Minnesota Public Utilities Commission

0190-30

Section 1.3.2 is updated with information about the status of the Canadian process for siting this project in Canada by Manitoba Hydro as provided by comment letter submitted by both the Province of Manitoba's General Counsel (see response to comment 078-1).

0190-30

**Appendix A – Links to legislation and key documents referred to in letter**

Order in Council 00128/2013 for Manitoba Public Utilities Board NFAT Review:  
<http://oic.gov.mb.ca/OICDocs/2013/04/Healthy%20Living,%20Seniors%20&%20Consumer%20Affairs.130417.Public%20Utilities%20Board%20Act.1282013.pdf>

Terms of Reference for Manitoba Public Utilities Board NFAT Review:  
<http://www.pub.gov.mb.ca/pdf/nfat/TermsOfReference-Ap25.pdf>

Interim Provincial Policy for Crown Consultation with First Nations, Métis Communities and Other Aboriginal Communities:  
[http://www.gov.mb.ca/ana/pdf/pubs/interim\\_aboriginal\\_consultation\\_policy\\_and\\_guidelines.pdf](http://www.gov.mb.ca/ana/pdf/pubs/interim_aboriginal_consultation_policy_and_guidelines.pdf)

*National Energy Board Act* (Canada)  
<http://laws-lois.justice.gc.ca/eng/acts/N-7/FullText.html>

National Energy Board Electricity Regulations  
<http://laws-lois.justice.gc.ca/eng/regulations/SOR-97-130/index.html>

*Canadian Environmental Assessment Act, 2012* (Canada)  
<http://laws-lois.justice.gc.ca/eng/acts/C-15.21/index.html>

*The Environment Act* (Manitoba)  
<http://web2.gov.mb.ca/laws/statutes/ccsm/e125e.php>

Classes of Development Regulation  
[http://web2.gov.mb.ca/laws/regs/current/\\_pdf-regs.php?reg=164/88](http://web2.gov.mb.ca/laws/regs/current/_pdf-regs.php?reg=164/88)

*The Public Utilities Board Act* (Manitoba)  
<http://web2.gov.mb.ca/laws/statutes/ccsm/p280e.php>

*The Crown Lands Act* (Manitoba)  
<http://web2.gov.mb.ca/laws/statutes/ccsm/c340e.php>

Order in Council 545/2014, authorizing Transmission Line  
<http://oic.gov.mb.ca/OICDocs/2014/12/Manitoba%20Hydro.141210.Manitoba%20Hydro%20Act.5452014.pdf>

Order in Council 00386/2013  
<http://oic.gov.mb.ca/OICDocs/2013/11/Conservation%20&%20Water%20Stewardship.131106.National%20Energy%20Board%20Act.3862013.pdf>



PO Box 7950 Stn Main • Winnipeg, Manitoba Canada • R3C 0J1  
(204) 360-4394 • sjohnson@hydro.mb.ca

July 30, 2015

Mr. William Cole Storm  
Environmental Review Manager  
Minnesota Department of Commerce  
85 7th Place East, Suite 500  
St. Paul, Minnesota, 55101

Dear Mr. Storm:

**RE: Great Northern Transmission Line Border Crossing**

As you are aware, Manitoba Hydro is the Proponent for the Canadian portion of the 500 kV transmission project known in Canada as the 'Manitoba-Minnesota Transmission Project,' and in the U.S. as the Great Northern Transmission Line (Project). We recently reviewed the Draft Environmental Impact Statement (EIS) (June 19, 2015), submitted by the Minnesota Department of Commerce - Energy Environmental Review and Analysis Staff and U.S. Department of Energy.

The Draft EIS identifies a number of border crossing variations that are under consideration. Manitoba Hydro would like to provide the following comments regarding selection of the border crossing:

1. Manitoba Hydro can only support the agreed-upon border crossing located at Lat. 49 00 00.00N; Long. 95 54 50.49W; known as the Proposed Border Crossing - Blue/Orange Route in the Draft EIS and noted as the MH Preferred Border Crossing and shown as a light blue area on the attached map.

Manitoba Hydro completed a robust, transparent comparative analysis of routes and all potential border crossings using a process based on the EPRI-GTC Overhead Electric Transmission Line Siting Methodology. This process:

- Evaluated numerous social, technical and environmental factors, similar to those criteria identified in the Minnesota Public Utilities Commission routing and siting regulations (such as land use, human settlement, agriculture, forestry, cultural and historic resources, wildlife, rare species, water resources, noise, air quality, health and safety, engineering constraints, etc.);
- Incorporated routing preferences (that is, a weighting of the routing criteria) based on discussions with internal and external stakeholders; and
- Used this data to identify and rank potential border crossings and routes.

Using this methodology, Manitoba Hydro determined that Piney East Border crossing (MH Former Border Crossing shown in light grey on the attached map) which encompassed Border Crossing Hwy 310 Variation, was not a feasible border crossing for a variety of compelling reasons. These included, but were not limited to, the fact that routes to this crossing traverse areas of high biological diversity that had been noted by government agencies and environmental

0190-31

Section 1.3.2 is updated with information about the status of the Canadian process for siting this project in Canada by Manitoba Hydro as provided by comment letter submitted by Manitoba Hydro (see response to comments 079-1 and 079-2).

0190-31

0190-31 0190-31 cont'd  
Continued

non-government organizations. Furthermore, this area is primarily composed of Crown (public) lands, which support traditional Aboriginal use and First Nations noted significant concerns in regards to route alternatives in this area. Border Crossing 500 kV Variation and the Border Crossing 230 kV Variation were outside of the agreed upon Border crossing and thus were not analyzed but would pose many of the same challenges.

Based on our environmental analysis and public, First Nations and Métis engagement processes, in consultation with Minnesota Power, the Proposed Border Crossing - Blue/Orange Route was selected as the preferred end point for each entity. While other border crossings were favored by each entity, the Proposed Border Crossing – Blue/Orange route was jointly selected because it balances environmental, technical, and stakeholder impacts on both sides of the border.

The preferred route and border crossing were presented as part of a third round of our engagement processes earlier this year. With the feedback received and through the environmental review work being undertaken, Manitoba Hydro determined the final placement of the transmission line and will submit an environmental impact statement to Manitoba Conservation and Water Stewardship. An application will also be filed with the National Energy Board in September. Manitoba Hydro **does not** have routes that connect to the border crossing variations included in the Draft EIS. Our application will only include the Proposed Border Crossing - Blue/Orange Route location developed and agreed upon by Manitoba Hydro and Minnesota Power.

Manitoba Hydro and Minnesota Power have made a business commitment to have the Project in service by June 2020. Selection of a border crossing location that does not align with our border crossing and route jeopardizes this commitment and the Project.

Should you have any questions or require further clarification please do not hesitate to contact me at 204-360-4394.

Regards,

*Original signed by Shannon Johnson*

Shannon Johnson  
Manager  
Licensing and Environmental Assessment Department  
Manitoba Hydro  
820 Taylor Ave (3)  
Winnipeg, Manitoba  
R3M 3T1

Attachments: 1

Cc: Julie Ann Smith, PhD, Federal Document Manager  
DOE Office of Electricity Delivery and Energy Reliability  
1000 Independence Avenue SW  
Washington, DC, 20585



| DEIS Chapter | Section | Page # | Paragraph, Figure or Table # | Comment  |
|--------------|---------|--------|------------------------------|--|
| 1            | 1.3.1.1 | 6      |                              | Does not address Minn. Stat. 216E.02, subd. 3 (cooperation on interstate routes) AND Does not address Minn. Stat. 216E.03, subd. 7(b)(12) issues raised by local entities (such as Roseau County) only addresses issues raised by DNR and USFWS.   |
| 1            | 1.3.2   | 9      |                              | Minnesota Public Utilities Commission – 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 MN PUC granted a Certificate of Need for the GNTL Project on June 30, 2015. This statement should be updated throughout the EIS.   |
| 1            | 1.4.3   | 12     |                              | The description of USFWS’s role as a cooperating agency is too limited. The DEIS states that “USFWS will also coordinate any special use permit if ROW access is requested and granted on USFWS interest properties.” This doesn’t mention the fact that ROW access would be requested from, and granted by, USFWS. That should be listed as one of USFWS’s primary roles as a cooperating agency.   |
| 2            | 2.1     | 15     |                              | “The new 500 kV substation required for the proposed Project would be expected to permanently impact approximately 17.8 acres.” Approximately 23 acres anticipated at this time with preliminary engineering, may deviate during detailed engineering. The DEIS references both 17.8 and 17.4 acres throughout.  |
| 2            | 2.1     | 15     |                              | “The series compensation station will permanently impact approximately 60 acres.” Approximately 6 acres anticipated at this time with preliminary engineering, may deviate during detailed engineering. Wetland investigations may dictate the layout and affect total size. Update throughout the document.   |
| 2            | 2.1     | 15     |                              | “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.” MP has provided its preferred series comp station site, which is located at approximately the midpoint between the Dorsey Substation (the endpoint of the Canadian project) and the Iron Range Substation (the endpoint of the Minnesota project). |
| 2            | 2.1     | 16     |                              | “The applicant proposes...” [x4] “Additional details of the proposed Project and construction methods are provided in Section 2.7 through 2.11.” Add a new sentence: “The Applicant notes that the details of construction methods are subject to change based on field surveys and numerous other factors.”   |
| 2            | 2.2.2   | 20     |                              | “...a new 500 kV transmission line – which can carry a total of up to 883 MW of electric power...” The line itself will have higher capacity than that, as described elsewhere. It’s transfer capability on the Manitoba-U.S. interface that we’re after. To avoid confusion, suggest revising to say “...a new 500 kV transmission line – which can facilitate up to 883 MW of additional power transfers between Manitoba and the United States...”  |
| 2            | 2.2.2   | 20     |                              | “[The Applicant] operates transmission and distribution systems, including 8,866 miles of transmission lines...” Should say “...8,866 miles of transmission & distribution lines...”   |
| 2            | 2.2.3   | 21     |                              | “...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.” The ROA described here was approved in a MPUC written order dated January 30, 2015 (MPUC Docket No. E015/M-14-960).  |
| 2            | 2.6.2   | 28     |                              | Remove the following: “...and one-third of the overall transmission line distance from the Riel Substation to the Blackberry 500 kV Substation.” The endpoint is wrong (should be Dorsey not Riel) and this location is no longer under consideration. Also, two sentences earlier, change “Riel” to “Dorsey.”   |
| 2            | 2.8.1   | 30     |                              | “The proposed Project is designed to increase the total transfer capability between the U.S. and Manitoba by at least 750 MW.” While this is technically accurate, it is out-of-date. Suggest updating to say “...increase the total transfer capability between the U.S. and Manitoba by up to 883 MW.”   |

- 0190-32 Local entities that raised substantive issues during the Draft EIS comment period are addressed as part of the comment/response process.
- 0190-33 No changes are made to the EIS in response to this comment.
- 0190-34 0190-33 The text is updated in Section 1.3.2 of the EIS to state that the formal order from the MN PUC was issued on June 30, 2015.
- 0190-35
- 0190-36 0190-34 USFWS, a cooperating agency for this EIS, provided this information.
- 0190-37 No changes are made to the EIS in response to this comment.
- 0190-38 0190-35 The acreage is revised to 23 acres in Sections 2.1, 2.6.1, and 6.7.3.2 of the EIS.
- 0190-39 0190-36 This edit is made in Section 2.1 of the EIS.
- 0190-40 0190-37 These comments are incorporated in Chapter 2 of the EIS.
- 0190-41
- 0190-38 0190-42 The following sentence is incorporated into Section 2.1 of the EIS: “The Applicant notes that the details of construction methods are subject to change based on field surveys.”
- 0190-43
- 0190-39 0190-39 This comment is incorporated into Section 2.2.2 of the EIS.

0190-40

This comment is incorporated into Section 2.2.2 of the EIS.

0190-41

This comment is incorporated into Section 2.2.3 of the EIS.

0190-42

This comment is incorporated into Section 2.6.2 of the EIS.

0190-43

This comment is incorporated into Section 2.8.1 of the EIS.

|   |          |    |      |   |
|---|----------|----|------|---|
| 2 | 2.8.1    | 30 |      | Remove the following sentence: "The Applicant will supplement this information after completion of additional MISO system impact studies." Additional information filed with Chris Lawrence at DOE: see 11/19/2014 email from David Moeller.  |
| 2 | 2.9.4    | 33 |      | "...the Applicant has identified a candidate site for the compensation station..." This is MP's preferred site. Suggest replacing "candidate" with "preferred."   |
| 2 | 2.9.4    | 33 |      | "...located at the approximate midpoint of the Minnesota portion of the transmission line..." The midpoint of the Minnesota portion is very different from the overall midpoint between Winnipeg and the Iron Range. Please modify as follows: "...located at the approximate overall midpoint of the transmission line."   |
| 2 | 2.9.4    | 33 |      | "The Applicant would then seek to obtain purchase option agreements with the owners of the identified properties along the route selected by the MN PUC." MP has obtained an option on its preferred series comp station site. Suggest eliminating this paragraph and continuing the first paragraph with the following: "The Applicant has entered a purchase option agreement with the owner of the property for its preferred compensation station site. The purchase agreement would be executed upon receiving the necessary regulatory permits."                          |
| 2 | 2.9.5    | 34 |      | "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." To be accurate, change this language to the following: "Depending on further engineering analysis, the Applicant may seek purchase option agreements on some or all of these candidate sites. Once the final route has been selected by the MN PUC, the Applicant will execute the appropriate purchase agreements." |
| 2 | 2.11.7.6 | 37 |      | "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." This should read, "Where practical, equipment would not be refueled in wetlands. In addition, and where practical, no petroleum products, herbicides or pesticides of any kind should be mixed or poured or otherwise handled in wetland areas."  |
| 2 | 2.14     | 43 |      | "...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)." Minnesota Power has provided updated cost information. Should say "...would cost between \$558 million and \$710 million (2013 dollars)."  |
| 2 | 2.15     | 43 | 2-14 | This section should be amended to state that "...construction could begin as early as fall of 2016; however, the applicant currently anticipates a 2017 start."   |
| 3 |          |    | 3rd  | "...pending 133 MW Renewable Optimization Agreement." This ROA was approved in MPUC written order dated January 30, 2015 (MPUC Docket No. E015/M-14-960).   |
| 3 |          |    | last | It should be noted here that MN PUC has now granted a CoN for the Project.  |
| 4 | 4.3.1.3  |    |      | To be consistent with other parts of this chapter, the statement "a need to avoid USFWS land" should say "a need to consider avoiding USFWS" land.  |
| 4 | 4.3.2.5  |    |      | C2 was developed by Minnesota Power, not commenters.  |
| 4 | 4.3.2.6  |    |      | C2 was developed by Minnesota Power, not commenters.  |
| 4 | 4.3.3.2  |    |      | The East Bear Lake variation is supposed to mitigate Bear-Wolf Peatland impacts, but there are no boundaries of this peatland, so it's impossible to know if the alternative mitigates impacts. The EIS should acknowledge this fact.   |
| 5 | 5.2.1.1  | 78 |      | "...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 of the proposed Project." This statement should be removed. This is not a true statement for a 500 kV line where the cost and space requirements of turning structures are significantly greater than even a 230 kV line. This line will not weave its way around inside the route to avoid things.  |

- 0190-44 0190-44  
The text is updated in Section 2.8.1 of the EIS to identify the Applicant filed the required sensitivity studies and other reliability-related reports to DOE on July 24, 2014.
- 0190-45
- 0190-46 0190-45  
This comment is incorporated into Section 2.9.4 of the EIS.
- 0190-47 0190-46  
This comment is incorporated into Sections 2.1 and 2.9.4 of the EIS.
- 0190-48 0190-47  
This comment is incorporated into Section 2.9.4 of the EIS.
- 0190-49 0190-48  
This comment is incorporated into Section 2.9.5 of the EIS.
- 0190-50 0190-49  
Applicant's Route Permit Application states, "refueling will occur at sites away from wetlands and waters" on pages ES-22, ES-23, 6.17-27, and 6.18-12 and that "refueling of equipment in wetlands will not be permitted" on page 5-12.
- 0190-51
- 0190-52 Section 2.11.1.6 of the EIS now states, "As a BMP, 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."
- 0190-53
- 0190-54
- 0190-55
- 0190-56
- 0190-57
- 0190-58 0190-50  
This comment is incorporated into Section 2.14 of the EIS.
- 0190-51

This comment is incorporated into Section 2.15 and Table 2-4 of the EIS.

0190-52

This comment is incorporated into Chapter 3 of the EIS.

0190-53

Section 1.3.2 states that the certificate of need was granted. The text in Chapter 3 refers to Section 1.3.2.

No changes are made to the EIS in response to this comment.

0190-54

This comment is incorporated into Section 4.3.1.3 of the EIS.

0190-55

Chapter 4 does not mention who developed the C2 alternative.

No changes are made to the EIS in response to this comment.

0190-56

Chapter 4 does not mention who developed the J2 alternative.

No changes are made to the EIS in response to this comment.

0190-57

The Bear-Wolf Peatland *does* have a boundary defined per the preliminary MBS SBS data received from the MnDNR on 12/10/2014. The SBS Site Name is "Bear - Wolf Peatland" and it has a rating of "High." The Proposed East Bear Lake Variation nearly entirely avoids this area. There is also adjacent, to the east, the "Bear Lake Inclusion" site which has a "Below" rating. Both the Proposed Orange Route and East Bear Lake Variation have new impacts through this area.

0190-58

The 3,000 foot route width would allow flexibility to site the transmission line.

|   |         |     |  |   |
|---|---------|-----|--|---|
| 5 | 5.2.1.2 | 105 |  | Values in second row ("500 kV Transmission Line paralleling existing 500 kV Transmission Line") are incorrect. They appear to have been copied from the previous row ("Standalone"). Correct values are as follows: Within ROW: 52 dBA \\\ At edge of ROW: 52 dBA \\\ At 300 feet from centerline: 51 dBA.  |
| 5 | 5.2.1.2 | 105 |  | Values in fifth row ("500 kV paralleling two existing 115 kV Transmission Lines") are incorrect. They appear to be the missing values from the second row (see above comment). Correct values are as follows: Within ROW: 51 dBA \\\ At edge of ROW: 48 dBA \\\ At 300 feet from centerline: 43 dBA.  |
| 5 | 5.2.1.2 | 105 |  | Values in sixth row ("500 kV paralleling existing 115 kV and 230 kV Transmission Lines") are incorrect. Correct values are as follows: Within ROW: 51 dBA \\\ At edge of ROW: 49 dBA \\\ At 300 feet from centerline: 45 dBA.   |
| 5 | 5.2.1.2 | 105 |  | Footnote (5) should say "Existing 115 kV 20L and 230 kV 83L transmission lines (H-Frame structures)."   |
| 5 | 5.2.1.2 | 106 |  | "Major noise sources from a series compensation station include capacitor bank, damping circuit, by-pass switches, and protective devices." It is misleading to say that these are "major noise sources" – the only "major noise sources" in a substation are generally transformers & reactors. Most of the time the operation of the listed equipment will be relatively silent, and noise will be below background levels. See a handful of sentences later, where the DEIS states "Most of the other electrical equipment at substations is either silent or generates minimal noise in comparison to transformers."  |
| 5 | 5.2     | 106 |  | "Based on these assumptions, the predicted noise operational level perceived at 100 feet from the proposed Blackberry 500 kV Substation would be 41 dBA (assuming the use of a substation perimeter wall)." A perimeter wall is not currently planned for the site. Substation security has not yet been addressed in engineering. Firewalls are likely between transformers and possible between reactors. Typical substation construction includes a perimeter fence – not a solid wall.  |
| 5 | 5.2.1.2 | 106 |  | "The nearest residence is located approximately 560 feet northeast of the proposed Blackberry 500 kV Substation." This may or may not be true if you're measuring from the fence, but a more appropriate way to characterize the distance would be to provide distance from the primary noise source (transformer) to the residence. See MP's RFI response dated April 6, 2015. Nearest residence is 1,120 feet from preliminary transformer location. This also directly contradicts the statement from Appendix H: "No residences have been identified in the vicinity of the substation site." (Page H-5)  |
| 5 | 5.2.1.2 | 106 |  | "At this location [the nearest residence], noise from the proposed substation would be 26 dBA (assuming the use of a substation perimeter wall)." See MP's RFI response dated April 6, 2015. Expected noise from substation transformers and reactors at this residences is between 44-46 dBA.  |
| 5 | 5.2.1.8 | 134 |  | "...that there is currently a sufficient labor pool in the ROI to supply the number of construction workers required for the proposed Project." The Project will have significant local economic benefit, but the assumption that labor will be largely supplied from the ROI is likely not correct due to the specialty trades required.   |
| 5 | 5.2.1.9 | 141 |  | "In addition, hunting activities in close proximity to a transmission line increases the risk for shooting insulators or conductors which can break wires and cause an electrical discharge arc." This statement is not consistent with the stated reference (67) and is not correct. Transmission lines appear to provide hunting opportunities based on the prevalence of hunting blinds on existing rights-of-way. Responsible hunting will not result in shot out insulators because no game species reside on the insulators. Insulators are shot at on occasion, but this should be characterized as a crime and discussed in Section 5.2.2.6 Intentional Destructive Acts. |

0190-59 0190-59  
 This comment is incorporated into Table 5-4 in Section 5.2.1.2 of the EIS.

0190-60

0190-60

0190-61 This comment is incorporated into Table 5-4 in Section 5.2.1.2 of the EIS.

0190-62

0190-63

0190-61

This comment is incorporated into Table 5-4 in Section 5.2.1.2 of the EIS.

0190-64

0190-62

This comment is incorporated into Table 5-4 in Section 5.2.1.2 of the EIS.

0190-65

0190-63

This comment is incorporated into Section 5.2.1.2 of the EIS.

0190-64

This comment is incorporated into Section 5.2 of the EIS.

0190-66

0190-65

This comment is incorporated into Section 5.2.1.2 of the EIS.

0190-67

0190-66

0190-69

This comment is incorporated into Section 5.2.1.2 of the EIS.

0190-67

This comment is incorporated into Section 5.2.1.8 of the EIS.

0190-68

Section 5.2.1.9 indicates an "increased risk" of potential damage to insulators or conductors due to accidental shooting during hunting

activities. As you indicate in your comment, insulators are shot at on occasion, this risk of occasional shooting is acknowledged in the literature cited in Section 5.2.1.9.

No changes are made to the EIS in response to this comment.

0190-69

Thank you for your comment. No changes are made to the EIS in response to this comment.

|   |         |     |      |   |
|---|---------|-----|------|---|
| 5 | 5.2.2.1 | 142 |      | "Based on epidemiological studies, there is an association between childhood leukemia and EMF exposure." This is taken out of context and it is misleading. The studies quoted in Appendix K always say or imply that it is a weak association. At the very least, the same language (weak association) should be used here. "...despite an association between childhood leukemia and EMF exposure..." Suggest modifying: "...despite a weak association between..."   |
| 5 | 5.2.2.1 | 144 | 5-21 | "Maximum field within ROW" value is incorrect for "500 kV Guyed V- and Self-Supporting towers" under "Proposed 500 kV paralleling existing 230 kV Line" section. Instead of 6.91 kV/m it should be 7.04 kV/m \\\ Instead of 7.02 kV/m it should be 7.04 kV/m \\\ Instead of 6.41 kV/m it should be 6.43 kV/m.   |
| 5 | 5.2.2.1 | 144 | 5-21 | Footnote (4) should say "Existing 230 kV 907L transmission line (H-Frame structures)."  |
| 5 | 5.2.2.1 | 144 | 5-21 | Footnote (7) should say "Existing 115 kV 20L and 230 kV 83L transmission lines (H-Frame structures)"  |
| 5 | 5.2.2.1 | 145 | 5-22 | Title should be "Predicted Magnetic Field Strengths for the Proposed Project at Maximum Continuous Rating."   |
| 5 | 5.2.2.1 | 145 | 5-22 | Multiple data errors are present in this table. MP will provide the correct data in a similar tabular format so it may be updated. Notes on MP-provided table below:<br>o All data based on "Maximum Continuous Rating" (2000 Amps)<br>o "Maximum within ROW" based on the raw data from the POWER Engineers analysis<br>o "paralleling existing 500 kV Transmission Line" data assumes existing D602F transmission line self-supporting structures<br>o Variations from the data in Table 5-21 of the DEIS are highlighted in a separate document.   |
| 5 | 5.2.2.1 | 145 | 5-22 | Footnote (1) should say "The Applicant has assumed magnetic fields from Self-Supporting lattice tower as equivalent to magnetic fields from guyed V-structures."  |
| 5 | 5.2.2.1 | 145 | 5-22 | Footnote (3) should say "Existing 230 kV 907L transmission line (H-Frame structures)."  |
| 5 | 5.2.2.1 | 145 | 5-22 | Footnote (6) should say "Existing 115 kV 20L and 230 kV 83L transmission lines (H-Frame structures)."   |
| 5 | 5.2.2.1 | 146 |      | "500 kV D602F transmission line (guyed Delta, guyed V, and self-supporting structures)"<br>The existing 500 kV line was not modeled in a Guyed-V configuration. Suggest modifying as follows: "500 kV D602F transmission line (Guyed Delta and self-supporting structures)."  |
| 5 | 5.2.2.1 | 146 |      | "230 kV 83L transmission line..." should say "230 kV 907L transmission line..."   |
| 5 | 5.2.2.1 | 146 |      | "115 kV 28L and 230 kV 83L transmission lines..." should say "115 kV 20L and 230 kV 83L transmission lines..."  |
| 5 | 5.2.2.1 | 146 |      | "The Applicant has modeled magnetic field levels for the two main operational scenarios that considered the proposed types of structures, and whether the proposed 500 kV transmission line would be installed stand-alone or located in a shared corridor with an existing transmission line. Predicted magnetic fields from a total of six cases were calculated at average and peak current levels. The average levels for these scenarios are the current levels experienced for most hours of the year; peak levels are current levels for limited hours of the year when current levels are projected to be higher due to system loading and electrical generation in the proposed Project area, among other factors." This entire paragraph is misleading. Suggest the following wording (refer to RPA text, Page 6.15-7): "The Applicant has modeled magnetic field levels for two conditions: the maximum continuous rating of the Project, which represents the maximum allowable power flow on the transmission line, and the projected peak loading when the Project is in service, derived from power system modeling of the Project under peak loading conditions. For both conditions, predicted magnetic fields from a total of six corridor scenarios (stand-alone or where the Project may parallel existing transmission lines) were calculated for each of the proposed structure types for the Project." |

- 0190-70 0190-70  
This comment is incorporated into Section 5.2.2.1 of the EIS.
- 0190-71 0190-71  
This comment is incorporated into Table 5-21 in Section 5.2.2.1 of the EIS.
- 0190-72
- 0190-73
- 0190-74 0190-72  
This comment is incorporated into Table 5-21 in Section 5.2.2.1 of the EIS.
- 0190-75
- 0190-73  
This comment is incorporated into Table 5-21 in Section 5.2.2.1 of the EIS.
- 0190-76
- 0190-77 0190-74  
This comment is incorporated into Table 5-22 in Section 5.2.2.1 of the EIS.
- 0190-78
- 0190-79
- 0190-80 0190-75  
This comment is incorporated into Table 5-22 in Section 5.2.2.1 of the EIS.
- 0190-81
- 0190-82
- 0190-76  
This comment is incorporated into Table 5-22 in Section 5.2.2.1 of the EIS.
- 0190-77  
This comment is incorporated into Table 5-22 in Section 5.2.2.1 of the EIS.
- 0190-78  
This comment is incorporated into Table 5-22 in Section 5.2.2.1 of the EIS.

0190-79

This comment is incorporated into Section 5.2.2.1 of the EIS.

0190-80

This comment is incorporated into Section 5.2.2.1 of the EIS.

0190-81

This comment is incorporated into Section 5.2.2.1 of the EIS.

0190-82

This comment is incorporated into Section 5.2.2.1 of the EIS.

|   |         |     |  |  |
|---|---------|-----|--|--|
| 5 | 5.2.2.8 | 158 |  | The last paragraph states “The Applicant would use protective devices to safeguard workers and the public from transmission line operational hazards, including the use of shield wires, circuit breakers, and relays.” These devices are for the protection of equipment, not necessarily the public.   |
| 5 | 5.3.1.2 | 163 |  | “This 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.” The property taxes paid by the Project would counter-balance any lost timber revenue. In addition, timber revenue from the ROW clearing go to the School Trust Land program as a one time payment.   |
| 5 | 5.3.2.1 | 168 |  | “For the transmission line itself, the footprint of the structure proposed for the project is 33 square feet.” This is not accurate. See Route Permit Application, Page 6-2: “Permanent land cover impacts are assumed to 1,936 square feet per structure for self-supporting suspension towers, which includes the area covered by the base of each structure plus a 2-foot buffer...”  |
| 5 | 5.3.2.1 | 168 |  | “In addition, stray voltage could affect livestock if facilities are not properly wired/grounded” This is misleading since there are no stray voltage impacts directly from the Project. See previously-provided information on stray voltage: Page 149, Stray Voltage – General Impacts: “Stray voltage impacts are not anticipated as a result of construction, operation, maintenance, and emergency repair of the proposed Project...” \\ Page 149, Stray Voltage – General Impacts: “Potential impacts related to stray voltage are not expected from construction, operation, maintenance, and emergency repair of the proposed Project for any proposed route or variation considered...” |
| 5 | 5.3.2.2 | 169 |  | “In addition, increasing the time between line maintenance in forested areas could result in harvestable products. Finally, elevated spanning, in areas with high elevations, could reduce forest clearing.” This is not practical. Utilities must certify vegetative clearance requirements are met annually to insure reliability. These statements are not accurate, and should be deleted.   |
| 5 | 5.3.2.2 | 169 |  | “As mentioned above, short-term impacts are estimated as 0.92 acres per structure location. Long-term impacts to forestry resources would be caused by the clearing of trees and physical presence of transmission line structures and associated facilities in forest lands. As mentioned above, for the transmission line itself, the footprint of the structure proposed for the project is 33 square feet.” The ROW would be cleared of vegetation during construction, not just the structure staging area. The footprint of the self-supporting structure would be 1,936 square feet. The 33 square foot footprint of the foundation system for the Guyed-V structure is irrelevant here.  |
| 5 | 5.3.4.3 | 185 |  | “Impacts are expected to be extensive in areas where new ROW would be created ..” Chapter 6 consistently and accurately describes impacts as minimal in the context of the entire area. This statement should be edited to make it consistent with those other statements.   |
| 5 | 5.3.4.3 | 185 |  | “Because the structures would be larger and the phase spacing for the proposed project’s conductors greater compared to distribution lines, avian electrocutions are unlikely.” In light of this statement, electrocutions should not be included in Chapter 6.  |
| 5 | 5.3.7   | 195 |  | “The existing 500-kV transmission line already has experienced an unexpected outage causing it to be the second largest contingency in the MISO footprint.” This is not stated correctly. It would be more accurate to say: “An unexpected outage of the existing 500-kV transmission line is currently the second largest contingency in the MISO footprint.”   |
| 5 | 5.3.7   | 195 |  | “The applicable Category D contingencies are loss of all transmission lines along a common ROW and loss of an entire voltage level at a substation” It would help to add the following clarifying information: “The applicable Category D contingencies from NERC standard TPL-004 are...”   |
| 5 | 5.3.7   | 195 |  | “(see Section 2.8.5)” This is not a helpful reference as the information in Section 2.8.5 doesn’t help understand the NERC standard being discussed.   |

- 0190-83 0190-83  
This comment refers to text on page 6.5-5 of the Applicant's Route Permit Application.
- 0190-84  
No changes are made to the EIS in response to this comment.
- 0190-85 0190-84  
The property taxes and timber revenue from ROW clearing would offset some of the revenue lost from the School Trust Land program. However, currently there is not enough information to determine the revenue offset.
- 0190-86  
No changes are made to the EIS in response to this comment.
- 0190-85  
This comment is incorporated into Chapters 5 and 6 of the EIS.
- 0190-87
- 0190-88 0190-86  
Section 5.3.2.1 provides a general overview of typical stray voltage effects in livestock facilities based on publicly available information and then discusses project-specific information to conclude that there would not be stray voltage effects associated with the project at those facilities identified in the ROI.
- 0190-89 No changes are made to the EIS in response to this comment.
- 0190-90 0190-87  
This comment is incorporated into Section 5.3.2.2 of the EIS.
- 0190-91  
0190-88  
This comment is incorporated into Section 5.3.2.2 of the EIS.
- 0190-92
- 0190-89  
0190-93  
Text in Chapter 5 is generally comparing the potential impacts to wildlife from the creation of a new corridor in an unfragmented forest. Impacts are expected to be greater (extensive, i.e. cover a larger area) in an unfragmented forest. Chapter 6 is comparing the

impacts across routes, while incorporating proximity to wildlife resources (i.e. WMAs). In comparing routes, while fragmenting a forest would have extensive (greater area) impacts, those impacts are minimal because there is a significant amount of habitat available.

No changes are made to the EIS in response to this comment.

0190-90

As indicated in this sentence, it is unlikely, not impossible. Text is present in Chapter 6 because it is a "potential" impact.

No changes are made to the EIS in response to this comment.

0190-91

This comment is incorporated into Section 5.3.7 of the EIS.

0190-92

This comment is incorporated into Section 5.3.7 of the EIS.

0190-93

This comment is incorporated into Section 5.3.7 of the EIS.

|       |         |     |     |  |
|-------|---------|-----|-----|--|
| 5     | 5.3.7   | 195 |     | "...so the analysis for the proposed Project would be on a case-by-case basis by the Applicant based on NERC standards." This analysis is not based solely on NERC standards. The following qualifying information would be helpful: "...so the analysis for the proposed Project would be on a case-by-case basis by the Applicant based on the applicable NERC standards as well as the purpose and expected performance of the Project and the adjacent transmission line."   |
| 5     | 5.3.7   | 195 |     | "When the proposed Project parallels an existing transmission line, the Applicant is proposing to offset the proposed transmission line by 50 feet from the ROW of the existing transmission line." This is poorly worded. Suggest the following correction: "When the proposed Project parallels an existing transmission line, the Applicant is proposing to offset the alignment of the proposed transmission line by 250 feet from the alignment of the existing transmission line."   |
| 5     | 5.3.7   | 195 |     | "...can be reduced by maintaining the proposed 50 foot offset between ROWs..." See above comment. Suggest the following correction: "...can be reduced by maintaining an appropriate offset between the two transmission lines..."   |
| 5     | 5.3.7.2 | 197 |     | "Therefore, the reliability impacts in the U.S. of an unexpected simultaneous outage of both the proposed and existing 500 kV tie transmission lines...would largely be addressed by these measures in conjunction with the proposed special protections system and corresponding power transfer reductions." MP suggests adding the following qualifying statement to the end of the paragraph: "Even so, the fact that all of these considerations must be discussed as a result of corridor sharing with the existing 500 kV transmission line illustrates that fact that corridor sharing causes real electrical reliability concerns. Therefore, routes and variations that increase the parallel distance or number of crossings with the Project and the existing 500 kV line should be considered to have a negative impact on electrical system reliability." |
| 6     | 6.4.1.1 | 534 |     | "Not including residences, the proposed routes and variation would affect similar numbers of aesthetic resources, with the Proposed Blue Route affecting 11, the Proposed Orange Route affecting 12, and the Effie Variation affecting 11." This is inconsistent with a statement elsewhere in the DEIS:<br>"In total, the proposed routes and variation would affect similar numbers of aesthetic resources, with the Proposed Blue Route affecting nine, the Proposed Orange Route affecting 10, and the Effie Variation affecting 11."  |
| 6     | 6.4.3.7 | 584 | ESR | "The configuration may decrease the reliability of the proposed Project...Adverse impacts are possible as a result of the construction and operation of three high-voltage transmission lines under one variation in the East Section." Reliability effects depend on the function and purpose of the lines. In this case, co-locating the Project with the two existing 115 kV lines would pose little to no reliability concern because the Project and the 115 kV lines serve vastly different purposes. See MP's general comments on electrical reliability.   |
| 6     | 6.7.1.2 | 651 |     | Says could contrast strongly w its surroundings. Has potential to result in significant aesthetic impacts. Could argue that residence is 0.4 miles north – and is already looking at T-line. If substation is on south side of existing and propose route would not "contrast strongly" with surroundings. (another reason to use MP route)  |
| 6     | 6.7.1.2 | 651 |     | FYI - Says Hwy 71 sites (orange and blue route) are in MBS Bio Sig sites (unknown rank) Blue Hwy 71 alt site isn't in wetland or MBS site..  |
| App H |         |     |     | Please work with MP to update the audible noise information presented in this appendix. Much of it is inaccurate.  |
| App I |         |     |     | All audible noise tables & plots are missing. MP will provide.   |
| App I |         |     |     | All magnetic field tables & plots are missing. MP will provide   |
| App I |         |     |     | Please do not include the memos from POWER in this appendix. The memos included have extra information that is irrelevant to the DEIS and potentially misleading, and not all relevant memos are included. Please remove all memos from POWER to Minnesota Power.  |

- 0190-94 0190-94  
Thank you for your comment.  
No changes are made to the EIS in response to this comment.
- 0190-95  
0190-95  
The Applicant provided the shapefiles used in the EIS analysis for their Proposed Blue Route, Proposed Orange Route, C2 Segment Option Variation, and J2 Segment Option Variation. In addition, the Applicant provided a memo with design changes (Decmber 1, 2014) which assumed a 250 foot separation between the anticipated alignments when paralleling existing 500 kV transmission line.
- 0190-96  
0190-97  
The shapefiles provided by the Applicant show that where their proposed alternatives parallel the existing 500 kV transmission line, there is a separation of 250 feet between the anticipated alignments. However, in the shapefile, where the proposed alternatives parallel the existing 230 kV transmission lines, the distance between the anticipated alignments is 150 feet. And where the proposed alternatives parallel an existing 115 kV transmission line, there is a separation of 150-300 feet between the anticipated alignments.
- 0190-98  
No changes are made to the EIS in response to this comment.
- 0190-99  
0190-96  
This comment is incorporated into Section 5.3.7 of the EIS.
- 0190-100  
0190-97  
Thank you for your comment, these concerns will be reduced by maintaining appropriate offsets.
- 0190-101  
0190-102  
No changes are made to the EIS in response to this comment.
- 0190-103  
0190-104  
0190-105  
0190-98  
This comment is incorporated into Section 6.4.1.1 of the EIS.

0190-99  
The following text is added to Section 2.8.3 of the EIS: According to

the Applicant, the electrical reliability impacts of establishing a parallel transmission line corridor depend primarily on the purpose and expected performance of the transmission lines. None of the alternatives that parallel existing corridors with 69 kV, 115 kV, or 230 kV transmission lines that do not connect Manitoba and the United States would impact electrical system reliability.

If the proposed Project parallels the existing 230 kV tie line corridor the impact of a simultaneous, unexpected outage of the two facilities on electrical reliability would be minimal, but still notable because the lines would share a common purpose of transferring power from Manitoba to the United States. If the Proposed Project parallels the existing 500 kV tie line corridor, a simultaneous unexpected outage would have a greater impact on electrical system reliability because the transmission lines not only share a common load, but would also carry similar (and greater) amounts of power.

If three transmission lines (i.e., the Proposed Project, 500 kV tie line, and 230 kV tie line) are located in parallel corridors, a simultaneous unexpected outage of the Proposed Project and two tie lines could have the greatest impact to electrical reliability.

0190-100

The aesthetic impact of the 500 kV series compensation station is not solely determined based on the nearest residence and the EIS acknowledges that the impact is dependent on the actual location, and therefore the compensation station could contrast strongly with its surroundings.

No changes are made to the EIS in response to this comment.

0190-101

The EIS text is correct - Section 6.7.2.1 states that the Hwy 71 regeneration station (option 1) is located in a wetland (per the NWI shapefile) and within an MBS SBS site (per the preliminary MBS SBS data we received from the MnDNR on 12/10/2014). The Hwy 71 regeneration station (option 2) is not located in a wetland (per the NWI shapefile) and is not located within an MBS SBS site (per the preliminary MBS SBS data we received from the MnDNR on 12/10/2014).

No changes are made to the EIS in response to this comment.

0190-102

Appendix H of the EIS is updated with information provided by the Applicant.

0190-103

Appendix I and Section 5.2.1.2 of the EIS is updated based on the information provided by the Applicant.

0190-104

Appendix I and Section 5.2.1.2 of the EIS is updated based on the information provided by the Applicant.

0190-105

Appendix I and Section 5.2.1.2 of the EIS is updated based on the information provided by the Applicant.

|       |  |  |  |   |
|-------|--|--|--|---|
| App N |  |  |  | Some of the photo sims (most obviously the Highway 11 crossings) show incorrect structure heights & conductor to ground clearances. These simulations give a highly inaccurate picture of what the Project may look like once it's built. Please work with MP to update these photo sims so they present a fair and accurate depiction of the Project |
|-------|--|--|--|---|

0190-106 0190-106

This structure heights and conductor to ground clearances used in the photosimulations were provided by the Applicant. Information was reviewed and provided to the Applicant for their consideration. Upon review of the information by the Applicant, they decided that no additional photosimulations or viewshed analysis would be required for the Final EIS. No changes are made to the EIS in response to this comment from the Applicant.

STATE OF MINNESOTA )  
 ) ss  
COUNTY OF ST. LOUIS )

AFFIDAVIT OF SERVICE VIA  
ELECTRONIC FILING AND  
U.S. MAIL

-----

Susan Romans of the City of Duluth, County of St. Louis, State of Minnesota, says that on the **10<sup>th</sup>** day of **August, 2015**, she served Minnesota Power's Response to the Great Northern Transmission Line Draft Environmental Impact Statement released on June 19, 2015 in Docket No. E015/TL-14-21 to William Storm of the Department of Commerce and Julie Smith of the Department of Energy, DoE No. EIS-0499, via email and electronic filing. The remaining parties on the attached service list were served as indicated.

  
\_\_\_\_\_  
Susan Romans

| First Name | Last Name      | Email                         | Company Name                          | Address  | Delivery Method           | View Trade Secret | Service List Name                        |
|------------|----------------|-------------------------------|---------------------------------------|--|---------------------------|-------------------|--|
| Burl W.    | Haar           | burl.haar@state.mn.us         | Public Utilities Commission           | Suite 350<br>121 7th Place East<br>St. Paul,<br>MN<br>551012147            | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Linda      | Jensen         | linda.s.jensen@ag.state.mn.us | Office of the Attorney<br>General-DOC | 1800 BRM Tower 445<br>Minnesota Street<br><br>St. Paul,<br>MN<br>551012134 | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Michael    | Kaluzniak      | mike.kaluzniak@state.mn.us    | Public Utilities Commission           | Suite 350<br>121 Seventh Place East<br>St. Paul,<br>MN<br>55101            | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| David      | Moeller        | dmoeller@allete.com           | Minnesota Power                       | 30 W Superior St<br><br>Duluth,<br>MN<br>558022093                         | Electronic Service        | No                | OFF_SL_14-21_Official CC<br>Service List |
| Ann        | O'Reilly       | ann.oreilly@state.mn.us       | Office of Administrative<br>Hearings  | PO Box 64620<br><br>St. Paul,<br>MN<br>55101                               | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Janet      | Shaddix Elling | jshaddix@janetshaddix.com     | Shaddix And Associates                | Ste 122<br>9100 W Bloomington<br>Bloomington,<br>MN<br>55431               | Electronic Service<br>Fwy | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Tracy      | Smetana        | tracy.smetana@state.mn.us     | Public Utilities Commission           | 121 7th Place East<br>Suite 350<br>St. Paul,<br>MN<br>55101                | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| William    | Storm          | bill.storm@state.mn.us        | Department of Commerce                | Room 500<br>85 7th Place East<br>St. Paul,<br>MN<br>551012198              | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Eric       | Swanson        | eswanson@winthrop.com         | Winthrop Weinstine                    | 225 S 6th St Ste 3500<br>Capella Tower<br>Minneapolis,<br>MN<br>554024629  | Electronic Service        | No                | OFF_SL_14-21_Official CC<br>Service List |

| First Name | Last Name  | Email                           | Company Name                           | Address   | Delivery Method    | View Trade Secret | Service List Name               |
|------------|------------|---------------------------------|--|---|--------------------|-------------------|---------------------------------|
| Sarah      | Beimers    | sarah.beimers@mnhs.org          | Minnesota Historical Society           | 345 Kellogg Boulevard West<br>St. Paul, MN 55102                            | Electronic Service | No                | SPL_SL_14-21_Agency Reprs 14-21 |
| Tamara     | Cameron    | tamara.e.cameron@usace.army.mil | U.S. Army Corps of Engineers           | 180 5th St # 700<br>Saint Paul, MN 55101                                    | Electronic Service | No                | SPL_SL_14-21_Agency Reprs 14-21 |
| Travis     | Germundson | travis.germundson@state.mn.us   |  | Board of Water & Soil Resources<br>520 Lafayette Rd<br>Saint Paul, MN 55155 | Electronic Service | No                | SPL_SL_14-21_Agency Reprs 14-21 |
| Brooke     | Haworth    | Brooke.Haworth@state.mn.us      | Department of Natural Resources        | 500 Lafayette Road<br>Saint Paul, MN 55155                                  | Electronic Service | No                | SPL_SL_14-21_Agency Reprs 14-21 |
| Susan      | Heffron    | susan.heffron@state.mn.us       | MN Pollution Control Agency            | 520 Lafayette Rd<br>Saint Paul, MN 55155                                    | Electronic Service | No                | SPL_SL_14-21_Agency Reprs 14-21 |
| Kari       | Howe       | kari.howe@state.mn.us           | DEED                                   | 332 Minnesota St, #E200<br>1ST National Bank Bldg<br>St. Paul, MN 55101     | Electronic Service | No                | SPL_SL_14-21_Agency Reprs 14-21 |
| Ray        | Kirsch     | Raymond.Kirsch@state.mn.us      | Department of Commerce                 | 85 7th Place E Ste 500<br>St. Paul, MN 55101                                | Electronic Service | No                | SPL_SL_14-21_Agency Reprs 14-21 |
| Stacy      | Kotch      | Stacy.Kotch@state.mn.us         | MINNESOTA DEPARTMENT OF TRANSPORTATION | 395 John Ireland Blvd.<br>St. Paul, MN 55155                                | Electronic Service | No                | SPL_SL_14-21_Agency Reprs 14-21 |
| Debra      | Moynihan   | debra.moynihan@state.mn.us      | MN Department of Transportation        | 395 John Ireland Blvd MS 620<br>St. Paul, MN 55155-1899                     | Electronic Service | No                | SPL_SL_14-21_Agency Reprs 14-21 |
| Bob        | Patton     | bob.patton@state.mn.us          | MN Department of Agriculture           | 625 Robert St N<br>Saint Paul, MN 55155-2538                                | Electronic Service | No                | SPL_SL_14-21_Agency Reprs 14-21 |

| First Name | Last Name | Email                        | Company Name                              | Address   | Delivery Method    | View Trade Secret | Service List Name                 |
|------------|-----------|------------------------------|---|---|--------------------|-------------------|-----------------------------------|
| Margaret   | Rheude    | Margaret_Rheude@fws.gov      | U.S. Fish and Wildlife Service            | Twin Cities Ecological Services Field Office<br>4101 American Blvd. E.<br>Bloomington,<br>MN<br>55425 | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Michele    | Ross      | michele.ross@state.mn.us     | Department of Health                      | 625 N Robert St<br><br>Saint Paul,<br>MN<br>55101   | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Jamie      | Schrenzel | jamie.schrenzel@state.mn.us  | Minnesota Department of Natural Resources | 500 Lafayette Road<br><br>Saint Paul,<br>MN<br>55155  | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| David      | Seykora   | dave.seykora@state.mn.us     | MN Department of Transportation           | 395 John Ireland Boulevard<br><br>Mail Stop 130<br>St. Paul,<br>MN<br>55155-1899                      | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Bruce      | West      | Bruce.West@state.mn.us       | Department of Public Safety               | Box 145<br>444 Cedar Street<br>St. Paul,<br>MN<br>55151   | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Jonathan   | Wolgram   | Jonathan.Wolgram@state.mn.us | Department of Public Safety               | 445 Minnesota Street Suite 147<br><br>St. Paul,<br>MN<br>55101-1547                                   | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |

0191-1

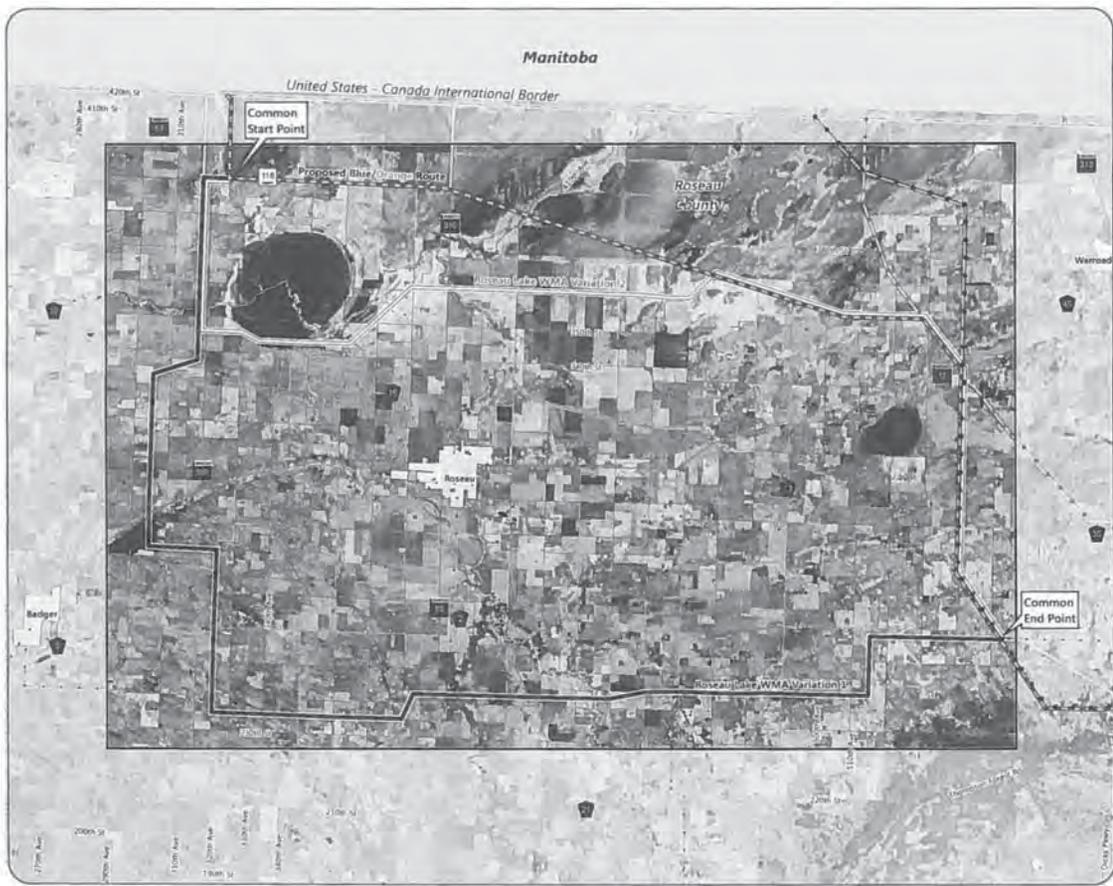
The relative merits table provided by the Applicant used different methodology than the relative merit tables in the EIS and is included in the comment appendix of the EIS. However, additional information is included in the Final EIS to introduce the relative merit tables and the relative merits tables are updated throughout the Final EIS. Appendix X includes detailed spreadsheets with the data used to compile the summary relative merits tables for the Final EIS.

---

## Great Northern Transmission Line

*Relative Merits Table*

| Color  |  | Definition  |
|--|--|---|
| Green  | The alternative will have minimal effects on the resource with the implementation of best management practices, such that no mitigation is required.   |   |
| Yellow   | The alternative will have minimal to moderate effects on the resource with the implementation of best management practices, such that mitigation is likely to be required.   |   |
|  | The alternative will have moderate or greater effects on the resource, and those effects cannot be mitigated.  |   |
| Some routing factors that are not susceptible to the minimal-moderate-unmitigable system described above. In such cases, Minnesota Power's tables assign colors in the following manner: |  |   |
| Corridor Sharing   | Green means greater than 90% of the Route or Variation parallels an existing transmission line; yellow means between 10% and 90% of the Route or Variation parallels existing transmission lines; and red means less than 10% of the Route or Variation parallels an existing transmission line.   |   |
| Costs  | Green represents the costs proposed in Minnesota Power's Certificate of Need application for a particular route segment, or anything less expensive. Yellow represents anything that costs up to 20% more than Minnesota Power's proposed costs. Red represents anything that costs more than 20% of what Minnesota Power proposed, because anything in excess of that threshold.  |   |
| Electrical System Reliability  | For electrical system reliability; green means no identifiable impact (does not parallel or cross any existing Manitoba-Minnesota tie lines); yellow means acceptable impact (impacts to electrical system reliability are moderate and acceptable); red means unacceptable impact (impacts to electrical system reliability are severe and unacceptable). These judgments are based on the expertise of Minnesota Power's engineers, and are further discussed in the company's comments on the DEIS. |   |
| Factor   | Element  | Footnote  |
| General  |  | Unless otherwise stated below, the ROIs discussed in Chapters 5 and 6 of the DEIS are used in these comparison tables. Consistent with its comments on the DEIS, Minnesota Power has used alternative ROIs and/or other metrics for assessing effects, as described below, and as further explained in its DEIS comments. Minnesota Power does not have access to the exact methodology or data used in the DEIS. As a result, Minnesota Power compiled these tables by copying and, when necessary or appropriate, interpreting the data used in Chapter 6 of the DEIS.                          |
| Human Settlement   | Aesthetics   | Minnesota Power did not include state forests in its calculation of aesthetic effects. The DEIS already addresses public recreation opportunities within state forests by including trails, campgrounds, and water access points in its list of aesthetic resources. Adding state forests to the list essentially double-counts these public recreational opportunities, while ignoring the fact that the vast state forests in the project area are rarely used as recreational areas.   |
|  | Land Use Compatibility   | The dominant land cover type is presented in the table to highlight the most abundant resource within the Route/Alternative.  |
|  | Land Ownership   |   |
|  | Public   | All public lands are added together for this comparison. Public lands include Federal, State, and County lands.   |
|  | Private  | Private land is calculated by subtracting public lands from the total number of acres within the ROW for a particular Route/Alternative. A more accurate count of acres of private land and number of private landowners crossed could be made by using County Tax Assessor parcel data.  |
| Land-Based Economies   | Agriculture  | Acres of agricultural land within 1,500 feet is used for this comparison to account for effects on agricultural land and practices that would likely occur beyond just the 200-foot ROW. GAP Landcover data was used to determine acres of agriculture because prime farmland soils are less accurate in identifying actual agricultural land uses.   |
|  | Forestry   | Only acres of State Forest land within the ROW is used for these comparisons. It should be noted that corporate lands (such as Blandin) could also be included to the extent they are available.  |
|  | Mining & Mineral Leases  | There are several occurrences where the acres of mining and mineral leases exceed the total number of acres within the ROW of a particular Route/Alternative. These numbers are highlighted in red in the tables. Minnesota Power is unsure about the source of this error and has not attempted to correct it.   |
| Rare and Unique Natural Resources  | Rare Species   | Minnesota Power removed aquatic species from this calculation in light of the Chapter 6 text (for each Variation Area) consistently stating that PWM, non-PWM, trout, and impaired streams will be spanned and no structures will be placed within the waterbodies.   |
|  | Rare Communities   | Acres of MBS Sites of Biodiversity and MBS Native Plant Communities include only the "high" or "outstanding" values where the data has been finalized; in other areas, the preliminary total of all ranks is used.  |
| Corridor Sharing   | Paralleling Existing Infrastructure  | Minnesota Power included only existing high-voltage transmission lines in this analysis because they are the only corridor sharing opportunities that would potentially provide any environmental benefit.  |
| Electrical System Reliability  |  | This assessment of the electrical system reliability impacts of each of the Routes and Variations performed by Minnesota Power's engineers takes into account specifically the locations where the proposed line parallels or crosses existing Manitoba - Minnesota tie lines. For the particular case of the GNTRL Project, no other common corridor or line crossing scenarios involving 69 kV, 115 kV, or 230 kV lines that do not connect Manitoba and the United States has any significant impact on electrical system reliability, regardless of how many transmission lines are involved. |



- 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
- Other Symbols**
- 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 5.



Map 4-4  
**ROSEAU LAKE WMA VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement



| Relative Merits                                  |                               |                       | Roseau Lake WMA Variations                |                |  |                |  |                |  |
|--|-------------------------------|-----------------------|---|----------------|--|----------------|--|----------------|--|
| Factor   | Element                       | ROI                   | Proposed Blue / Orange Route (30.7 miles) |                | Roseau Lake WMA Variation 1 (44.1 miles) |                | Roseau Lake WMA Variation 2 (37.5 miles) |                | Notes  |
|  |                               |                       | Count / Acres                             | Percent of ROI | Count / Acres                            | Percent of ROI | Count / Acres                            | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |   |                |  |                |  |                |  |
|  | Residences                    | 1,500 feet            | 12  | -              | 50                                       | -              | 23                                       | -              | Roseau Lake WMA Variation 1 could potentially impact more than four times as many residences as the Blue/Orange Route.   |
|  | Historic Architectural Sites  | 5,280 feet            | 0   | -              | 1  | -              | 2  | -              | The Blue/Orange Route would not impact any known architectural sites within 5,280.   |
|  | State Scenic Byways           | 1,500 feet            | 1   | -              | 1  | -              | 1  | -              | All Alternatives would cross State Highway 11 - Waters of the Dancing Sky Scenic Byway.  |
|  | Trails                        |                       | 1   | -              | 1  | -              | 1  | -              | All Alternatives would cross one snowmobile trail.   |
|  | <b>Land Use Compatibility</b> |                       |   |                |  |                |  |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 7,350 ac of Forested and/or Swamp         | 84.9%          | 12,616 ac of Agricultural Land           | 78.2%          | 8,783 ac of Agricultural Land            | 63.8%          | The Blue/Orange Route's major land cover type is Forested and/or Swamp which would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 272). The Variations' major land cover type is Agriculture. |
|  | Land Ownership                | 200 feet              | 744 acres total                           |                | 1,069 acres total                        |                | 909 acres total                          |                | The Blue/Orange Route contains more acres of public land but would potentially impact the fewest private landowners.   |
|  | Public                        |                       | 453                                       | 60.9%          | 6  | 0.6%           | 145                                      | 15.9%          |  |
|  | Private                       |                       | 291                                       | 39.1%          | 1,063                                    | 99.4%          | 764                                      | 84.0%          |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 3,364                                     | 29.7%          | 12,616                                   | 78.2%          | 8,783                                    | 63.8%          | Variation 1 would potentially impact four times as many acres of agricultural land than the Blue/Orange Route.   |
|  | Forestry                      | 200 feet              | 334                                       | 44.9%          | 6  | 0.6%           | 52                                       | 5.7%           | The Blue/Orange Route contains more acres of State Forest land.  |
|  | Mining & Mineral Leases       |                       | 0   | 0.0%           | 0  | 0.0%           | 0  | 0.0%           | No Alternatives would impact any mining or mineral leases.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 0   | -              | 1  | -              | 2  | -              | The Blue/Orange Route would not impact any known architectural sites within 5,280 nor would it impact any known archaeological sites within 1,500 feet.  |
|  | Archaeological Sites          | 1,500 feet            | 0   | -              | 3  | -              | 3  | -              |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 2   | -              | 10                                       | -              | 3  | -              | All Alternatives would cross a number of waterbodies; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |                       | 23  | -              | 38                                       | -              | 33                                       | -              |  |
|  | Impaired Waters               |                       | 1   | -              | 2  | -              | 2  | -              |  |
|  | Floodplains                   |                       | 321                                       | 43.1%          | 202                                      | 18.9%          | 307                                      | 33.8%          | All Alternatives contain a similar number of acres of FEMA-designated floodplains and all will require structure placement within floodplains.   |

| Relative Merits                   |  |                                       | Roseau Lake WMA Variations                |                |  |                |  |  | Notes   |
|-----------------------------------|--|---------------------------------------|---|----------------|--|----------------|--|--|---|
| Factor                            | Element                                      | ROI                                   | Proposed Blue / Orange Route (30.7 miles) |                | Roseau Lake WMA Variation 1 (44.1 miles) |                | Roseau Lake WMA Variation 2 (37.5 miles) |  |   |
|                                   |  |                                       | Count / Acres                             | Percent of ROI | Count / Acres                            | Percent of ROI | Count / Acres                            | Percent of ROI   |   |
|                                   | NWI Wetlands                                 |                                       | 547                                       | 73.5%          | 102                                      | 9.5%           | 272                                      | 29.9%  | The Blue/Orange Route would potentially impact twice as many acres of NWI-mapped wetlands as Variation 2. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 279).   |
| Vegetation                        | North American Boreal Flooded & Swamp Forest | 200 feet                              | 388                                       | 52.1%          | 61                                       | 5.7%           | 185                                      | 18.1%  | The Blue/Orange Route contains a greater amount of forest land; the two Variations contain a greater amount of herbaceous agricultural vegetative cover. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 280).   |
|                                   | North American Boreal Forest                 |                                       | 73  | 9.8%           | 30                                       | 2.8%           | 57                                       | 6.3%   |   |
|                                   | Herbaceous Agricultural                      |                                       | 106                                       | 26.3%          | 666                                      | 81.0%          | 531                                      | 58.4%  |   |
|                                   | Other  |                                       | 87  | 11.7%          | 112                                      | 10.5%          | 156                                      | 17.2%  |   |
| Wildlife                          | WMAs   | 200 feet                              | 69  | 9.3%           | 0  | 0.0%           | 44                                       | 4.8%   | The Blue/Orange Route and Variation 2 contain similar acres of WMA. Variation 2 contains the most acres of Grassland Bird Conservation Areas, however, ongoing vegetation management of the ROW in early successional vegetative state, would be compatible with grassland bird species' habitat requirements (pg. 282).  |
|                                   | Grassland Bird Conservation Areas            |                                       | 131                                       | 17.6%          | 40                                       | 3.7%           | 220                                      | 24.2%  |   |
| Rare and Unique Natural Resources | Rare Species                                 | 1 mile (aquatic species not included) | 7   | -              | 2  | -              | 3  | -  | The Blue/Orange Route is located within one mile of seven documented rare species. Surveys will be performed on the final 200-foot ROW to determine if any of these species are present within the permitted ROW. Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through the use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 284). |
|                                   | State Rare Communities                       | 200 feet                              | 107                                       | 14.4%          | 7  | 0.7%           | 77                                       | 8.5%   | The Blue/Orange Route contains more acres of MBS Sites of Biodiversity, HCVF, and MBS Native Plant communities.   |
|                                   | MBS Sites of Biodiversity                    |                                       | 22  | 3.0%           | 6  | 0.6%           | 8  | 0.7%   |   |
|                                   | High Conservation Value Forest               |                                       | 39  | 5.2%           | 0  | 0.0%           | 22                                       | 2.4%   |   |
|                                   | MBS Native Plant Communities                 |                                       |   |                |  |                |  |  |   |
| Corridor Sharing                  | Paralleling Existing Infrastructure          | -                                     | -   | 33.0%          | -  | -              | 27.0%                                    | The Blue/Orange Route parallels existing transmission lines for approximately 1/3rd of its length. |   |

| Relative Merits               |            |     | Roseau Lake WMA Variations                |                |  |                |  |                |   |
|-------------------------------|------------|-----|---|----------------|--|----------------|--|----------------|---|
| Factor                        | Element    | ROI | Proposed Blue / Orange Route (30.7 miles) |                | Roseau Lake WMA Variation 1 (44.1 miles) |                | Roseau Lake WMA Variation 2 (37.5 miles) |                | Notes   |
|                               |            |     | Count / Acres                             | Percent of ROI | Count / Acres                            | Percent of ROI | Count / Acres                            | Percent of ROI |   |
| Electrical System Reliability |            | -   |   | -              |  | -              |  | -              | The Blue/Orange Route and Variation 2 both parallel one existing Manitoba - Minnesota tie line for part of their length, while Variation 1 does not parallel any existing Manitoba - Minnesota tie lines. |
| Cost                          | Total Cost | -   | \$33,247,088                              | -              |  | -              |  | -              | Variation 1 would cost the most to construct.   |



- 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
  - 89 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 5.



Map 4-5

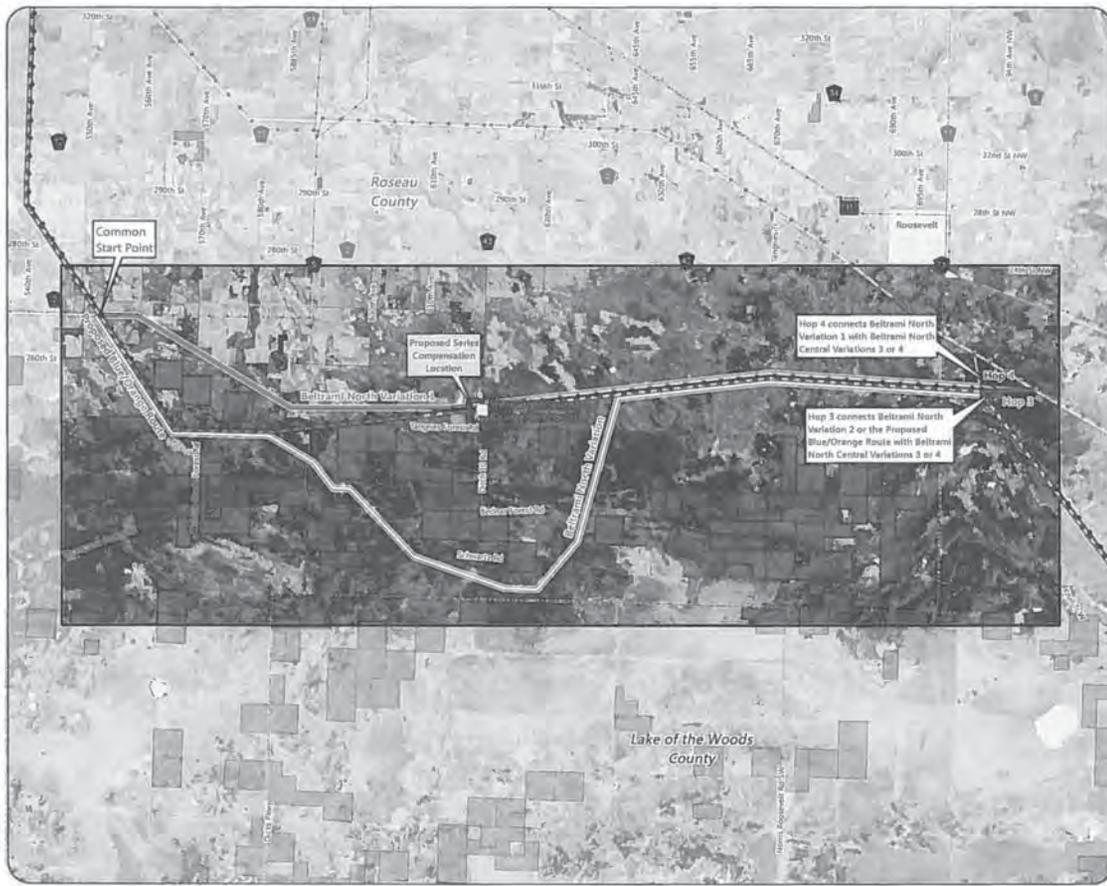
**CEDAR BEND WMA VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement



| Relative Merits                                  |                               | Cedar Bend WMA Variation |   |                 |                                       | Notes  |  |
|--|-------------------------------|--------------------------|---|-----------------|---------------------------------------|--|--|
| Factor   | Element                       | ROI                      | Proposed Blue / Orange Route (24.7 miles) |                 | Cedar Bend WMA Variation (19.6 miles) |  |  |
|  |                               |                          | Count / Acres                             | Percent of ROI  | Count / Acres                         |  | Percent of ROI   |
| Human Settlement                                 | <b>Aesthetics</b>             |                          |   |                 |                                       |  |  |
|  | Residences                    | 1,500 feet (within ROW)  | 11 (0)                                    | -               | -                                     | -  | The Cedar Bend WMA Variation would potentially impact ten times as many residences as the Blue/Orange Route and contains 4 homes within the ROW.   |
|  | Historic Architectural Sites  | 5,280 feet               | 0   | -               | 8                                     | -  | The Cedar Bend WMA Variation has a higher potential to impact eight known architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.  |
|  | State Scenic Byways           | 1,500 feet               | 1   | -               | 1                                     | -  | Both Alternatives would cross State Highway 11 - Waters of the Dancing Sky Scenic Byway. Both Alternatives would cross the scenic byway adjacent to existing transmission lines of similar design.   |
|  | Trails                        |                          | 2   | -               | 2                                     | -  | Both Alternatives would cross two snowmobile trails.   |
|  | <b>Land Use Compatibility</b> |                          |   |                 |                                       |  |  |
|  | Dominant Land Cover Type      | 1,500 feet               | 8,045 ac                                  | 88.1%           | 4,180 ac                              | 57.3%  | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 281). |
| Land Ownership                                   |                               | 599 acres total          |   | 475 acres total |                                       | The Blue/Orange Route contains more than five times as many acres of public land; however, it would potentially impact the fewest private land owners. |  |
| Public   | 200 feet                      | 447                      | 74.6%                                     | 84              | 17.7%                                 |  |  |
| Private  |                               | 152                      | 25.4%                                     | 391             | 82.3%                                 |  |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet               | 844                                       | 9.2%            | 2,625                                 | 36.0%  | The Cedar Bend WMA Variation would potentially impact three times as many acres of agricultural land than the Blue/Orange Route.   |
|  | Forestry                      | 200 feet                 | 372                                       | 62.1%           | 76                                    | 16.4%  | The Blue/Orange Route contains more than four times as many acres of State Forest land than the Variation.   |
|  | Mining & Mineral Leases       |                          | 97  | 16.2%           | 0                                     | 0.0%   | The Blue/Orange Route would potentially impact more mining and mineral lease lands.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet               | 0   | -               | 8                                     | -  | The Cedar Bend WMA Variation has a higher potential to impact eight known architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. The Cedar Bend WMA Variation also has a higher potential to impact two known archaeological sites within 1,500 feet.   |
|  | Archaeological Sites          | 1,500 feet               | 0   | -               | 2                                     | -  |  |
| Water Resources                                  | PWI Waters                    |                          | 4   | -               | 5                                     | -  | Both Alternatives would cross a number of waterbodies, however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.  |
|  | Non-PWI Waters                |                          | 12  | -               | 11                                    | -  |  |
|  | Impaired Waters               |                          | 2   | -               | 3                                     | -  |  |

| Relative Merits                   |                                   |                                       | Cedar Bend WMA Variation                  |                |                                       |                | Notes  |
|-----------------------------------|-----------------------------------|---------------------------------------|---|----------------|---------------------------------------|----------------|--|
| Factor                            | Element                           | ROI                                   | Proposed Blue / Orange Route (24.7 miles) |                | Cedar Bend WMA Variation (19.6 miles) |                |  |
|                                   |                                   |                                       | Count / Acres                             | Percent of ROI | Count / Acres                         | Percent of ROI |  |
| Water Resources                   | Floodplains                       | Crossings or 200 feet                 | 0   | 0.0%           | 32                                    | 6.7%           | The Cedar Bend WMA Variation would potentially impact a FEMA-designated floodplain as it would require construction and placement of transmission structures within Zone A of two floodplain areas. Impacts to floodplains are expected to be minimal (pg. 298).   |
|                                   | NWI Wetlands                      |                                       | 466                                       | 77.8%          | 154                                   | 32.4%          | The Blue/Orange Route would potentially impact three times as many acres of NWI-mapped wetlands and the Cedar Bend WMA Variation. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 299).  |
| Vegetation                        | Boreal Flooded & Swamp Forest     | 200 feet                              | 338                                       | 56.4%          | 117                                   | 24.8%          | The Blue/Orange Route contains a greater amount of forest land and Cedar Bend Variation contains a greater amount of agricultural land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 300).   |
|                                   | Boreal Forest                     |                                       | 110                                       | 18.4%          | 57                                    | 12.0%          |  |
|                                   | Cool Temperate Forest             |                                       | 37  | 6.2%           | 28                                    | 5.9%           |  |
|                                   | Eastern Flooded & Swamp Forest    |                                       | 58  | 9.7%           | 84                                    | 13.5%          |  |
|                                   | Herbaceous Agricultural           |                                       | 41  | 6.8%           | 186                                   | 39.1%          |  |
|                                   | Other                             |                                       | 15  | 2.5%           | 23                                    | 4.8%           |  |
| Wildlife                          | WMAs                              | 200 feet                              | 44  | 7.3%           | 0                                     | 0.0%           | The Blue/Orange Route contains more acres of WMA and crosses one DNR shallow lake. Both Alternatives contain similar amounts of Grassland Bird Conservation Areas; however, ongoing vegetation management of the ROW in early successional vegetative state, would be compatible with grassland bird species' habitat requirements (pg. 302).  |
|                                   | Shallow Lakes                     |                                       | 1   | 0.2%           | 0                                     | 0.0%           |  |
|                                   | Grassland Bird Conservation Areas |                                       | 50  | 8.4%           | 10                                    | 2.1%           |  |
| Rare and Unique Natural Resources | Rare Species                      | 1 mile (aquatic species not included) | 2   | -              | 0                                     | -              | The Blue/Orange Route is located within one mile of two documented vascular plants. Surveys will be performed on the final 200-foot ROW to determine if any of these species are present within the permitted ROW. Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 304). |
|                                   | Slate Rare Communities            | 200 feet                              |   |                |                                       |                | The Blue/Orange Route contains the most MBS Sites of Biodiversity, HCVF, and MBS Native Plant Communities.   |
|                                   | MBS Sites of Biodiversity         |                                       | 43  | 7.2%           | 0                                     | 0.0%           |  |
|                                   | High Conservation Value Forest    |                                       | 6   | 1.3%           | 0                                     | 0.0%           |  |

| Relative Merits  |                                     |     | Cedar Bend WMA Variation                  |                |                                       |                | Notes   |
|------------------|-------------------------------------|-----|---|----------------|---------------------------------------|----------------|---|
| Factor           | Element                             | ROI | Proposed Blue / Orange Route (24.7 miles) |                | Cedar Bend WMA Variation (19.6 miles) |                |   |
|                  |                                     |     | Count / Acres                             | Percent of ROI | Count / Acres                         | Percent of ROI |   |
|                  | MBS Native Plant Communities        |     | 22  | 3.7%           | 0                                     | 0.0%           |   |
| Corridor Sharing | Paralleling Existing Infrastructure | -   | -   | 100.0%         | -                                     | 100.0%         | Both Alternatives parallel existing transmission lines for 100% of their lengths.   |
|                  | Electrical System Reliability       | -   | -   | -              | -                                     | -              | Both Alternatives parallel one existing Manitoba – Minnesota tie line for their entire length, but the Cedar Bend WMA Variation would establish two new crossings of the existing 500 kV tie line that are not necessary for the Blue/Orange Route and is also routed unacceptably close to at least two existing transmission substations. |
| Cost             | Total Cost                          | -   | \$27,197,850                              | -              | \$23,202,312                          | -              | The Blue/Orange Route would cost the most to construct. Cost for the Cedar Bend WMA have been updated since the initial data request.   |



- 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 5.



Map 4-6

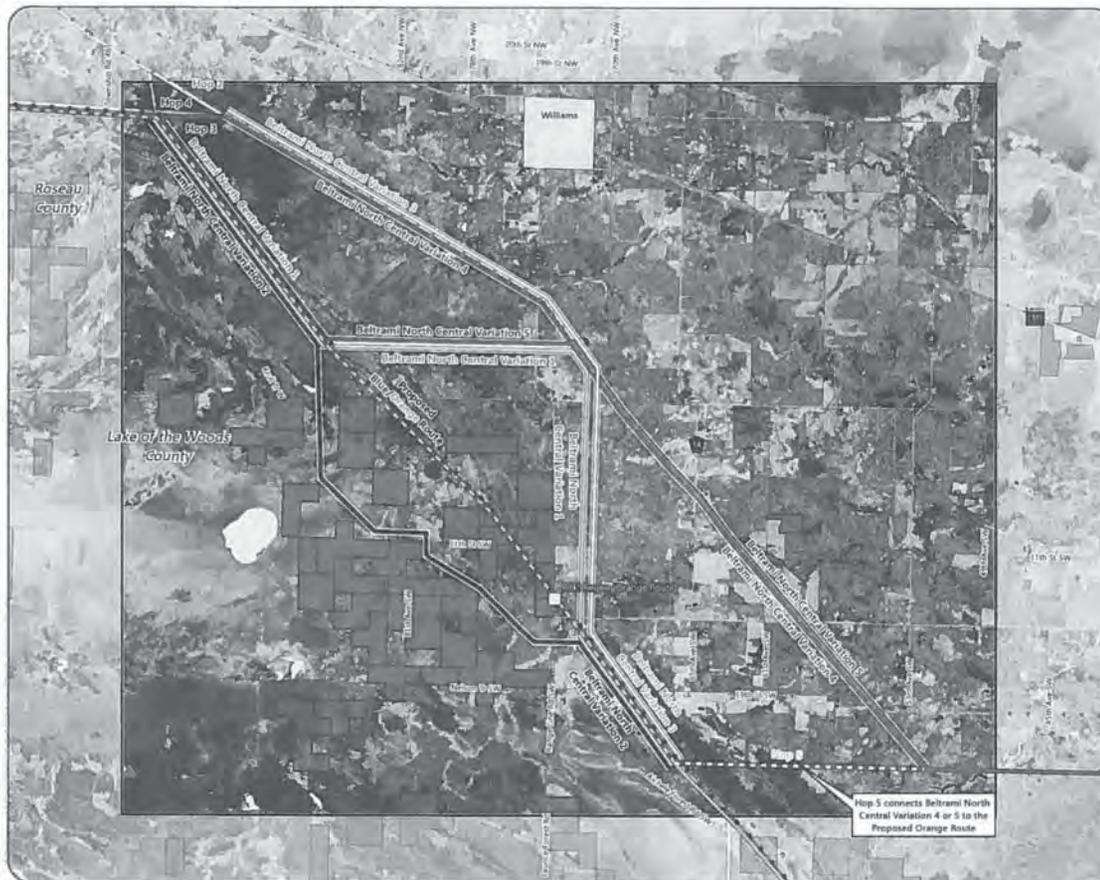
**BELTRAMI NORTH VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement



| Relative Merits                                  |                               |                       | Beltrami North Variations                 |                |   |                |   |                | Notes  |
|--|-------------------------------|-----------------------|---|----------------|---|----------------|---|----------------|--|
| Factor   | Element                       | ROI                   | Proposed Blue / Orange Route (16.5 miles) |                | Beltrami North Variation 1 (15.8 miles) |                | Beltrami North Variation 2 (19.7 miles) |                |  |
|  |                               |                       | Count / Acres                             | Percent of ROI | Count / Acres                           | Percent of ROI | Count / Acres                           | Percent of ROI |  |
|  |                               |                       |   |                |   |                |   |                |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |   |                |   |                |   |                |  |
|  | Residences                    | 1,500 feet            | 3   | -              | 6                                       | -              | 1                                       | -              | Variation 1 would potentially impact more residences than the other Alternatives.  |
|  | Historic Architectural Sites  | 5,280 feet            | 0   | -              | 0                                       | -              | 2                                       | -              | Variation 2 has a higher potential to impact 2 known architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Trails                        | 1,500 feet            | 2   | -              | 2                                       | -              | 2                                       | -              | All Alternatives would cross two snowmobile trails.  |
|  | <b>Land Use Compatibility</b> |                       |   |                |   |                |   |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 5,961 ac                                  | 97.0%          | 5,391 ac                                | 91.4%          | 7,190 ac                                | 98.5%          | All Alternatives' major land cover type is Forested and/or Swamp. All Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 311). |
|  | Land Ownership                | 200 feet              | 400 acres total                           |                | 383 acres total                         |                | 478 acres total                         |                | Variation 2 contains more acres of public land than the other Alternatives and the fewest acres of private land.   |
| Public   |                               | 372                   | 93.0%                                     | 297            | 77.5%                                   | 462            | 96.7%                                   |                |  |
| Private  |                               | 28                    | 7.0%                                      | 86             | 22.5%                                   | 16             | 3.4%                                    |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 84  | 1.4%           | 358                                     | 6.1%           | 22                                      | 0.3%           | Variation 1 would potentially impact four times as many acres of agricultural land than the Blue/Orange Route  |
|  | Forestry                      | 200 feet              | 372                                       | 93.0%          | 291                                     | 76.0%          | 462                                     | 96.7%          | Variation 2 contains the most acres of State Forest; Variation 1 contains the fewest.  |
|  | Mining & Mineral Leases       | 200 feet              | 97  | 24.3%          | 97                                      | 25.3%          | 152                                     | 31.8%          | Variation 2 would potentially impact more mining and mineral lease lands than the Blue/Orange Route and Variation 1.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 0   | -              | 0                                       | -              | 2                                       | -              | Variation 2 has a higher potential to impact two known architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. Variation 2 also has a higher potential to impact two known archaeological sites within 1,500 feet.   |
|  | Archaeological Sites          | 1,500 feet            | 0   | -              | 0                                       | -              | 2                                       | -              |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 4   | -              | 9                                       | -              | 3                                       | -              | All Alternatives would cross a number of waterbodies; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |                       | 7   | -              | 4                                       | -              | 12                                      | -              |  |
|  | Impaired Waters               |                       | 2   | -              | 6                                       | -              | 2                                       | -              |  |
|  | Floodplains                   |                       | 0   | 0.0%           | -                                       | 0.0%           | 0                                       | 0.0%           | No Alternatives would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                       | 323                                       | 80.8%          | 294                                     | 76.8%          | 391                                     | 81.9%          | All Alternatives would potentially impact a similar amount of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 316).   |

| Relative Merits                   |   |                                       | Beltrami North Variations                 |                |   |                |   |                | Notes  |
|-----------------------------------|---|---------------------------------------|---|----------------|---|----------------|---|----------------|--|
| Factor                            | Element                                       | ROI                                   | Proposed Blue / Orange Route (16.5 miles) |                | Beltrami North Variation 1 (15.8 miles) |                | Beltrami North Variation 2 (19.7 miles) |                |  |
|                                   |   |                                       | Count / Acres                             | Percent of ROI | Count / Acres                           | Percent of ROI | Count / Acres                           | Percent of ROI |  |
| Vegetation                        | North American Boreal Flooded & Swamp Forest  | 200 feet                              | 242                                       | 80.5%          | 221                                     | 57.7%          | 300                                     | 62.8%          | All Alternatives would potentially impact a similar amount of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 318).  |
|                                   | North American Boreal Forest                  |                                       | 94  | 23.5%          | 84                                      | 21.9%          | 117                                     | 24.5%          |  |
|                                   | Eastern North American Cool Temperate Forest  |                                       | 27  | 6.8%           | 24                                      | 6.3%           | 21                                      | 4.4%           |  |
|                                   | Eastern North American Flooded & Swamp Forest |                                       | 26  | 6.5%           | 38                                      | 9.9%           | 35                                      | 7.3%           |  |
|                                   | Other   |                                       | 11  | 2.8%           | 54                                      | 14.1%          | 40                                      | 8.4%           |  |
| Wildlife                          | Shallow Lakes                                 | 200 feet                              | 1   | -              | 0                                       | -              | 1                                       | -              | Variation 2 contains more acres of land designated as an Important Bird Area and the Blue/Orange Route and Variation 2 both cross one DNR Shallow Lake. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 319).   |
|                                   | Important Bird Areas                          |                                       | 0   | 0.0%           | 0                                       | 0.0%           | 23                                      | 4.8%           |  |
| Rare and Unique Natural Resources | Rare Species                                  | 1 mile (aquatic species not included) | 2   |                | 1                                       | -              | 7                                       |                | Variation 2 is located within one mile of seven documented vascular plants. Surveys will be performed on the final 200-foot ROW to determine if any of these species are present within the permitted ROW. Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 322). |
|                                   | State Rare Communities                        | 200 feet                              |   |                |   |                |   |                |  |
|                                   | MBS Sites of Biodiversity                     |                                       | 0   | 0.0%           | 8                                       | 1.6%           | 30                                      | 6.3%           |  |
|                                   | High Conservation Value Forest                |                                       | 8   | 2.0%           | 0                                       | 0.0%           | 8                                       | 1.7%           |  |
| MBS Native Plant Communities      |   |                                       | 0   | 0.0%           | 0                                       | 0.0%           | 8                                       | 1.7%           | Variation 2 contains the most amount of MBS Sites of Biodiversity, Blue/Orange has the fewest. All Alternatives contain relatively few or no acres of HCVF and MBS Native Plant Communities.   |

| Relative Merits               |                                     | Beltrami North Variations |   |                |   |                |   | Notes |  |
|-------------------------------|-------------------------------------|---------------------------|---|----------------|---|----------------|---|-------|--|
| Factor                        | Element                             | ROI                       | Proposed Blue / Orange Route (16.6 miles) |                | Beltrami North Variation 1 (15.8 miles) |                | Beltrami North Variation 2 (19.7 miles) |       |  |
|                               |                                     |                           | Count / Acres                             | Percent of ROI | Count / Acres                           | Percent of ROI | Count / Acres                           |       | Percent of ROI   |
| Corridor Sharing              | Paralleling Existing Infrastructure | -                         | -   | 100.0%         | -                                       | 72.0%          | -                                       | 53.0% | The Blue/Orange Route parallels existing transmission lines for 100% of its length; Variation 1 for 72%; and Variation 2 for 53%. All three Alternatives share a similar corridor for most of their lengths; when that similar corridor is removed from consideration; Variation 2 would not parallel any existing transmission lines. |
| Electrical System Reliability |                                     | -                         | -   | -              | -                                       | -              | -                                       | -     | All Alternatives all parallel one existing Manitoba – Minnesota tie line for a significant part of their length.   |
| Cost                          | Total Cost                          | -                         | \$18,984,370                              | -              | \$19,591,868                            | -              | -                                       | -     | Variation 2 would cost the most to construct. <i>Cost for Variation 1 have been updated since the initial data request.</i>  |



- 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 5.



**BELTRAMI NORTH CENTRAL VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement



| Relative Merits                                  |                              | Beltrami North Central Variations |   |                |   |                |   |                |   |                |   |                |   | Notes |   |
|--|------------------------------|-----------------------------------|---|----------------|---|----------------|---|----------------|---|----------------|---|----------------|---|-------|---|
| Factor   | Element                      | ROI                               | Proposed Blue / Orange Route (11.6 miles) |                | Beltrami North Central Variation 1 (13.7 miles) |                | Beltrami North Central Variation 2 (12.6 miles) |                | Beltrami North Central Variation 3 (12.2 miles) |                | Beltrami North Central Variation 4 (13.5 miles) |                | Beltrami North Central Variation 5 (15.0 miles) |       |   |
|  |                              |                                   | Count / Acres                             | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   |       | Percent of ROI  |
| Human Settlement                                 | Aesthetics                   |                                   |   |                |   |                |   |                |   |                |   |                |   |       | Beltrami North Variation 4 would potentially impact the most residences within 1,500 feet.<br>Variations 4 and 5 have a potential to impact one known historic site within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.<br>All Alternatives would cross one snowmobile trail.   |
|  | Residences                   | 1,500 feet                        | 3   | —              | 2   | —              | 2   | —              | 4   | —              | 10  | —              | 8   | —     |   |
|  | Historic Architectural Sites | 5,280 feet                        | 0   | —              | 0   | —              | 0   | —              | 0   | —              | 1   | —              | 1   | —     |   |
|  | Trails                       | 1,500 feet                        | 1   | —              | 1   | —              | 1   | —              | 1   | —              | 1   | —              | 1   | —     |   |
|  | Land Use Compatibility       |                                   |   |                |   |                |   |                |   |                |   |                |   |       |   |
|  | Dominant Land Cover Type     | 1,500 feet                        | 4,304 ac                                  | 98.7%          | 5,005 ac  | 97.7%          | 4,553 ac  | 98.8%          | 4,460 ac  | 97.2%          | 4,874 ac  | 92.0%          | 5,219 ac  | 92.9% |   |
| Land Ownership                                   |                              |                                   | 281 acres total                           |                | 332 acres total                                 |                | 296 acres total                                 |                | 296 acres total                                 |                | 327 acres total                                 |                | 304 acres total                                 |       | All Alternatives contain similar amounts of public land.  |
|  | Public                       | 200 feet                          | 242                                       | 86.1%          | 237   | 71.4%          | 56  | 83.8%          | 184   | 62.2%          | 178   | 54.4%          | 230   | 63.3% |   |
|  | Private                      | 200 feet                          | 39  | 13.9%          | 95  | 28.6%          | 50  | 16.4%          | 112   | 37.9%          | 149   | 45.5%          | 154   | 42.4% |   |
| Land-Based Economies                             | Agriculture                  | 1,500 feet                        | 1   | 0.0%           | 49  | 1.0%           | 0   | 0.0%           | 49  | 1.1%           | 278   | 5.4%           | 277   | 4.9%  | The Blue/Orange Route and Variation 2 would potentially impact the fewest acres of agricultural land whereas Variations 4 and 5 would potentially impact the most.<br>All Alternatives contain similar amounts of State Forest land.  |
|  | Forestry                     | 200 feet                          | 224                                       | 79.7%          | 237   | 71.4%          | 55  | 83.5%          | 184   | 62.2%          | 178   | 54.4%          | 230   | 63.3% |   |
| Archaeology and Historic Architectural Resources | Mining & Mineral Leases      | 200 feet                          | 0   | 0.0%           | 0   | 0.0%           | 0   | 0.0%           | 0   | 0.0%           | 0   | 0.0%           | 0   | 0.0%  | No Alternatives would impact any mining or mineral leases.<br>Variations 4 and 5 have a potential to impact one known historic site within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. No Alternatives would impact any known archaeological sites within 1,500 feet.  |
|  | Historic Architectural Sites | 5,280 feet                        | 0   | —              | 0   | —              | 0   | —              | 0   | —              | 1   | —              | 1   | —     |   |
|  | Archaeological Sites         | 1,500 feet                        | 0   | —              | 0   | —              | 0   | —              | 0   | —              | 0   | —              | 0   | —     |   |
|  |                              |                                   | 8   | —              | 8   | —              | 1   | —              | 2   | —              | 8   | —              | 8   | —     | All Alternatives would cross a number of waterbodies; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.<br>All Alternatives would cross FEMA-designated floodplains; however, these crossings are spannable and structures would not be placed within the floodplain.<br>All Alternatives would potentially impact a similar amount of NW-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 337). |
|  |                              |                                   | 8   | —              | 8   | —              | 0   | —              | 0   | —              | 8   | —              | 7   | —     |   |
|  |                              |                                   | 1   | 0.4%           | 1   | 0.6%           | 0   | —              | 0   | —              | 0   | —              | 0   | 0.6%  |   |
|  |                              |                                   | 96  | 96.7%          | 96  | 94.5%          | 96  | —              | 96  | —              | 96  | —              | 96  | 92.7% |   |
|  |                              |                                   | 90  | 62.9%          | 60  | —              | 178   | —              | 107   | —              | 106   | —              | 163   | 44.8% | All Alternatives would potentially impact similar amounts of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 336).  |
|  |                              |                                   | 86  | 23.5%          | 184   | 31.3%          | 78  | —              | 100   | —              | 114   | —              | 118   | 31.6% |   |
|  |                              |                                   | 38  | 10.7%          | 38  | 10.2%          | 42  | —              | 51  | —              | 52  | —              | 60  | 15.1% |   |
|  |                              |                                   | 1   | 2.8%           | 1   | 4.2%           | 7   | —              | 8   | —              | 8   | —              | 11  | —     |   |

| Relative Merits                   |   |                                       | Beltrami North Central Variations         |                |   |                |   |                |   |                |   |                |   |                | Notes   |
|-----------------------------------|---|---------------------------------------|---|----------------|---|----------------|---|----------------|---|----------------|---|----------------|---|----------------|---|
| Factor                            | Element   | ROI                                   | Proposed Blue / Orange Route (11.6 miles) |                | Beltrami North Central Variation 1 (13.7 miles) |                | Beltrami North Central Variation 2 (12.6 miles) |                | Beltrami North Central Variation 3 (12.2 miles) |                | Beltrami North Central Variation 4 (13.5 miles) |                | Beltrami North Central Variation 5 (15.0 miles) |                |   |
|                                   |   |                                       | Count / Acres                             | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI |   |
| Wildlife                          | Important Bird Areas                                | 200 feet                              | 117                                       | 41.6%          | 31  | 9.3%           | 127   | 51.4%          | 31  | 10.5%          | 33  | 10.1%          | 33  | 9.1%           | The Orange/Blue Route and Variation 2 contain more acres of designated Important Bird Area lands than the other Variations. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 339).  |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 4   | -              | 4   | -              | 4   | -              | 4   | -              | 0   | -              | 3   | -              | All Alternatives (except Variation 4) are within one mile of three to four documented vascular plants. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 341). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 101                                       | 35.9%          | 15  | 4.5%           | 115   | 37.6%          | 15  | 5.1%           | 0   | 0.0%           | 6   | 0.0%           | The Blue/Orange and Variation 2 contain similar amounts of MBS Sites of Biodiversity; however it should be noted that not all biodiversity significance ranks have been determined for Lake of the Woods County.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 |                                       |   | 100.0%         |   | 48.0%          |   | 49.0%          |   | 70.0%          |   | 82.0%          |   | 70.0%          | The Blue/Orange Route parallels existing transmission lines for 100% of its length.   |
| Electrical System Reliability     |   |                                       |   | -              |   | -              |   | -              |   | -              |   | -              |   | -              | The Blue/Orange Route and the five Variations all parallel one existing Manitoba - Minnesota tie line for a significant part of their length. Variations 1 and 3 also establish two new crossings of the existing 500 kV tie line that are not necessary for the Blue/Orange Route.   |
| Cost                              | Total Cost  |                                       | \$12,574,123                              | -              | \$14,368,802                                    | -              | \$14,478,550                                    | -              |   | -              |   |                |   | -              | Variation 4 would cost the most to construct. Costs for Variations 1, 3, 4, and 5 have been updated since the initial data request.   |



- 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 only 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 5.



Map 4-9

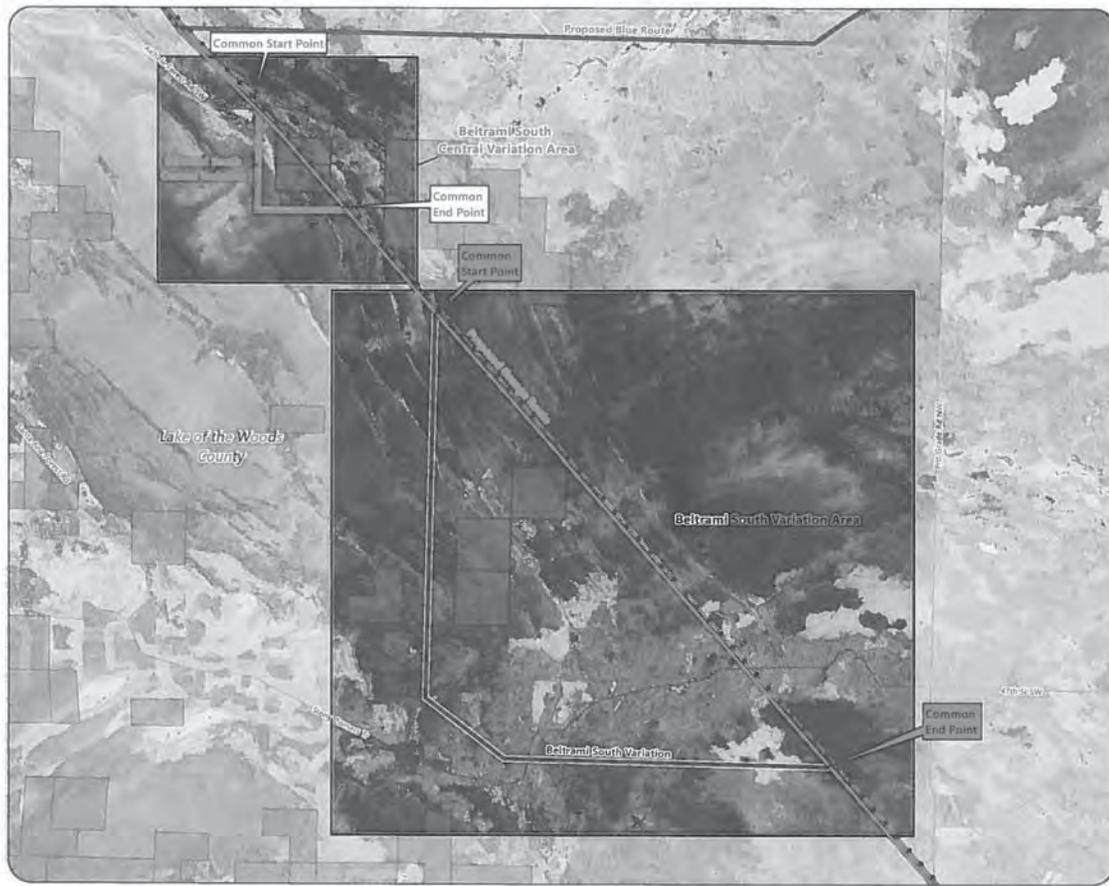
**PINE ISLAND VARIATION AREA**  
 Great Northern Transmission Line  
 Draft Environmental Impact Statement



| Relative Merits                                  |                               |                       | Pine Island Variation Area           |                |  |                | Notes  |
|--|-------------------------------|-----------------------|--------------------------------------|----------------|--|----------------|--|
| Factor   | Element                       | ROI                   | Proposed Blue Route<br>(109.8 miles) |                | Proposed Orange Route<br>(105.4 miles) |                |  |
|  |                               |                       | Count / Acres                        | Percent of ROI | Count / Acres                          | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |                                      |                |  |                |  |
|  | Residences                    | 1,500 feet            | 14                                   | -              | 2                                      | -              | The Blue Route would potentially impact more residences than the Orange Route.   |
|  | Historic Architectural Sites  | 5,280 feet            | 2                                    | -              | 7                                      | -              | The Orange Route has a higher potential to impact known historic architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Trails                        |                       | 5                                    |                | 8                                      |                | Both Alternatives would cross one state trail and one water trail. The Orange Route would cross one more snowmobile trail than the Blue Route.   |
|  | <b>Land Use Compatibility</b> |                       |                                      |                |  |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 38,203 ac                            | 95.4%          | 37,685 ac                              | 98.0%          | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 384-385). |
|  | Land Ownership                | 200 feet              | 2,662 acres total                    |                | 2,555 acres total                      |                | Both Alternatives contain similar amounts of public and private lands.   |
| Public   |                               | 2,299                 | 86.4%                                | 2,326          | 91.0%                                  |                |  |
| Private  |                               | 363                   | 13.6%                                | 229            | 9.0%                                   |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 985                                  | 2.5%           | 305                                    | 0.8%           | The Blue Route would potentially impact almost three times as many acres of agricultural land.   |
|  | Forestry                      |                       | 2,291                                | 86.1%          | 1,980                                  | 77.5%          | Both Routes contain similar amounts of State Forest lands.   |
|  | Mining & Mineral Leases       | 200 feet              | 1,205                                | 45.3%          | 370                                    | 14.5%          | The Blue Route would potentially impact over three times as many acres of mining and mineral leases than the Orange Route.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 2                                    | -              | 7                                      | -              | The Orange Route has a higher potential to impact known historic architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Archaeological Sites          | 1,500 feet            | 1                                    | -              | 0                                      | -              | The Blue Route is within 1,500 feet of a known archaeological site.  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 18                                   | -              | 25                                     | -              | Both Alternatives would a similar number of PWI, non-PWI, and impaired waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.  |
|  | Non-PWI Waters                |                       | 48                                   | -              | 46                                     | -              |  |
|  | Impaired Waters               |                       | 1                                    | -              | 1                                      | -              |  |
|  | Trout Stream                  |                       | 1                                    | -              | 0                                      | -              |  |
|  | Floodplains                   |                       | 20                                   | -              | 11                                     | -              | Both Routes would cross FEMA-designated floodplains; however, crossings would be less than the average spanning length of 1,250 feet and structures would not be placed in them.   |

| Relative Merits                   |   |                                       | Pine Island Variation Area           |                |  |                | Notes  |
|-----------------------------------|---|---------------------------------------|--------------------------------------|----------------|--|----------------|--|
| Factor                            | Element                                       | ROI                                   | Proposed Blue Route<br>(109.8 miles) |                | Proposed Orange Route<br>(105.4 miles) |                |  |
|                                   |   |                                       | Count / Acres                        | Percent of ROI | Count / Acres                          | Percent of ROI |  |
|                                   | NWI Wetlands                                  |                                       | 2,102                                | 79.0%          | 1,875                                  | 73.4%          | The Orange Route would potentially impact slightly more acres of NWI-mapped wetlands than the East Bear Lake Variation. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 391).  |
| Vegetation                        | North American Boreal Flooded & Swamp Forest  | 200 feet                              | 1,372                                | 51.5%          | 1,323                                  | 51.8%          | Both Alternatives would potentially impact a similar amount of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 393).   |
|                                   | North American Boreal Forest                  |                                       | 785                                  | 29.5%          | 760                                    | 30.1%          |  |
|                                   | Eastern North American Flooded & Swamp Forest |                                       | 386                                  | 13.8%          | 358                                    | 14.0%          |  |
|                                   | Other   |                                       | 139                                  | 5.2%           | 1,232                                  | 48.2%          |  |
| Wildlife                          | WMAs  | 200 feet                              | 49                                   | 1.8%           | 274                                    | 10.7%          | The Blue Route contains fewer acres of WMA than the Orange Route.  |
|                                   | Important Bird Areas                          |                                       | 1,405                                | 52.8%          | 1,722                                  | 67.4%          | Both Alternatives contain a similar amount of land designated as an Important Bird Area. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 395).  |
| Rare and Unique Natural Resources | Rare Species                                  | 1 mile (aquatic species not included) | 6                                    | -              | 13                                     | -              | The Orange Route is within one mile of more than twice as many documented rare species than the Blue Route. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 397). |
|                                   | Slate Rare Communities                        | 200 feet                              | -                                    | -              | -                                      | -              | Both Routes contain few acres of Ecologically Important Lowland Conifers; however, the Blue Route would pass through more acres than the Orange Route.   |
|                                   | Ecologically Important Lowland Conifers       |                                       | 29                                   | 1.1%           | 5                                      | 0.2%           |  |
|                                   | MBS Sites of Biodiversity                     |                                       | 1,514                                | 56.8%          | 1,839                                  | 64.1%          | Both Routes contain similar amounts of MBS Sites of Biodiversity.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure           | -                                     | -                                    | 39.0%          | -                                      | 23.0%          | The Blue Route parallels existing transmission lines for 39% of its length; the Orange Route for 23% of its length.  |

| Relative Merits               |            |     | Pine Island Variation Area           |                   |  |                   | Notes   |
|-------------------------------|------------|-----|--------------------------------------|-------------------|--|-------------------|---|
| Factor                        | Element    | ROI | Proposed Blue Route<br>(109.8 miles) |                   | Proposed Orange Route<br>(105.4 miles) |                   |   |
|                               |            |     | Count / Acres                        | Percent<br>of ROI | Count / Acres                          | Percent<br>of ROI |   |
| Electrical System Reliability |            | -   |                                      | -                 |  | -                 | Both proposed routes parallel one existing Manitoba – Minnesota tie line for a significant part of their length. The Blue Route also establishes two new crossings of the existing 500 kV tie line that are not necessary for the Orange Route. |
| Cost                          | Total Cost | -   | \$118,876,237                        | -                 | \$113,672,041                          | -                 | The Blue Route would cost the most to construct. <i>The cost of the Blue Route has been updated since the initial data request.</i>   |



- Proposed Routes**
- Blue/Orange Route
  - Blue Route
  - Orange Route
- Alternatives**
- Beltrami South Central Variation
  - Beltrami South Variation
  - 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 5.



**BELTRAMI SOUTH CENTRAL AND BELTRAMI SOUTH VARIATION AREAS**  
Great Northern Transmission Line  
Draft Environmental Impact Statement

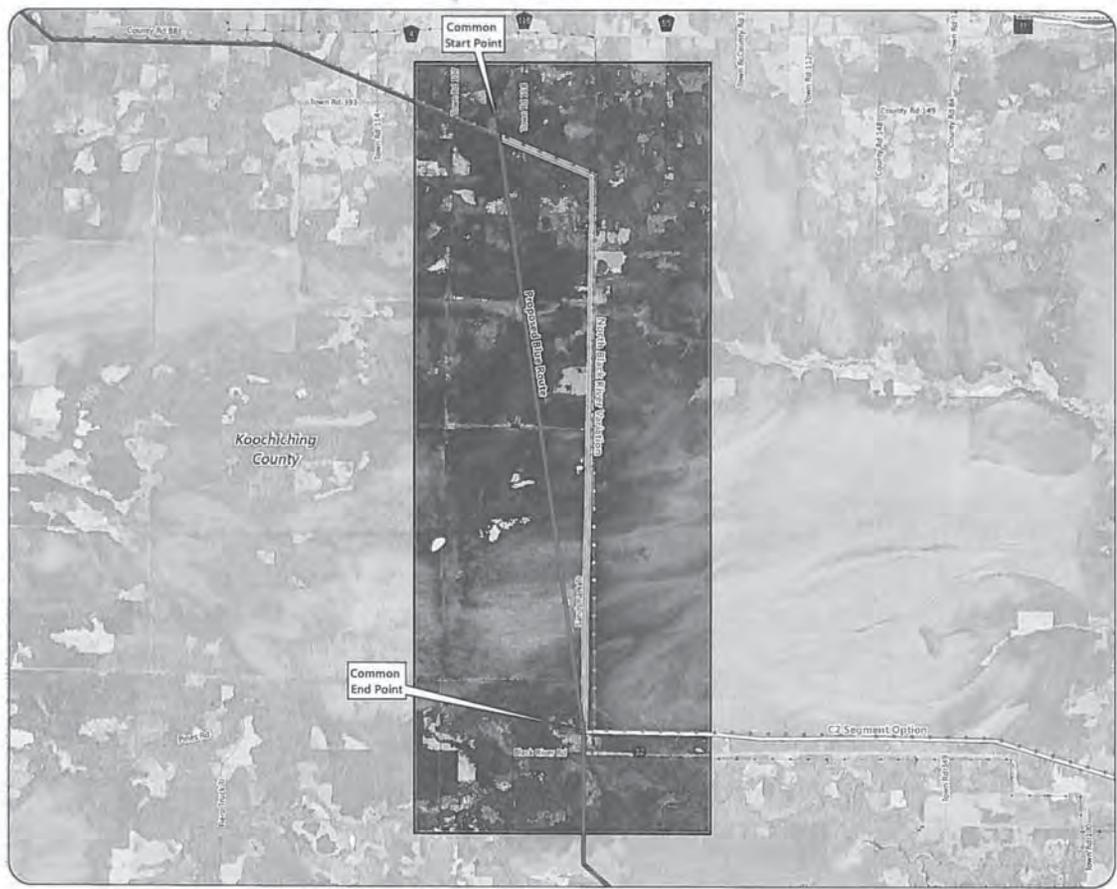
U.S. DEPARTMENT OF ENERGY U.S. DEPARTMENT OF COMMERCE

| Relative Merits                                  |  | Beltrami South Central Variations |                                   |                |  | Notes  |  |
|--|--|-----------------------------------|-----------------------------------|----------------|--|--------|--|
| Factor   | Element                                      | ROI                               | Proposed Orange Route (1.2 miles) |                | Beltrami South Central Variation (1.7 miles) |        |  |
|  |  |                                   | Count / Acres                     | Percent of ROI | Count / Acres                                |        | Percent of ROI   |
| Human Settlement                                 | <b>Aesthetics</b>                            |                                   |                                   |                |  |        |  |
|  | Residences                                   | 1,500 feet                        | 0                                 | -              | 0  | -      | Neither Alternative would impact residences within 1,500 feet.   |
|  | Historic Architectural Sites                 | 5,280 feet                        | 0                                 | -              | 0  | -      | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Trails                                       | 1,500 feet                        | 1                                 | -              | 1  | -      | Both Alternatives would cross one snowmobile trail.  |
|  | <b>Land Use Compatibility</b>                |                                   |                                   |                |  |        |  |
|  | Dominant Land Cover Type                     | 1,500 feet                        | 596 ac                            | 98.8%          | 773 ac                                       | 99.2%  | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 402). |
|  | Land Ownership                               | 200 feet                          | 29 acres total                    |                | 41 acres total                               |        | Both Alternatives are entirely located within public lands and neither would impact private land owners.   |
| Public   |  | 30                                | 103.1%                            | 43             | 104.4%                                       |        |  |
| Private  |  | 0                                 | 0.0%                              | 0              | 0.0%   |        |  |
| Land-Based Economies                             | Agriculture                                  | 1,500 feet                        | 0                                 | 0.0%           | 0  | 0.0%   | Neither Alternative would impact agricultural land.  |
|  | Forestry                                     |                                   | 30                                | 103.1%         | 43   | 104.4% | Both Alternatives are entirely located within State Forest lands.  |
|  | Mining & Mineral Leases                      | 200 feet                          | 0                                 | 0.0%           | 0  | 0.0%   | Neither Alternative would impact any mining or mineral leases.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites                 | 5,280 feet                        | 0                                 | -              | 0  | -      | Neither Alternative would impact any known historic architectural sites or archaeological sites.   |
|  | Archaeological Sites                         | 1,500 feet                        | 0                                 | -              | 0  | -      |  |
| Water Resources                                  | PWI Waters                                   | Crossings or 200 feet             | 0                                 | -              | 0  | -      | Neither Alternative would cross any PWI, non-PWI, or impaired waters.  |
|  | Non-PWI Waters                               |                                   | 0                                 | -              | 0  | -      |  |
|  | Impaired Waters                              |                                   | 0                                 | -              | 0  | -      |  |
|  | Floodplains                                  |                                   | 0                                 | -              | 0  | -      | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                                 |                                   | 30                                | 103.1%         | 43   | 104.4% | Both Alternatives would potentially impact a similar amount of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 406).  |
| Vegetation                                       | North American Boreal Flooded & Swamp Forest | 200 feet                          | 24                                | 82.5%          | 32   | 77.7%  | Both Alternatives would potentially impact similar amounts of forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 406).  |
|  | Other  |                                   | 5                                 | 17.2%          | 9  | 21.8%  |  |

| Relative Merits                   |   |                                       | Beltrami South Central Variations |                |  |                | Notes  |
|-----------------------------------|---|---------------------------------------|-----------------------------------|----------------|--|----------------|--|
| Factor                            | Element   | ROI                                   | Proposed Orange Route (1.2 miles) |                | Beltrami South Central Variation (1.7 miles) |                |  |
|                                   |   |                                       | Count / Acres                     | Percent of ROI | Count / Acres                                | Percent of ROI |  |
| Wildlife                          | Important Bird Areas                                | 200 feet                              | 30                                | 103.1%         | 43   | 104.4%         | Both Alternatives are entirely located within lands designated as Important Bird Areas. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 409).   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 4                                 | -              | 4  | -              | Both Alternatives would be located within one mile of four vascular plants. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 409). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 30                                | 103.1%         | 43   | 104.4%         | Both Alternatives contain similar amounts of MBS Sites of Biodiversity.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                 | 100.0%         | -  | -              | The Orange Route parallels existing transmission lines for 100% of its length.   |
| Electrical System Reliability     |   | -                                     | -                                 | -              | -  | -              | The Orange Route parallels one existing Manitoba – Minnesota tie line for its entire length while the Variation does not parallel any existing Manitoba – Minnesota tie lines.   |
| Cost                              | Total Cost  | -                                     | \$1,214,573                       | -              | -  | -              | Beltrami South Central Variation would cost the most to construct. These costs have been updated since the initial information request.  |

| Relative Merits                                  |                               |                       | Beltram\ South Variations            |                |   |                |  |
|--|-------------------------------|-----------------------|--------------------------------------|----------------|---|----------------|--|
| Factor   | Element                       | ROI                   | Proposed Orange Route<br>(5.6 miles) |                | Beltram\ South Variation<br>(7.5 miles) |                | Notes  |
|  |                               |                       | Count / Acres                        | Percent of ROI | Count / Acres                           | Percent of ROI |  |
|  |                               |                       |                                      |                |   |                |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |                                      |                |   |                |  |
|  | Residences                    | 1,500 feet            | 0                                    | -              | 0                                       | -              | Neither Alternative would impact residences within 1,500 feet.   |
|  | Historic Architectural Sites  | 5,280 feet            | 0                                    | -              | 0                                       | -              | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Trails                        | 1,500 feet            | 0                                    | -              | 0                                       | -              | Neither Alternative would cross any trails.  |
|  | <b>Land Use Compatibility</b> |                       |                                      |                |   |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 2,186 ac                             | 99.5%          | 2,887 ac                                | 99.7%          | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 415). |
|  | Land Ownership                | 200 feet              | 136 acres total                      |                | 182 acres total                         |                | Both Alternatives are entirely located within public lands and neither would impact private land owners.   |
| Public   |                               | 136                   | 100.1%                               | 183            | 100.7%                                  |                |  |
| Private  |                               | 0                     | 0.0%                                 | 0              | 0.0%                                    |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 0                                    | 0.0%           | 0                                       | 0.0%           | Neither Alternative would impact agricultural land.  |
|  | Forestry                      |                       | 136                                  | 100.1%         | 183                                     | 100.7%         | Both Alternatives are entirely located within State Forest lands.  |
|  | Mining & Mineral Leases       | 200 feet              | 58                                   | 42.7%          | 267                                     | 157.9%         | There are more acres of mineral leases within Beltram\ South Variation than the total number of acres within the ROW. Regardless, the Beltram\ South Variation would potentially impact more mining and mineral leases than the Orange Route.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 0                                    | -              | 0                                       | -              | Neither Alternative would impact any known historic architectural sites or archaeological sites.   |
|  | Archaeological Sites          | 1,500 feet            | 0                                    | -              | 0                                       | -              |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 0                                    | -              | 0                                       | -              | Neither Alternative would cross any PWI, non-PWI, or impaired waters.  |
|  | Non-PWI Waters                |                       | 0                                    | -              | 0                                       | -              |  |
|  | Impaired Waters               |                       | 0                                    | -              | 0                                       | -              |  |
|  | Floodplains                   |                       | 0                                    | -              | 0                                       | -              | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                       | 136                                  | 100.1%         | 183                                     | 100.7%         | Both Alternatives would potentially impact a similar amount of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 418).  |

| Relative Merits                   |  |                                       | Beltrami South Variations            |                |   |                | Notes   |
|-----------------------------------|--|---------------------------------------|--------------------------------------|----------------|---|----------------|---|
| Factor                            | Element                                      | ROI                                   | Proposed Orange Route<br>(5.6 miles) |                | Beltrami South Variation<br>(7.5 miles) |                |   |
|                                   |  |                                       | Count / Acres                        | Percent of ROI | Count / Acres                           | Percent of ROI |   |
| Vegetation                        | North American Boreal Flooded & Swamp Forest | 200 feet                              | 114                                  | 83.9%          | 139                                     | 76.5%          | Both Alternatives would potentially impact similar amounts of forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 420).   |
|                                   | North American Boreal Forest                 |                                       | 18                                   | 11.6%          | 35                                      | 19.3%          |   |
|                                   | Other  |                                       | 22                                   | 16.2%          | 49                                      | 23.7%          |   |
| Wildlife                          | Important Bird Areas                         | 200 feet                              | 136                                  | 100.1%         | 183                                     | 100.7%         | Both Alternatives are entirely located on lands designated as Important Bird Areas. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 420).  |
| Rare and Unique Natural Resources | Rare Species                                 | 1 mile (aquatic species not included) | 1                                    | -              | 2                                       | -              | Beltrami South Variation is within one mile of two vascular plants; the Orange Route is within one mile of one vascular plant. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 422). |
|                                   | State Rare Communities                       | 200 feet                              |                                      |                |   |                |   |
|                                   | MBS Sites of Biodiversity                    |                                       |                                      | 120            | 88.4%                                   | 181            | 88.6%   |
| Corridor Sharing                  | Paralleling Existing Infrastructure          | -                                     | -                                    | 100.0%         | -                                       | -              | The Orange Route parallels existing transmission lines for 100% of its length.  |
| Electrical System Reliability     |  | -                                     | -                                    | -              | -                                       | -              | The Orange Route parallels one existing Manitoba – Minnesota tie line for its entire length while the Beltrami South Variation does not parallel any existing Manitoba – Minnesota tie lines.   |
| Cost                              | Total Cost                                   | -                                     | \$5,805,518                          | -              | -                                       | -              | Beltrami South Variation would cost the most to construct. <i>These costs have been updated since the initial information request.</i>  |



- 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
  - Dotted line symbol"/> 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



| Relative Merits                                  |                               |                       | North Black River Variations    |                |   |                |  |
|--|-------------------------------|-----------------------|---------------------------------|----------------|---|----------------|--|
| Factor   | Element                       | ROI                   | Proposed Blue Route (8.4 miles) |                | North Black River Variation (9.2 miles) |                | Notes  |
|  |                               |                       | Count / Acres                   | Percent of ROI | Count / Acres                           | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |                                 |                |   |                |  |
|  | Residences                    | 1,500 feet            | 1                               | -              | 5                                       | -              | North Black River Variation would potentially impact more residences than the Blue Route.  |
|  | Historic Architectural Sites  | 5,280 feet            | 0                               | -              | 0                                       | -              | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Trails                        | 1,500 feet            | 2                               | -              | 2                                       | -              | Both Alternatives would cross two snowmobile trails.   |
|  | <b>Land Use Compatibility</b> |                       |                                 |                |   |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 3,190 ac                        | 99.4%          | 3,206 ac                                | 94.3%          | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 428). |
|  | Land Ownership                | 200 feet              | 204 acres total                 |                | 223 acres total                         |                | Both Alternatives contain a similar amount of public lands; however, the Blue Route would not impact any private land owners.  |
| Public   |                               | 188                   | 92.3%                           | 158            | 70.9%                                   |                |  |
| Private  |                               | 16                    | 7.9%                            | 65             | 29.1%                                   |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 0                               | 0.0%           | 69                                      | 2.0%           | The Blue Route would not impact agricultural land.   |
|  | Forestry                      |                       | 188                             | 92.3%          | 156                                     | 70.0%          | Both Alternatives contain a similar amount of State Forest land.   |
|  | Mining & Mineral Leases       | 200 feet              | 405                             | 198.9%         | 362                                     | 162.3%         | There are more acres of mineral leases within both Alternatives than the total number of acres within the 200-foot ROW.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 0                               | -              | 0                                       | -              | Neither Alternative would impact any known historic architectural sites or archaeological sites.   |
|  | Archaeological Sites          | 1,500 feet            | 0                               | -              | 0                                       | -              |  |
| Water Resources                                  | PWI Waters                    | Crossings of 200 feet | 0                               | -              | 0                                       | -              | Both Alternatives would cross few non-PWI waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |                       | 4                               | -              | 4                                       | -              |  |
|  | Impaired Waters               |                       | 0                               | -              | 0                                       | -              |  |
|  | Floodplains                   |                       | 0                               | -              | 0                                       | -              | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                       |                                 | 193            | 94.8%                                   | 198            | 88.8%  |

| Relative Merits                   |   |                                       | North Black River Variations       |                   |  |  | Notes   |
|-----------------------------------|---|---------------------------------------|------------------------------------|-------------------|--|--|---|
| Factor                            | Element   | ROI                                   | Proposed Blue Route<br>(8.4 miles) |                   | North Black River<br>Variation (9.2 miles) |  |   |
|                                   |   |                                       | Count / Acres                      | Percent<br>of ROI | Count / Acres                              | Percent<br>of ROI  |   |
| Vegetation                        | North American Boreal Flooded & Swamp Forest        | 200 feet                              | 144                                | 70.7%             | 114  | 51.1%  | Both Alternatives would potentially impact a similar amount of forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 435).  |
|                                   | North American Boreal Forest                        |                                       | 47                                 | 23.1%             | 49   | 22.0%  |   |
|                                   | Eastern North American Flooded Swamp & Forest       |                                       | 12                                 | 5.9%              | 29   | 13.0%  |   |
|                                   | Other   |                                       | 60                                 | 29.5%             | 109  | 48.9%  |   |
| Wildlife                          | Important Bird Areas                                | 200 feet                              | 191                                | 93.8%             | 214  | 96.0%  | Both Alternatives contain a similar amount of land designated as an Important Bird Area. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 436).   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 0                                  | -                 | 0  | -  | Neither Alternative is located within one mile of a documented rare species. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 437). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 165                                | 81.0%             | 109  | 48.9%  | Both Alternatives contain similar amounts of MBS Sites of Biodiversity.   |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                  | -                 | 100.0%                                     | The North Black River Variations parallels existing transmission lines for 100% of its length.   |   |
| Electrical System Reliability     | -   | -                                     | -                                  | -                 | -  | The North Black River Variation parallels one existing Manitoba – Minnesota tie line for its entire length while the Blue Route does not parallel any existing Manitoba – Minnesota tie lines. |   |
| Cost                              | Total Cost  | -                                     | \$9,895,500                        | -                 | \$10,552,560                               | -  | The North Black River Variations would cost the most to construct. This cost has been updated since the initial information request.  |



- Proposed Regeneration Location
- Proposed Routes
- Blue Route
- Alternatives
- C2 Segment Option Variation
- Alignment Modification
- Alignment
- 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 5.



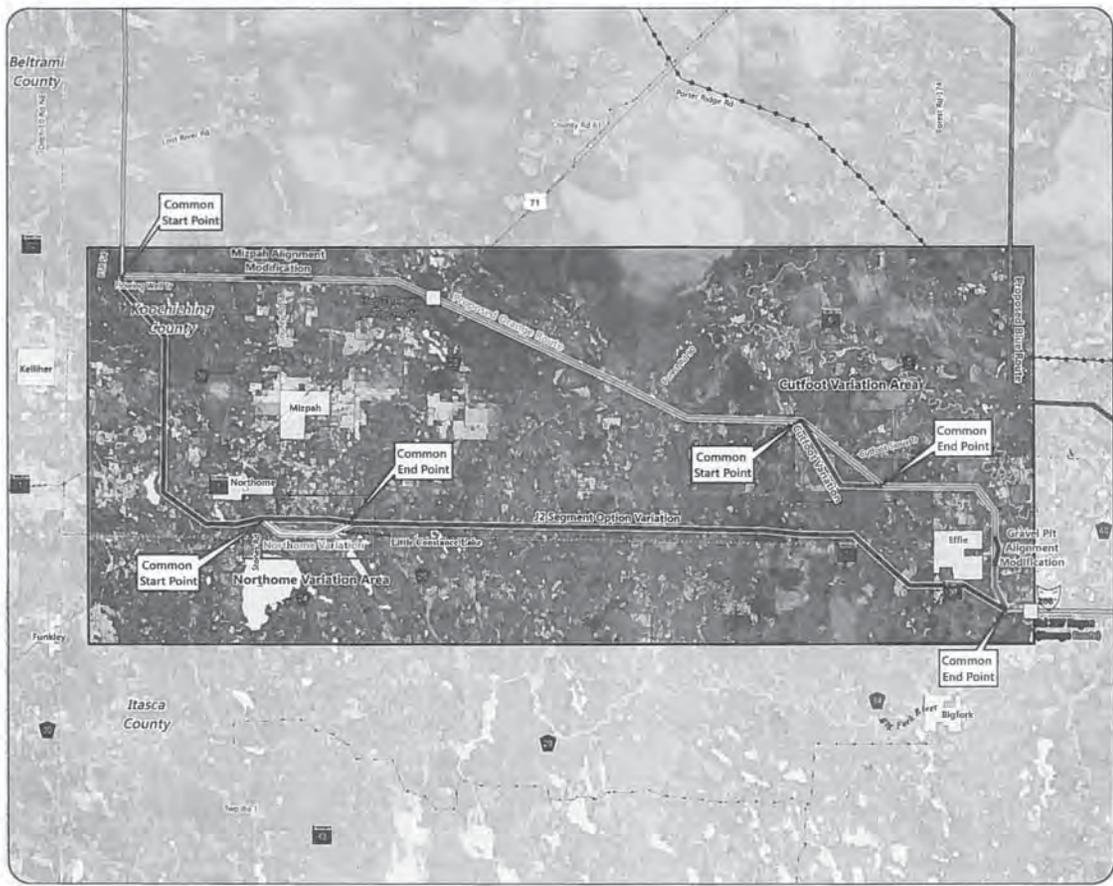
Map 4-12

**C2 SEGMENT OPTION  
VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement



| Relative Merits                                  |                               | C2 Segment Option Variation Area |                                  |                |                              | Notes |  |
|--|-------------------------------|----------------------------------|----------------------------------|----------------|------------------------------|-------|--|
| Factor   | Element                       | ROI                              | Proposed Blue Route (32.8 miles) |                | C2 Segment Option (46 miles) |       |  |
|  |                               |                                  | Count / Acres                    | Percent of ROI | Count / Acres                |       | Percent of ROI   |
| Human Settlement                                 | <b>Aesthetics</b>             |                                  |                                  |                |                              |       |  |
|  | Residences                    | 1,500 feet                       | 0                                | -              | 29                           | -     | C2 would potentially impact 29 more residences than the Blue Route.  |
|  | Historic Architectural Sites  | 5,280 feet                       | 0                                | -              | 0                            | -     | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Trails                        | 1,500 feet                       | 4                                | -              | 3                            | -     | Both Alternatives would cross one water trail and one state trail. The Blue Route would cross one more snowmobile trail than C2.   |
|  | <b>Land Use Compatibility</b> |                                  |                                  |                |                              |       |  |
|  | Dominant Land Cover Type      | 1,500 feet                       | 11,922 ac                        | 98.5%          | 16,121 ac                    | 95.5% | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 441-442). |
|  | Land Ownership                | 200 feet                         | 795 acres total                  |                | 1,115 acres total            |       | Both Alternatives contain a similar amount of public lands; however, the Blue Route would not impact any private land owners.  |
| Public   |                               | 797                              | 100.2%                           | 654            | 58.8%                        |       |  |
| Private  |                               | 0                                | 0.0%                             | 461            | 41.4%                        |       |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet                       | 0                                | 0.0%           | 167                          | 1.0%  | The Blue Route would not impact agricultural lands whereas C2 would potentially impact 167 acres.  |
|  | Forestry                      | 200 feet                         | 797                              | 100.2%         | 274                          | 24.6% | The Blue Route is located entirely within State Forest land.   |
|  | Mining & Mineral Leases       |                                  | 16                               | 2.0%           | 67                           | 6.0%  | C2 would potentially impact four times as many mining and mineral leases than the Blue Route.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet                       | 0                                | -              | 0                            | -     | Neither Alternative would impact any known historic architectural sites or archaeological sites.   |
|  | Archaeological Sites          | 1,500 feet                       | 0                                | -              | 0                            | -     |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet            | 5                                | -              | 3                            | -     | Both Alternatives would cross a number of PWI, non-PWI, and impaired waterways; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |                                  | 12                               | -              | 5                            | -     |  |
|  | Impaired Waters               |                                  | 1                                | -              | 2                            | -     |  |
|  | Floodplains                   |                                  | 6                                | -              | 28                           | -     | C2 would potentially impact more acres of FEMA-designated floodplain; however, both Alternatives would require construction and placement of transmission structures in Zone A floodplains of the Black and Big Fork Rivers, respectively (pg. 448).   |
|  | NWI Wetlands                  |                                  | 726                              | 91.5%          | 826                          | 74.3% | Both Alternatives would potentially impact similar amounts of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 449).   |

| Relative Merits                   |   |                                       | C2 Segment Option Variation Area |                |                              |  | Notes  |
|-----------------------------------|---|---------------------------------------|----------------------------------|----------------|------------------------------|--|--|
| Factor                            | Element                                       | ROI                                   | Proposed Blue Route (32.8 miles) |                | C2 Segment Option (46 miles) |  |  |
|                                   |   |                                       | Count / Acres                    | Percent of ROI | Count / Acres                | Percent of ROI   |  |
| Vegetation                        | North American Boreal Flooded & Swamp Forest  | 200 feet                              | 464                              | 60.9%          | 726                          | 65.3%  | C2 impacts almost twice as many acres of forest land than the Blue Route. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 450).   |
|                                   | North American Boreal Forest                  |                                       | 248                              | 31.2%          | 162                          | 14.5%  |  |
|                                   | Eastern North American Flooded Swamp & Forest |                                       | 56                               | 7.0%           | 185                          | 16.6%  |  |
|                                   | Other   |                                       | 311                              | 39.1%          | 387                          | 34.7%  |  |
| Wildlife                          | Important Bird Areas                          | 200 feet                              | 488                              | 59.0%          | 406                          | 36.4%  | Both Alternatives contain a similar amount of land designated as an Important Bird Area. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 452).  |
| Rare and Unique Natural Resources | Rare Species                                  | 1 mile (aquatic species not included) | 0                                | -              | 2                            | -  | C2 is within one mile of two document rare species. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 453). |
|                                   | State Rare Communities                        | 200 feet                              |                                  |                |                              |  | Both Routes would potentially impact similar amounts of the same DNR Ecologically Important Lowland Conifer stand.   |
|                                   | Ecological Important Lowland Conifers         |                                       | 7                                | 0.9%           | 6                            | 0.5%   |  |
|                                   | MBS Sites of Biodiversity                     |                                       | 642                              | 80.7%          | 510                          | 45.7%  | Both Alternatives contain similar amounts of MBS Sites of Biodiversity, the Blue Route contains slightly more acres than C2.   |
| Corridor Sharing                  | Paralleling Existing Infrastructure           | -                                     | -                                | -              | 81.0%                        | The Blue Route does not parallel existing transmission lines whereas C2 parallels existing transmission for 81% of its length.                               |  |
| Electrical System Reliability     |   | -                                     | -                                | -              | -                            | C2 parallels one existing Manitoba – Minnesota tie line for its entire length. The Blue Route does not parallel any existing Manitoba – Minnesota tie lines. |  |
| Cost                              | Total Cost                                    | -                                     | \$35,769,239                     | -              | -                            | C2 Segment would cost the most to construct.   |  |



- Proposed Regeneration Site
- Proposed Routes
  - Blue Route
  - Orange Route
- Alternatives
  - J2 Segment Option Variation
  - Northome 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 5



**J2 SEGMENT OPTION, NORTHOME AND CUTFOOT VARIATION AREAS**  
Great Northern Transmission Line  
Draft Environmental Impact Statement



| Relative Merits                                  |                               | J2 Segment Option Variation Area |                                    |                   |                                | Notes   |  |
|--|-------------------------------|----------------------------------|------------------------------------|-------------------|--------------------------------|---|--|
| Factor   | Element                       | ROI                              | Proposed Orange Route (42.2 miles) |                   | J2 Segment Option (45.2 miles) |   |  |
|  |                               |                                  | Count / Acres                      | Percent of ROI    | Count / Acres                  |   | Percent of ROI   |
| Human Settlement                                 | <b>Aesthetics</b>             |                                  |                                    |                   |                                |   |  |
|  | Residences                    | 1,500 feet                       | 0                                  | -                 | 6                              | -   | J2 would potentially impact six more residences than the Orange Route.   |
|  | Historic Architectural Sites  | 5,280 feet                       | 2                                  | -                 | 7                              | -   | J2 would potentially impact more known historical architectural sites, however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.  |
|  | Scenic Byway                  | 1,500 feet                       | 0                                  | -                 | 2                              | -   | J2 would cross Scenic Byways 46 and 38.  |
|  | Trails                        | 1,500 feet                       | 3                                  | -                 | 5                              | -   | Both Alternatives would cross one state trail; J2 would cross four snowmobile trails and the Orange Route would cross two.   |
|  | <b>Land Use Compatibility</b> |                                  |                                    |                   |                                |   |  |
|  | Dominant Land Cover Type      | 1,500 feet                       | 15,110 ac                          | 97.4%             | 15,860 ac                      | 94.1%   | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 458). |
| Land Ownership                                   | 200 feet                      | 1,023 acres total                |                                    | 1,096 acres total |                                | Both Alternatives are primarily located on public lands; however, J2 would potentially impact almost three times as many acres of private land than would the Orange Route. |  |
|  |                               | Public                           | 945                                | 92.4%             | 866                            |   | 79.2%  |
|  |                               | Private                          | 78                                 | 7.6%              | 228                            | 20.8%   |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet                       | 153                                | 1.0%              | 164                            | 1.0%  | Both Alternatives contain similar amounts of agricultural lands.   |
|  | Forestry                      |                                  | 851                                | 83.2%             | 715                            | 65.2%   | Both Alternatives contain similar amounts of State Forest lands.   |
|  | Mining & Mineral Leases       | 200 feet                         | 82                                 | 8.0%              | 73                             | 6.7%  | Both Alternatives would potentially impact a similar amount of mining and mineral lease land.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet                       | 2                                  | -                 | 7                              | -   | J2 would potentially impact more known historical architectural sites; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. Neither Alternative would impact any known archaeological sites.   |
|  | Archaeological Sites          | 1,500 feet                       | 0                                  | -                 | 0                              | -   |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet            | 6                                  | -                 | 3                              | -   | Both Alternatives would cross a number of PWI and non-PWI waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |                                  | 24                                 | -                 | 36                             | -   |  |
|  | Impaired Waters               |                                  | 0                                  | -                 | 0                              | -   |  |
|  | Floodplains                   |                                  | 3                                  | -                 | 0                              | -   | The Orange Route would cross a Zone A floodplain; however, crossings would be less than the average spanning length of 1,250 feet and structures would not be placed in them.  |
|  | NW Wetlands                   |                                  | 509                                | 49.8%             | 353                            | 32.2%   | The Orange Route would potentially impact slightly more acres of NW-mapped wetlands than J2. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 466).   |

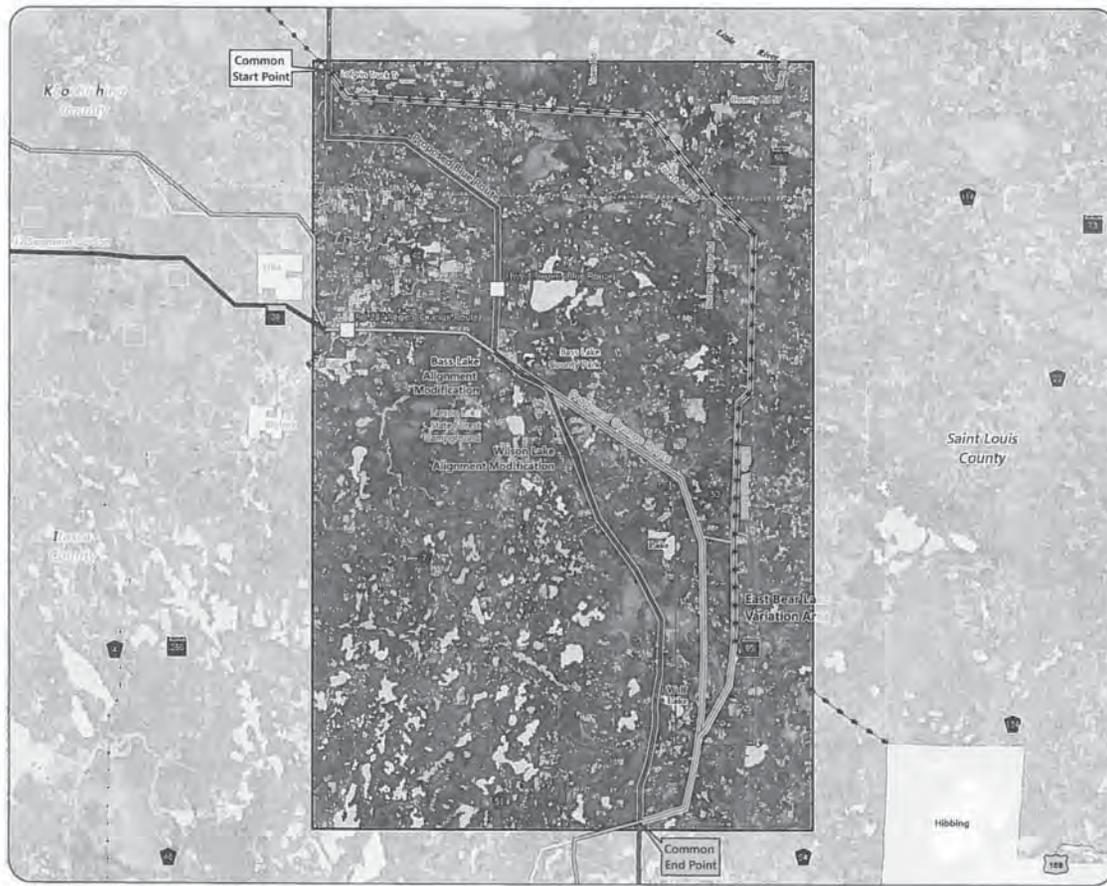
| Relative Merits                   |   |                                       | J2 Segment Option Variation Area   |                |                                |   | Notes  |
|-----------------------------------|---|---------------------------------------|------------------------------------|----------------|--------------------------------|---|--|
| Factor                            | Element   | ROI                                   | Proposed Orange Route (42.2 miles) |                | J2 Segment Option (45.2 miles) |   |  |
|                                   |   |                                       | Count / Acres                      | Percent of ROI | Count / Acres                  | Percent of ROI  |  |
| Vegetation                        | North American Boreal Flooded & Swamp Forest        | 200 feet                              | 319                                | 31.2%          | 124                            | 11.3%   | Both Alternatives would potentially impact a similar amount of forest land. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 467).  |
|                                   | North American Boreal Forest                        |                                       | 477                                | 46.6%          | 650                            | 59.3%   |  |
|                                   | Eastern North American Flooded Swamp & Forest       |                                       | 176                                | 17.2%          | 191                            | 17.4%   |  |
|                                   | Eastern North American Cool Temperate Forest        |                                       | 36                                 | 3.5%           | 98                             | 9.0%  |  |
|                                   | Other   |                                       | 704                                | 68.8%          | 972                            | 88.7%   |  |
| Wildlife                          | Important Bird Areas                                | 200 feet                              | 282                                | 25.6%          | 72                             | 6.6%  | The Orange Route contains more acres of land designated as an Important Bird Area. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 465).  |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 3                                  | -              | 2                              | -   | The Orange Route is within one mile of three vascular plant species whereas J2 is within one mile of one vascular plant species and one colonial water bird nesting site (animal assemblage). Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 470). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 489                                | 47.6%          | 185                            | 16.9%   | The Orange Route would potentially impact more acres of MBS Sites of Biodiversity Significance.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                  | -              | -                              | Neither Alternative parallels existing transmission lines.                            |  |
| Electrical System Reliability     |   | -                                     | -                                  | -              | -                              | Neither Alternative parallels or crosses any existing Manitoba - Minnesota tie lines. |  |
| Cost                              | Total Cost  | -                                     | \$48,706,641                       | -              | \$52,128,879                   | -   | J2 Segment would cost the most to construct.   |

| Relative Merits                                  |                                     |                       | Northome Variation Area       |                |                              |   | Notes  |
|--|-------------------------------------|-----------------------|-------------------------------|----------------|------------------------------|---|--|
| Factor   | Element                             | ROI                   | J2 Segment Option (3.7 miles) |                | Northome Variation (4 miles) |   |  |
|  |                                     |                       | Count / Acres                 | Percent of ROI | Count / Acres                | Percent of ROI  |  |
| Human Settlement                                 | <b>Aesthetics</b>                   |                       |                               |                |                              |   |  |
|  | Residences                          | 1,500 feet            | 0                             | -              | 0                            | -   | Neither Alternative would impact any residences within 1,500 feet.   |
|  | Historic Architectural Sites        | 5,280 feet            | 0                             | -              | 0                            | -   | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Scenic Byway                        | 1,500 feet            | 0                             | -              | 0                            | -   | Neither Alternative would cross a Scenic Byway.  |
|  | Trails                              | 1,500 feet            | 0                             | -              | 0                            | -   | Neither Alternative would cross any trails.  |
|  | <b>Land Use Compatibility</b>       |                       |                               |                |                              |   |  |
|  | Land Cover of Forested and/or Swamp | 1,500 feet            | 1,418 ac                      | 93.1%          | 1,555 ac                     | 95.3%   | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 474). |
| Land Ownership                                   | 200 feet                            | 90 acres total        |                               | 97 acres total |                              | The Northome Variation contains more public lands than private lands; J2 contains more acre of private lands than Northome Variation. |  |
|  |                                     | Public                | 67                            | 74.7%          | 81                           |   | 83.5%  |
|  |                                     | Private               | 23                            | 25.6%          | 16                           |   | 16.5%  |
| Land-Based Economies                             | Agriculture                         | 1,500 feet            | 64                            | 4.2%           | 0                            | 0.0%  | J2 would impact few acres of agricultural land whereas the Northome Variation does not impact agricultural lands.  |
|  | Forestry                            | 200 feet              | 0                             | 0.0%           | 0                            | 0.0%  | Neither Alternative contains State Forest lands.   |
|  | Mining & Mineral Leases             |                       | 0                             | 0.0%           | 0                            | 0.0%  | Neither Alternative would impact mining or mineral leases.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites        | 5,280 feet            | 0                             | -              | 0                            | -   | Neither Alternative would impact any known architectural sites. Northome Variation would potentially impact one archeological site; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Archaeological Sites                | 1,500 feet            | 0                             | -              | 1                            | -   |  |
| Water Resources                                  | PWI Waters                          | Crossings or 200 feet | 0                             | -              | 1                            | -   | Both Alternatives would cross very few PWI and non-PWI waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.  |
|  | Non-PWI Waters                      |                       | 8                             | -              | 1                            | -   |  |
|  | Impaired Waters                     |                       | 0                             | -              | 0                            | -   |  |
|  | Floodplains                         |                       | 0                             | -              | 0                            | -   | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                        |                       | 23                            | 25.8%          | 14                           | 14.4%   | Both Alternatives would potentially impact very few acres of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 479).  |

| Relative Merits                   |   |                                       | Northome Variation Area       |                |                              |                |  |
|-----------------------------------|---|---------------------------------------|-------------------------------|----------------|------------------------------|----------------|--|
| Factor                            | Element   | ROI                                   | J2 Segment Option (3.7 miles) |                | Northome Variation (4 miles) |                | Notes  |
|                                   |   |                                       | Count / Acres                 | Percent of ROI | Count / Acres                | Percent of ROI |  |
| Vegetation                        | North American Boreal Forest                        | 200 feet                              | 71                            | 79.2%          | 81                           | 83.5%          | Both Alternatives would potentially impact a similar amount of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (pg. 480)   |
|                                   | Eastern North American Cool Temperate Forest        |                                       | 10                            | 11.1%          | 10                           | 10.3%          |  |
|                                   | Other   |                                       | 19                            | 21.2%          | 16                           | 16.5%          |  |
| Wildlife                          | Shallow Lakes                                       | 200 feet                              | 0                             | -              | 1                            | -              | The Northome Variation would cross one DNR Shallow Lake.   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 1                             | -              | 2                            | -              | One colonial waterbird nesting site is listed within one mile of J2 and two nesting sites are listed within one mile of the Northome Variation. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 482). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 0                             | 0.0%           | 0                            | 0.0%           | There are no MBS Sites of Biodiversity within either Alternative.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                             | -              | -                            | -              | Neither Alternative parallels existing transmission lines.   |
| Electrical System Reliability     | -   | -                                     | -                             | -              | -                            | -              | Neither Alternative parallels or crosses any existing Manitoba - Minnesota tie lines.  |
| Cost                              | Total Cost  | -                                     | \$4,192,642                   | -              | -                            | -              | The Northome Variation would cost the most to construct.   |

| Factor   | Element                       | ROI                   | Cutfoot Variation Area            |                |                               |                | Notes  |
|--|-------------------------------|-----------------------|-----------------------------------|----------------|-------------------------------|----------------|--|
|  |                               |                       | Proposed Orange Route (4.2 miles) |                | Cutfoot Variation (4.8 miles) |                |  |
|  |                               |                       | Count / Acres                     | Percent of ROI | Count / Acres                 | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |                                   |                |                               |                |  |
|  | Residences                    | 1,500 feet            | 0                                 | -              | 0                             | -              | Neither Alternative would impact any residences within 1,500 feet.   |
|  | Historic Architectural Sites  | 5,280 feet            | 0                                 | -              | 0                             | -              | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Scenic Byway                  | 1,500 feet            | 0                                 | -              | 0                             | -              | Neither Alternative would cross a Scenic Byway.  |
|  | Trails                        | 1,500 feet            | 0                                 | -              | 0                             | -              | Neither Alternative would cross any trails.  |
|  | <b>Land Use Compatibility</b> |                       |                                   |                |                               |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 1,652 ac                          | 97.3%          | 1,674 ac                      | 99.3%          | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 485). |
| Land Ownership                                   |                               | 200 feet              | 102 acres total                   |                | 116 acres total               |                | Both Alternatives are located entirely within public land.   |
| Public   | 103                           |                       | 101.2%                            | 116            | 99.7%                         |                |  |
| Private  | 0                             |                       | 0.0%                              | 0              | 0.0%                          |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 0                                 | 0.0%           | 0                             | 0.0%           | Neither Alternative would impact agricultural land.  |
|  | Forestry                      | 200 feet              | 103                               | 101.2%         | 116                           | 99.7%          | Both Alternatives are entirely located within State Forest lands.  |
|  | Mining & Mineral Leases       |                       | 29                                | 28.5%          | 4                             | 3.4%           | The Orange Route contains more acres of mining and mineral leases than the Cutfoot Variation; however both would impact aggregate mining resources.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 0                                 | -              | 0                             | -              | Neither Alternative would impact any known historic architectural or archaeological sites.   |
|  | Archaeological Sites          | 1,500 feet            | 0                                 | -              | 0                             | -              |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 0                                 | -              | 0                             | -              | The Orange Route would cross very few, if any, PWI and non-PWI waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them. The Cutfoot Variation would not cross any waterbodies.   |
|  | Non-PWI Waters                |                       | 2                                 | -              | 0                             | -              |  |
|  | Impaired Waters               |                       | 0                                 | -              | 0                             | -              |  |
|  | Floodplains                   |                       | 0                                 | -              | 0                             | -              | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                       | 57                                | 58.0%          | 67                            | 57.6%          | Both Alternatives would potentially impact very few acres of NW-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 490).   |

| Relative Merits                   |   |                                       | Cutfoot Variation Area            |                |                               |                | Notes  |
|-----------------------------------|---|---------------------------------------|-----------------------------------|----------------|-------------------------------|----------------|--|
| Factor                            | Element   | ROI                                   | Proposed Orange Route (4.2 miles) |                | Cutfoot Variation (4.8 miles) |                |  |
|                                   |   |                                       | Count / Acres                     | Percent of ROI | Count / Acres                 | Percent of ROI |  |
| Vegetation                        | North American Boreal Flooded & Swamp Forest        | 200 feet                              | 28                                | 27.5%          | 30                            | 25.8%          | Both Alternatives would potentially impact a similar amount of forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 4B2). |
|                                   | North American Boreal Forest                        |                                       | 30                                | 29.5%          | 64                            | 55.0%          |  |
|                                   | Eastern North American Flooded & Swamp Forest       |                                       | 39                                | 38.3%          | 20                            | 17.2%          |  |
|                                   | Other   |                                       | 74                                | 72.7%          | 86                            | 73.9%          |  |
| Wildlife                          | All/Any   | 200 feet                              | 0                                 | 0.0%           | 0                             | 0.0%           | Neither Alternative would impact recognized wildlife resource areas.   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 0                                 | -              | 0                             | -              | Neither Alternative is located within one mile of a documented rare species.   |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 43                                | 42.2%          | 60                            | 51.5%          | Both Alternatives would potentially impact similar amounts of MBS Sites of Biodiversity.   |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                 | -              | -                             | -              | Neither Alternative parallels existing transmission lines.   |
| Electrical System Reliability     |   | -                                     | -                                 | -              | -                             | -              | Neither Alternative parallels or crosses any existing Manitoba – Minnesota tie lines.  |
| Cost                              | Total Cost  | -                                     | \$5,940,638                       | -              | \$6,222,257                   | -              | The Cutfoot Variation would cost the most to construct.  |



- 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 5.



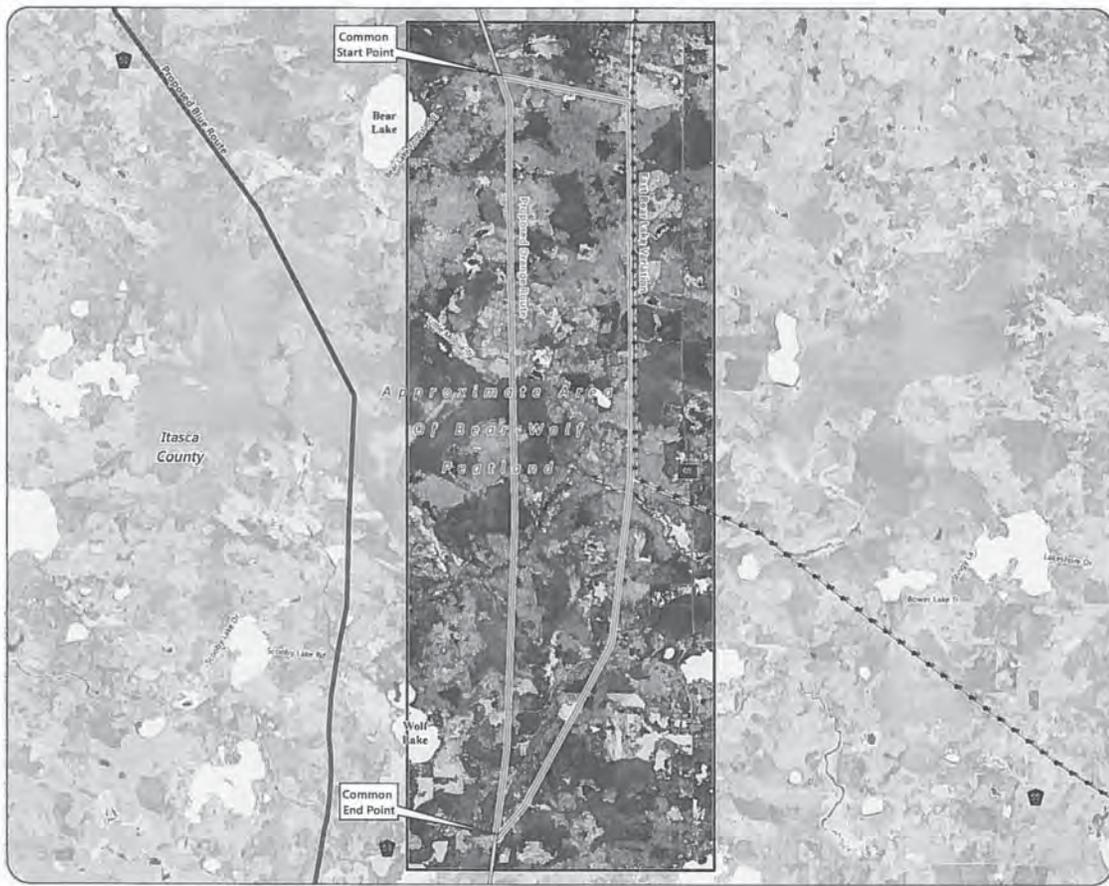
Map 4-15

**EFFIE VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement

| Relative Merits                                  |                               |            | Effie Variation                  |                |                                    |                |                              |                | Notes  |
|--|-------------------------------|------------|----------------------------------|----------------|------------------------------------|----------------|------------------------------|----------------|--|
| Factor   | Element                       | ROI        | Proposed Blue Route (41.1 miles) |                | Proposed Orange Route (44.6 miles) |                | Effie Variation (49.8 miles) |                |  |
|  |                               |            | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI | Count / Acres                | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>             |            |                                  |                |                                    |                |                              |                |  |
|  | Residences                    | 1,500 feet | 4                                | -              | 5                                  | -              | 14                           | -              | The Effie Variation impacts generally three times as many residences as the Blue or Orange Routes.   |
|  | Historic Architectural Sites  | 5,280 feet | 1                                | -              | 1                                  | -              | 3                            | -              | Both the Blue and Orange Routes would potentially impact one historic architectural site within 5,280 feet. The Effie Variation would potentially impact three sites; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Parks                         | 1,500 feet | 1                                | -              | 1                                  | -              | 0                            | -              | Both the Blue and Orange Routes would potentially impact one County Park; the Effie Variation would not.   |
|  | Trails                        | 1,500 feet | 8                                | -              | 7                                  | -              | 5                            | -              | All Alternatives would cross at least five state or snowmobile trails.   |
|  | Water Access                  | 1,500 feet | 0                                | -              | 0                                  | -              | 1                            | -              | The Blue and Orange Routes would not impact any water access points; the Effie Variation would potentially impact one water access.  |
|  | <b>Land Use Compatibility</b> |            |                                  |                |                                    |                |                              |                |  |
|  | Dominant Land Cover Type      | 1,500 feet | 14,723 ac                        | 97.6%          | 15,801 ac                          | 96.7%          | 17,898 ac                    | 96.8%          | All Alternatives' major land cover type is Forested and/or Swamp. All Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 465, 555).        |
|  | Land Ownership                | 200 feet   | 996 acres total                  |                | 1,081 acres total                  |                | 1,207 acres total            |                | All Alternatives are almost entirely located on public lands. The Effie Variation contains the most acres of private land.   |
|  | Public                        |            | 819                              | 92.2%          | 962                                | 89.0%          | 1,088                        | 90.0%          |  |
| Private  |                               | 77         | 7.7%                             | 119            | 11.0%                              | 121            | 10.0%                        |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet | 0                                | 0.0%           | 0                                  | 0.0%           | 0                            | 0.0%           | None of the Alternatives would impact agricultural land.   |
|  | Forestry                      |            | 909                              | 91.2%          | 958                                | 88.6%          | 1,086                        | 90.0%          | All Alternatives are mostly located within State Forests; the Effie Variation would potentially impact the most acres of State Forest.   |
|  | Mining & Mineral Leases       | 200 feet   | 847                              | 84.9%          | 819                                | 75.7%          | 824                          | 68.3%          | All Alternatives contain numerous acres of mining and mineral leases; the Effie Variation contains the most acres of mining and mineral leases.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet | 1                                | -              | 1                                  | -              | 3                            | -              | Both the Blue and Orange Routes would potentially impact one historic architectural site within 5,280 feet. The Effie Variation would potentially impact three sites; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. The Blue and Orange Routes would not impact any known archaeological sites; the Effie Variation would potentially impact two sites. |
|  | Archaeological Sites          | 1,500 feet | 0                                | -              | 0                                  | -              | 2                            | -              |  |
| Water Resources                                  | PWI Waters                    |            | 10                               | -              | 13                                 | -              | 13                           | -              | All Alternatives will require crossing a number of waterbodies; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |            | 8                                | -              | 11                                 | -              | 15                           | -              |  |
|  | Impaired Waters               |            | 0                                | -              | 0                                  | -              | 0                            | -              |  |

| Relative Merits                   |   |                                       | Effie Variation                  |                |                                    |                |                              |                |  |
|-----------------------------------|---|---------------------------------------|----------------------------------|----------------|------------------------------------|----------------|------------------------------|----------------|--|
| Factor                            | Element                                       | ROI                                   | Proposed Blue Route (41.1 miles) |                | Proposed Orange Route (44.6 miles) |                | Effie Variation (49.8 miles) |                | Notes  |
|                                   |   |                                       | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI | Count / Acres                | Percent of ROI |  |
| Water Resources                   | Floodplains                                   | Crossings or 200 feet                 | 3                                | 0.3%           | 3                                  | 0.3%           | 0                            | 0.0%           | The Effie Variation would not impact any FEMA-designated floodplains. The Blue and Orange Routes would cross a Zone A floodplain; however, the crossings would be less than the average spanning length of 1,250 feet. Therefore, it would be expected that the floodplain crossings would be spanned and transmission structures would not be placed in them (pg. 544).   |
|                                   | NWI Wetlands                                  |                                       | 443                              | 44.5%          | 391                                | 36.2%          | 413                          | 34.2%          |  |
| Vegetation                        | North American Boreal Forest                  | 200 feet                              | 473                              | 47.5%          | 569                                | 52.6%          | 558                          | 46.1%          | All Alternatives would potentially impact a similar amount of forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 546).  |
|                                   | North American Boreal Flooded & Swamp Forest  |                                       | 399                              | 40.0%          | 338                                | 31.4%          | 364                          | 30.1%          |  |
|                                   | Eastern North American Cool Temperate Forest  |                                       | 25                               | 2.5%           | 40                                 | 3.7%           | 35                           | 2.9%           |  |
|                                   | Eastern North American Flooded & Swamp Forest |                                       | 81                               | 8.1%           | 99                                 | 9.2%           | 208                          | 17.2%          |  |
|                                   | Other   |                                       | 18                               | 1.8%           | 133                                | 12.3%          | 252                          | 20.9%          |  |
| Wildlife                          | Important Bird Areas                          | 200 feet                              | 69                               | -              | 69                                 | -              | 0                            | -              | The Blue and Orange Routes contain 69 acres of land designated as an Important Bird Area. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 547).   |
| Rare and Unique Natural Resources | Rare Species                                  | 1 mile (aquatic species not included) | 3                                | -              | 4                                  | -              | 2                            | -              | All Alternatives are within one mile of a colonial waterbird nesting site and at least one vascular plant. The Orange Route is within one mile of the greatest number of species. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 550). |
|                                   | MBS Sites of Biodiversity                     | 200 feet                              | 422                              | 42.4%          | 490                                | 45.3%          | 427                          | 35.4%          | All Alternatives would potentially impact a similar number of acres of MBS Sites of Biodiversity; the Orange Route would pass through the most acres (pg. 551).  |

| Relative Merits               |                                     |     | Effie Variation                  |                |                                    |                |                              |  |       |
|-------------------------------|-------------------------------------|-----|----------------------------------|----------------|------------------------------------|----------------|------------------------------|--|-------|
| Factor                        | Element                             | ROI | Proposed Blue Route (41.1 miles) |                | Proposed Orange Route (44.6 miles) |                | Effie Variation (49.8 miles) |  | Notes |
|                               |                                     |     | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI | Count / Acres                | Percent of ROI   |       |
| Corridor Sharing              | Paralleling Existing Infrastructure | -   | -                                | -              | -                                  | -              | 80.0%                        | The Blue and Orange Routes would not parallel any existing transmission lines, however the Effie Variation would parallel two existing transmission line for approximately 80% of its length.  |       |
| Electrical System Reliability |                                     | -   | -                                | -              | -                                  | -              | -                            | The Blue and Orange Routes do not parallel any existing Manitoba – Minnesota tie lines. The Blue Route would establish one new crossing of the existing 500 kV tie line. The Effie Variation would establish one new crossing of the existing 500 kV tie line and, more significantly, parallel both the 500 kV tie line and the 230 kV tie line in the same corridor for a significant part of its length, which would result in unacceptable risk to northern Minnesota loads. |       |
| Cost                          | Total Cost                          | -   | \$46,840,800                     | -              | \$49,488,323                       | -              | -                            | Both the Orange Route and Effie Variation would cost more to construct than the Blue Route.  |       |



- 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

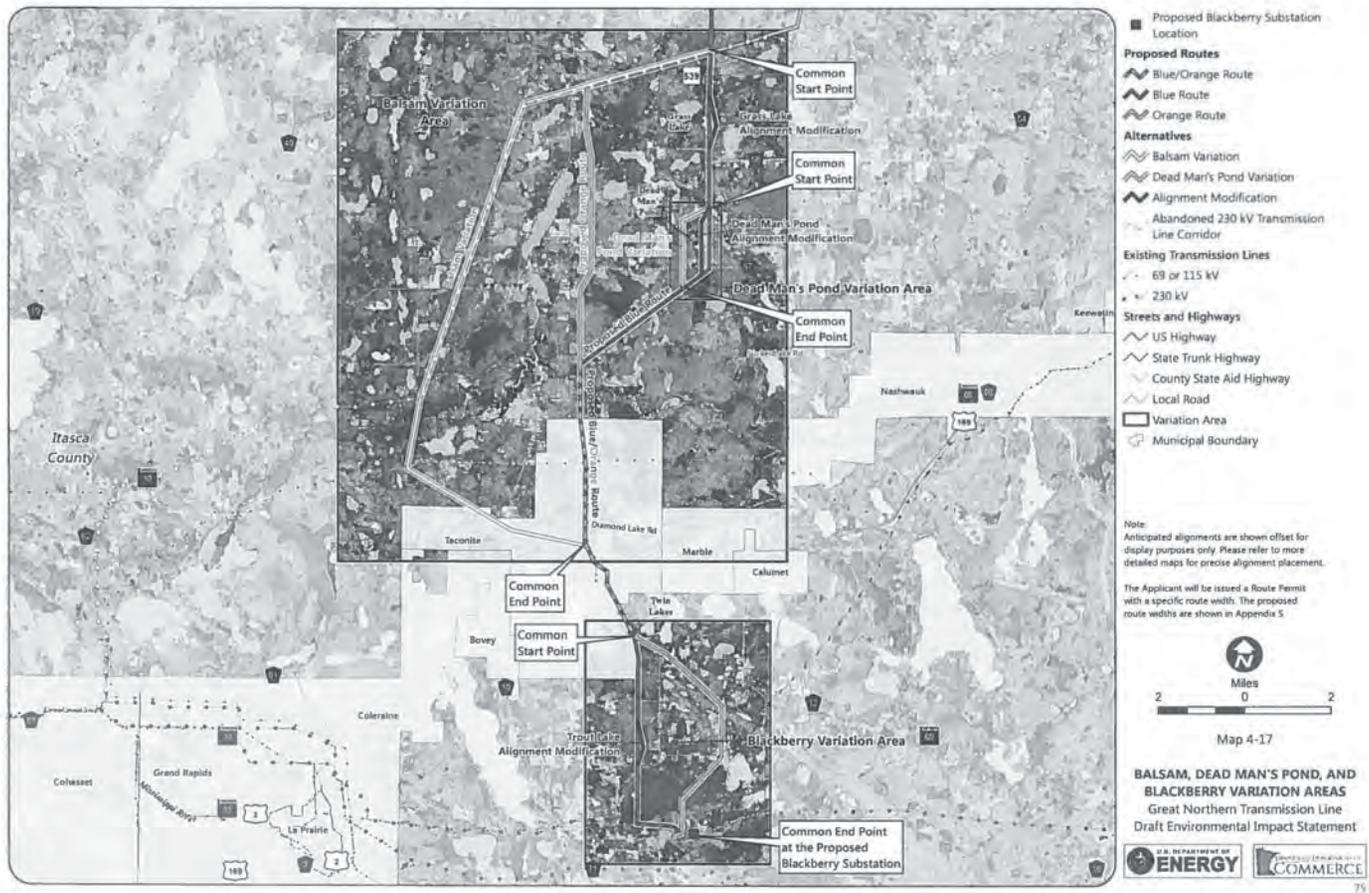
Note:  
 Anticipated alignments are shown of set for display purposes only. Please refer to more detailed maps for precise alignment placement.  
 The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



Map 4-16  
**EAST BEAR LAKE VARIATION AREA**  
 Great Northern Transmission Line  
 Draft Environmental Impact Statement

| Relative Merits                                  |                               | East Bear Lake Variation Area |                                      |                |  | Notes  |   |
|--|-------------------------------|-------------------------------|--------------------------------------|----------------|--|--------|---|
| Factor   | Element                       | ROI                           | Proposed Orange Route<br>(8.9 miles) |                | East Bear Lake Variation<br>(10.5 miles) |        |   |
|  |                               |                               | Count / Acres                        | Percent of ROI | Count / Acres                            |        | Percent of ROI  |
| Human Settlement                                 | <b>Aesthetics</b>             |                               |                                      |                |  |        |   |
|  | Residences                    | 1,500 feet                    | 0                                    | -              | 0  | -      | Neither Alternative would impact any residences.  |
|  | Historic Architectural Sites  | 5,280 feet                    | 0                                    | -              | 0  | -      | Neither Alternative would impact any known historic architectural sites.  |
|  | Scenic Byway                  |                               | 0                                    |                | 0  |        | Neither Alternative would impact any Scenic Byways  |
|  | Trails                        | 1,500 feet                    | 4                                    |                | 4  |        | Both Alternatives would potentially impact one state trail and three snowmobile trails  |
|  | Water Access Points           |                               | 0                                    | -              | 1  | -      | The East Bear Lake Variation would potentially impact one water access point.   |
|  | <b>Land Use Compatibility</b> |                               |                                      |                |  |        |   |
|  | Dominant Land Cover Type      | 1,500 feet                    | 3,381 ac                             | 99.2%          | 3,910 ac                                 | 98.2%  | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 555) |
|  | Land Ownership                | 200 feet                      | 218 acres total                      |                | 255 acres total                          |        | Both Alternatives are entirely located within public lands.   |
|  | Public                        |                               | 217                                  | 100.6%         | 256                                      | 100.6% |   |
| Private  | 0                             |                               | 0.0%                                 | 0              | 0.0%                                     |        |   |
| Land-Based Economies                             | Agriculture                   | 1,500 feet                    | 0                                    | 0.0%           | 0  | 0.0%   | Neither Alternative would impact agricultural land.   |
|  | Forestry                      |                               | 217                                  | 100.6%         | 256                                      | 100.6% | Both Alternatives are entirely located within State Forest lands.   |
|  | Mining & Mineral Leases       | 200 feet                      | 96                                   | 44.5%          | 193                                      | 75.8%  | The East Bear Lake Variation would potentially impact nearly double the acres of mining and mineral leases than the Orange Route.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet                    | 0                                    | -              | 0  | -      | Neither Alternative would impact any known historic architectural or archaeological sites.  |
|  | Archaeological Sites          | 1,500 feet                    | 0                                    | -              | 0  | -      |   |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet         | 4                                    | -              | 2  | -      | Both Alternatives would cross a small number of PWI and non-PWI waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.  |
|  | Non-PWI Waters                |                               | 0                                    | -              | 3  | -      |   |
|  | Impaired Waters               |                               | 0                                    | -              | 0  | -      |   |
|  | Floodplains                   |                               | 0                                    | -              | 0  | -      |   |

| Relative Merits                   |  |                                       | East Bear Lake Variation Area        |                |  |                |   |
|-----------------------------------|--|---------------------------------------|--------------------------------------|----------------|--|----------------|---|
| Factor                            | Element                                      | ROI                                   | Proposed Orange Route<br>(8.9 miles) |                | East Bear Lake Variation<br>(10.5 miles) |                | Notes   |
|                                   |  |                                       | Count / Acres                        | Percent of ROI | Count / Acres                            | Percent of ROI |   |
|                                   | NWI Wetlands                                 |                                       | 104                                  | 48.2%          | 89                                       | 35.0%          | The Orange Route would potentially impact slightly more acres of NWI-mapped wetlands than the East Bear Lake Variation. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 561).   |
| Vegetation                        | North American Boreal Forest                 | 200 feet                              | 103                                  | 47.7%          | 140                                      | 55.0%          | Both Alternatives would potentially impact a similar amount of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 562).  |
|                                   | North American Boreal Flooded & Swamp Forest |                                       | 84                                   | 43.6%          | 77                                       | 30.3%          |   |
|                                   | Other  |                                       | 103                                  | 52.4%          | 105                                      | 45.2%          |   |
| Wildlife                          | All/Any                                      | 200 feet                              | 0                                    | 0.0%           | 0  | 0.0%           | Neither Alternative would impact recognized wildlife resource areas.  |
| Rare and Unique Natural Resources | Rare Species                                 | 1 mile (aquatic species not included) | 1                                    | -              | 1  | -              | Both Alternatives would be located within one mile of a state-listed special concern vascular plant. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 564). |
|                                   | State Rare Communities                       |                                       |                                      |                |  |                |   |
|                                   | MBS Sites of Biodiversity                    | 200 feet                              | 217                                  | 100.6%         | 255                                      | 100.2%         |   |
| Corridor Sharing                  | Paralleling Existing Infrastructure          | -                                     | -                                    | -              | -  | 42.0%          | The East Bear Lake Alternative parallels existing transmission line for approximately 42% of its length.  |
| Electrical System Reliability     |  | -                                     | -                                    | -              | -  | -              | The Orange Route does not parallel any existing Manitoba - Minnesota tie lines. The East Bear Lake Variation would parallel both the 500 kV tie line and the 230 kV tie line in the same corridor for a significant part of its length, which would result in unacceptable risk to northern Minnesota loads.  |
| Cost                              | Total Cost                                   | -                                     | \$8736760                            | -              | -  | -              | The East Bear Lake Variation would cost the most to construct.  |



| Relative Merits                                  |                                     |            | Balsam Variation Area            |                |                                    |                |                               |                | Notes  |
|--|-------------------------------------|------------|----------------------------------|----------------|------------------------------------|----------------|-------------------------------|----------------|--|
| Factor   | Element                             | ROI        | Proposed Blue Route (12.9 miles) |                | Proposed Orange Route (13.7 miles) |                | Balsam Variation (17.8 miles) |                |  |
|  |                                     |            | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI | Count / Acres                 | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>                   |            |                                  |                |                                    |                |                               |                |  |
|  | Residences                          | 1,500 feet | 7                                | -              | 21                                 |                | 11                            | -              | The Orange Route has the highest potential to impact residences; the Balsam Variation has 11 residences within 1,500 feet and the Blue Route has the lowest potential impact to residences.  |
|  | Historic Architectural Sites        | 5,280 feet | 13                               | -              | 24                                 |                | 28                            | -              | The Orange Route and Balsam Variation have the highest potential to impact architectural sites; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Scenic Byway                        |            | 0                                |                | 0                                  |                | 0                             |                | No Alternatives would impact Scenic Byways.  |
|  | Trails                              | 1,500 feet | 2                                |                | 2                                  |                | 3                             |                | The Blue and Orange Routes would potentially impact two snowmobile trails. Balsam Variation would impact three.  |
|  | <b>Land Use Compatibility</b>       |            |                                  |                |                                    |                |                               |                |  |
|  | Land Cover of Forested and/or Swamp | 1,500 feet | 4,541 ac                         | 93.5%          | 4,828 ac                           | 94.1%          | 6,189 ac                      | 93.2%          | All Alternatives' major land cover type is Forested and/or Swamp. All Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 572). |
|  | Land Ownership                      | 200 feet   | 313 acres total                  |                | 332 acres total                    |                | 432 acres total               |                | All Alternatives are generally located on a majority of private lands. The Balsam Variation would potentially impact the most acres of private land.   |
| Public   |                                     | 67         | 21.4%                            | 53             | 16.0%                              | 107            | 24.8%                         |                |  |
| Private  |                                     | 246        | 78.7%                            | 279            | 84.0%                              | 325            | 75.2%                         |                |  |
| Land-Based Economies                             | Agriculture                         | 1,500 feet | 4                                | 0.1%           | 70                                 | 1.4%           | 72                            | 1.1%           | The Blue Route would potentially impact the fewest acres of agricultural land; the Balsam Variation would impact the most.   |
|  | Forestry                            |            | 0                                | 0.0%           | 0                                  | 0.0%           | 0                             | 0.0%           | No Alternatives would be located in State Forest lands.  |
|  | Mining & Mineral Leases             | 200 feet   | 0                                | 0.0%           | 0                                  | 0.0%           | 69                            | 20.6%          | The Blue and Orange Routes would not impact mining and mineral leases; the Balsam Variation would potentially impact 69 acres. It should be noted that an active mine would impede the construction and operation of the Balsam Variation and therefore it is no longer feasible.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites        | 5,280 feet | 13                               | -              | 24                                 |                | 28                            | -              | The Orange Route and Balsam Variation have the highest potential to impact known architectural sites. The Blue and Orange Routes would not impact any known archaeological sites; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Archaeological Sites                | 1,500 feet | 0                                | -              | 0                                  |                | 1                             | -              |  |
| PWV Waters                                       | PWV Waters                          |            | 7                                | -              | 5                                  |                | 4                             | -              | All Alternatives would cross a small number of PWV and non-PWV waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.  |
|  | Non-PWV Waters                      |            | 1                                | -              | 4                                  |                | 3                             | -              |  |
|  | Impaired Waters                     |            | 0                                | -              | 0                                  |                | 0                             | -              |  |

| Relative Merits                   |  |                                       | Balsam Variation Area            |                |                                    |                |                               |                | Notes  |
|-----------------------------------|--|---------------------------------------|----------------------------------|----------------|------------------------------------|----------------|-------------------------------|----------------|--|
| Factor                            | Element  | ROJ                                   | Proposed Blue Route (12.9 miles) |                | Proposed Orange Route (13.7 miles) |                | Balsam Variation (17.8 miles) |                |  |
|                                   |  |                                       | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI | Count / Acres                 | Percent of ROI |  |
| Water Resources                   | Floodplains  | Crossings or 200 feet                 | 0                                | --             | 26                                 |                | 22                            | -              | The Blue Route would not impact FEMA-designated floodplains whereas the Orange Route and Balsam Variation would require construction and placement of transmission structures within Zone A floodplain.  |
|                                   | NWI Wetlands   |                                       | 54                               | 17.3%          | 69                                 | 20.8%          | 96                            | 22.2%          | The Balsam Variation would potentially impact the most acres of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 578).   |
| Vegetation                        | North American Boreal Forest                                 | 200 feet                              | 205                              | 65.6%          | 208                                | 62.6%          | 234                           | 54.2%          | The Balsam Variation would pass through more forested land than the Blue and Orange Routes. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 580).   |
|                                   | North American Boreal Flooded & Swamp Forest                 |                                       | 12                               | 3.8%           | 15                                 | 4.5%           | 40                            | 9.3%           |  |
|                                   | Eastern North American Cool Temperate Forest                 |                                       | 53                               | 16.9%          | 47                                 | 14.2%          | 60                            | 13.9%          |  |
|                                   | Eastern North American Cool Temperate Flooded & Swamp Forest |                                       | 29                               | 9.3%           | 47                                 | 14.2%          | 68                            | 15.8%          |  |
|                                   | Other  |                                       | 108                              | 34.5%          | 124                                | 37.3%          | 196                           | 45.9%          |  |
| Wildlife                          | All/Any  | 200 feet                              | 0                                | 0.0%           | 0                                  | 0.0%           | 0                             | 0.0%           | No Alternatives would impact recognized wildlife resource areas.   |
| Rare and Unique Natural Resources | Rare Species   | 1 mile (aquatic species not included) | 1                                |                | 0                                  | 0.0%           | 0                             | -              | The Blue Route is located within one mile of a state-listed special concern vascular plant. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 582). |
|                                   | State Rare Communities                                       | 200 feet                              |                                  |                |                                    |                |                               |                |  |
|                                   | MBS Sites of Biodiversity                                    |                                       | 78                               | 24.9%          | 105                                | 31.8%          | 95                            | 22.0%          | The Orange Route would potentially impact the most acres of MBS Sites of Biodiversity; the Blue Route would potentially impact the fewest.   |
| Corridor Sharing                  | Paralleling Existing Infrastructure                          |                                       |                                  | 15.0%          |                                    | 14.0%          |                               |                | The Blue and Orange Routes would parallel existing transmission lines for 15 and 14% of their lengths, respectively; the Balsam Variation would not parallel existing transmission lines.  |

| Relative Merits               |            |     | Balsam Variation Area            |                |                                    |                |                               |                | Notes  |
|-------------------------------|------------|-----|----------------------------------|----------------|------------------------------------|----------------|-------------------------------|----------------|--|
| Factor                        | Element    | ROI | Proposed Blue Route (12.9 miles) |                | Proposed Orange Route (13.7 miles) |                | Balsam Variation (17.8 miles) |                |  |
|                               |            |     | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI | Count / Acres                 | Percent of ROI |  |
| Electrical System Reliability |            | -   |                                  | -              |                                    |                |                               | -              | No Alternatives parallel or cross any existing Manitoba – Minnesota tie lines.             |
| Cost                          | Total Cost | -   | \$15,121,621                     | -              | \$18,018,490                       |                |                               | -              | Both the Orange and the Balsam Variation would cost more to construct than the Blue Route. |

| Relative Merits                                  |                               |                       | Dead Man's Pond Variation Area  |                |                                       |  | Notes  |
|--|-------------------------------|-----------------------|---------------------------------|----------------|---------------------------------------|--|--|
| Factor   | Element                       | ROI                   | Proposed Blue Route (2.2 miles) |                | Dead Man's Pond Variation (2.3 miles) |  |  |
|  |                               |                       | Count / Acres                   | Percent of ROI | Count / Acres                         | Percent of ROI   |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |                                 |                |                                       |  |  |
|  | Residences                    | 1,500 feet            | 2                               | -              | 4                                     | -  | Dead Man's Pond Variation would potentially impact more residences within 1,500 feet.  |
|  | Historic Architectural Sites  | 5,280 feet            | 1                               | -              | 1                                     | -  | Both Alternatives would potentially impact a historic architectural site within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Scenic Byway                  | 1,500 feet            | 0                               | -              | 0                                     | -  | Neither Alternative would cross a Scenic Byway.  |
|  | Trails                        | 1,500 feet            | 0                               | -              | 0                                     | -  | Neither Alternative would cross any trails.  |
|  | <b>Land Use Compatibility</b> |                       |                                 |                |                                       |  |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 905 ac                          | 94.2%          | 925 ac                                | 93.7%  | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 588). |
| Land Ownership                                   | 200 feet                      | 53 acres total        |                                 | 56 acres total |                                       | The Blue Route is mostly located on private land whereas the Dead Man's Pond Variation is mostly located on public land. |  |
| Public   |                               | 19                    | 35.8%                           | 37             | 66.3%                                 |  |  |
| Private  |                               | 34                    | 63.8%                           | 19             | 34.1%                                 |  |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 0                               | 0.0%           | 2                                     | 0.2%   | The Blue Route would not impact agricultural land.   |
|  | Forestry                      | 200 feet              | 0                               | 0.0%           | 0                                     | 0.0%   | Neither Alternative would impact State Forest lands.   |
|  | Mining & Mineral Leases       |                       | 0                               | 0.0%           | 0                                     | 0.0%   | Neither Alternative would impact any mining or mineral leases.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 1                               | -              | 1                                     | -  | Both Alternatives would potentially impact a historic architectural site within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. There are no known archaeological sites within one mile of either Alternative.  |
|  | Archaeological Sites          | 1,500 feet            | 0                               | -              | 0                                     | -  |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 0                               | -              | 0                                     | -  | Neither Alternative would cross any PWI, non-PWI, or impaired waters.  |
|  | Non-PWI Waters                |                       | 0                               | -              | 0                                     | -  |  |
|  | Impaired Waters               |                       | 0                               | -              | 0                                     | -  |  |
|  | Floodplains                   |                       | 0                               | -              | 0                                     | -  | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                       | 14                              | 26.3%          | 4                                     | 7.2%   | Both Alternatives would potentially impact very few acres of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 592).  |

| Relative Merits                      |   |   | Dead Man's Pond Variation Area     |                   |  |                   | Notes  |
|--------------------------------------|---|---|------------------------------------|-------------------|--|-------------------|--|
| Factor                               | Element   | ROI   | Proposed Blue Route<br>(2.2 miles) |                   | Dead Man's Pond<br>Variation (2.3 miles) |                   |  |
|                                      |   |   | Count / Acres                      | Percent<br>of ROI | Count / Acres                            | Percent<br>of ROI |  |
| Vegetation                           | North American<br>Boreal Forest                           | 200 feet                                    | 34                                 | 63.8%             | 43                                       | 77.1%             | Both Alternatives would potentially impact a similar amount for forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (pg. 593). |
|                                      | Eastern North<br>American Cool<br>Temperate<br>Forest     |   | 14                                 | 26.3%             | 6  | 10.8%             |  |
|                                      | Other   |   | 19                                 | 35.6%             | 13                                       | 23.3%             |  |
| Wildlife                             | All/Any   | 200 feet                                    | 0                                  | 0.0%              | 0  | 0.0%              | Neither Alternative would impact recognized wildlife resource areas.   |
| Rare and Unique Natural<br>Resources | Rare Species  | 1 mile (aquatic<br>species not<br>included) | 0                                  | -                 | 0  | -                 | Neither Alternative is located within one mile of a documented rare species.   |
|                                      | State Rare<br>Communities<br>MBS Sites of<br>Biodiversity | 200 feet                                    | 0                                  | 0.0%              | 0  | 0.0%              | There are no MBS Sites of Biodiversity within either Alternative.  |
| Corridor Sharing                     | Paralleling<br>Existing<br>Infrastructure                 | -   | -                                  | -                 | -  | -                 | Neither Alternative parallels existing transmission lines.   |
| Electrical System Reliability        |   | -   | -                                  | -                 | -  | -                 | Neither Alternative parallels or crosses any existing Manitoba - Minnesota tie lines.  |
| Cost                                 | Total Cost  | -   | \$2,673,223                        | -                 | -  | -                 | The Dead Man's Pond Variation would cost the most to construct.  |

| Relative Merits                                  |                               | Blackberry Variation Area |                                    |                 |                                      | Notes  |  |
|--|-------------------------------|---------------------------|------------------------------------|-----------------|--------------------------------------|--|--|
| Factor   | Element                       | ROI                       | Proposed Blue Route<br>(5.4 miles) |                 | Proposed Orange Route<br>(6.1 miles) |  |  |
|  |                               |                           | Count / Acres                      | Percent of ROI  | Count / Acres                        |  | Percent of ROI   |
| Human Settlement                                 | <b>Aesthetics</b>             |                           |                                    |                 |                                      |  |  |
|  | Residences                    | 1,500 feet                | 11                                 | -               | 22                                   | -  | The Orange Route has twice as many homes (22) within 1,500 feet as the Blue Route (11).  |
|  | Historic Architectural Sites  | 5,280 feet                | 8                                  | -               | 1                                    | -  | The Blue Route has a higher potential to impact historic architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Scenic Byway                  | 1,500 feet                | 0                                  | -               | 0                                    | -  | Neither Route would cross a Scenic Byway.  |
|  | Trails                        | 1,500 feet                | 1                                  | -               | 1                                    | -  | Both Routes would cross one snowmobile trail.  |
|  | <b>Land Use Compatibility</b> |                           |                                    |                 |                                      |  |  |
|  | Dominant Land Cover Type      | 1,500 feet                | 2,004 ac                           | 94.2%           | 1,982 ac                             | 84.2%  | Both Routes' major land cover type is Forested and/or Swamp. Both Routes would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 599). |
| Land Ownership                                   | 200 feet                      | 131 acres total           |                                    | 148 acres total |                                      | Both Routes contain a similar number of acres of public and private lands. |  |
| Public   |                               | 41                        | 31.3%                              | 54              | 36.5%                                |  |  |
| Private  |                               | 90                        | 68.8%                              | 94              | 63.6%                                |  |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet                | 50                                 | 2.4%            | 192                                  | 8.2%   | The Blue Route would potentially impact fewer acres of agriculture than the Orange Route.  |
|  | Forestry                      |                           | 0                                  | 0.0%            | 0                                    | 0.0%   | Neither Route would impact State Forest lands.   |
|  | Mining & Mineral Leases       | 200 feet                  | 37                                 | 28.3%           | 33                                   | 22.3%  | Both Routes would potentially impact a similar acres of mining and mineral leases.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet                | 8                                  | -               | 1                                    | -  | The Blue Route has a higher potential to impact historic architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. There are no known archaeological sites within one mile of either Route.  |
|  | Archaeological Sites          | 1,500 feet                | 0                                  | -               | 0                                    | -  |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet     | 0                                  | -               | 0                                    | -  | Both Routes would cross a small number non-PWI and impaired waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them (pg. 603-604).   |
|  | Non-PWI Waters                |                           | 1                                  | -               | 3                                    | -  |  |
|  | Impaired Waters               |                           | 1                                  | -               | 1                                    | -  |  |
|  | Floodplains                   |                           | 0                                  | -               | 0                                    | -  | Neither Route would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                           | 51                                 | 39.0%           | 40                                   | 27.0%  | Both Routes would potentially impact very few acres of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 604).  |

| Relative Merits                   |   |                                       | Blackberry Variation Area          |                   |                                      |                   | Notes  |
|-----------------------------------|---|---------------------------------------|------------------------------------|-------------------|--------------------------------------|-------------------|--|
| Factor                            | Element   | ROI                                   | Proposed Blue Route<br>(5.4 miles) |                   | Proposed Orange Route<br>(6.1 miles) |                   |  |
|                                   |   |                                       | Count / Acres                      | Percent<br>of ROI | Count / Acres                        | Percent<br>of ROI |  |
| Vegetation                        | North American Boreal Forest                        | 200 feet                              | 60                                 | 45.8%             | 52                                   | 35.2%             | The Blue and Orange Routes would pass through a similar amount of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 606)   |
|                                   | North American Boreal Flooded & Swamp Forest        |                                       | 30                                 | 22.9%             | 26                                   | 17.6%             |  |
|                                   | Eastern North American Cool Temperate Forest        |                                       | 33                                 | 25.2%             | 49                                   | 33.1%             |  |
|                                   | Other   |                                       | 71                                 | 54.2%             | 86                                   | 64.9%             |  |
| Wildlife                          | All/Any   | 200 feet                              | 0                                  | 0.0%              | 0                                    | 0.0%              | Neither Route would impact recognized wildlife resource areas.   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 2                                  | -                 | 3                                    | -                 | Both Routes are within one mile of two threatened vascular plants; the Orange Route is within one mile of a special-concern bird listing. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 608). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 57                                 | 43.5%             | 79                                   | 53.4%             | Loss or conversion of native vegetation would likely be similar between the Blue and Orange Routes (pg. 608).  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                  | 20.0%             | -                                    | 37.0%             | The Orange Route parallels existing transmission lines for 37% of its length; the Blue Route parallels existing transmission lines for 20%.  |
| Electrical System Reliability     | -   | -                                     | -                                  | -                 | -                                    | -                 | Neither Alternative parallels or crosses any existing Manitoba – Minnesota tie lines.  |
| Cost                              | Total Cost  | -                                     | \$8,380,690                        | -                 | -                                    | -                 | The Orange Route would cost the most to construct.   |

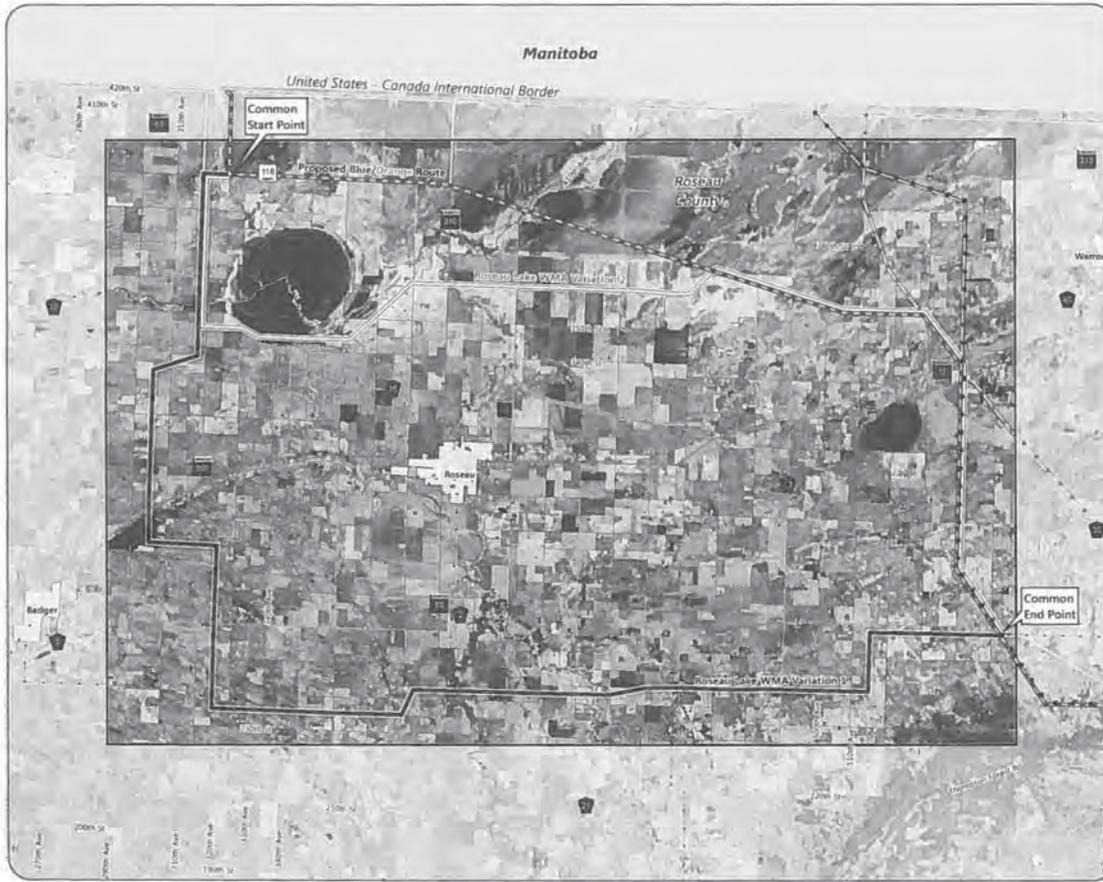
0192-1  
DUPLICATE

---

## Great Northern Transmission Line

*Relative Merits Table*

| Color  |  | Definition   |
|--|--|--|
| Green  | The alternative will have minimal effects on the resource with the implementation of best management practices, such that no mitigation is required.   |  |
| Yellow   | The alternative will have minimal to moderate effects on the resource with the implementation of best management practices, such that mitigation is likely to be required.   |  |
|  | The alternative will have moderate or greater effects on the resource, and those effects cannot be mitigated.  |  |
| Some routing factors that are not susceptible to the minimal-moderate-unmitigable system described above. In such cases, Minnesota Power's tables assign colors in the following manner: |  |  |
| Corridor Sharing   | Green means greater than 90% of the Route or Variation parallels an existing transmission line; yellow means between 10% and 90% of the Route or Variation parallels existing transmission lines; and red means less than 10% of the Route or Variation parallels an existing transmission line.   |  |
| Costs  | Green represents the costs proposed in Minnesota Power's Certificate of Need application for a particular route segment, or anything less expensive. Yellow represents anything that costs up to 20% more than Minnesota Power's proposed costs. Red represents anything that costs more than 20% of what Minnesota Power proposed, because anything in excess of that threshold.  |  |
| Electrical System Reliability  | For electrical system reliability; green means no identifiable impact (does not parallel or cross any existing Manitoba-Minnesota tie lines); yellow means acceptable impact (impacts to electrical system reliability are moderate and acceptable); red means unacceptable impact (impacts to electrical system reliability are severe and unacceptable). These judgments are based on the expertise of Minnesota Power's engineers, and are further discussed in the company's comments on the DEIS. |  |
| Factor   | Element  | Footnote   |
| General  |  | Unless otherwise stated below, the ROIs discussed in Chapters 5 and 6 of the DEIS are used in these comparison tables. Consistent with its comments on the DEIS, Minnesota Power has used alternative ROIs and/or other metrics for assessing effects, as described below, and as further explained in its DEIS comments. Minnesota Power does not have access to the exact methodology or data used in the DEIS. As a result, Minnesota Power compiled these tables by copying and, when necessary or appropriate, interpreting the data used in Chapter 6 of the DEIS.                         |
| Human Settlement   | Aesthetics   | Minnesota Power did not include state forests in its calculation of aesthetic effects. The DEIS already addresses public recreation opportunities within state forests by including trails, campgrounds, and water access points in its list of aesthetic resources. Adding state forests to the list essentially double-counts these public recreational opportunities, while ignoring the fact that the vast state forests in the project area are rarely used as recreational areas.  |
|  | Land Use Compatibility   | The dominant land cover type is presented in the table to highlight the most abundant resource within the Route/Alternative.   |
|  | Land Ownership   | All public lands are added together for this comparison. Public lands include Federal, State, and County lands.  |
|  | Private  | Private land is calculated by subtracting public lands from the total number of acres within the ROW for a particular Route/Alternative. A more accurate count of acres of private land and number of private landowners crossed could be made by using County Tax Assessor parcel data.   |
| Land-Based Economies   | Agriculture  | Acres of agricultural land within 1,500 feet is used for this comparison to account for effects on agricultural land and practices that would likely occur beyond just the 200-foot ROW. GAP Landcover data was used to determine acres of agriculture because prime farmland soils are less accurate in identifying actual agricultural land uses.  |
|  | Forestry   | Only acres of State Forest land within the ROW is used for these comparisons. It should be noted that corporate lands (such as Blandin) could also be included to the extent they are available.   |
|  | Mining & Mineral Leases  | There are several occurrences where the acres of mining and mineral leases exceed the total number of acres within the ROW of a particular Route/Alternative. These numbers are highlighted in red in the tables. Minnesota Power is unsure about the source of this error and has not attempted to correct it.  |
| Rare and Unique Natural Resources  | Rare Species   | Minnesota Power removed aquatic species from this calculation in light of the Chapter 6 text (for each Variation Area) consistently stating that PWM, non-PWM, trout, and impaired streams will be spanned and no structures will be placed within the waterbodies.  |
|  | Rare Communities   | Acres of MBS Sites of Biodiversity and MBS Native Plant Communities include only the "high" or "outstanding" values where the data has been finalized. In other areas, the preliminary total of all ranks is used.   |
| Corridor Sharing   | Paralleling Existing Infrastructure  | Minnesota Power included only existing high-voltage transmission lines in this analysis because they are the only corridor sharing opportunities that would potentially provide any environmental benefit.   |
| Electrical System Reliability  |  | This assessment of the electrical system reliability impacts of each of the Routes and Variations performed by Minnesota Power's engineers takes into account specifically the locations where the proposed line parallels or crosses existing Manitoba - Minnesota tie lines. For the particular case of the GNTL Project, no other common corridor or line crossing scenarios involving 69 kV, 115 kV, or 230 kV lines that do not connect Manitoba and the United States has any significant impact on electrical system reliability, regardless of how many transmission lines are involved. |



- 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
- Other Features**
- 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 5.



Map 4-4

**ROSEAU LAKE WMA VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement

| Relative Merits                                  |                               |                       | Roseau Lake WMA Variations                |                |  |                |  |                |  |
|--|-------------------------------|-----------------------|---|----------------|--|----------------|--|----------------|--|
| Factor   | Element                       | ROI                   | Proposed Blue / Orange Route (30.7 miles) |                | Roseau Lake WMA Variation 1 (44.1 miles) |                | Roseau Lake WMA Variation 2 (37.5 miles) |                | Notes  |
|  |                               |                       | Count / Acres                             | Percent of ROI | Count / Acres                            | Percent of ROI | Count / Acres                            | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |   |                |  |                |  |                |  |
|  | Residences                    | 1,500 feet            | 12  | -              | 50                                       | -              | 23                                       | -              | Roseau Lake WMA Variation 1 could potentially impact more than four times as many residences as the Blue/Orange Route.   |
|  | Historic Architectural Sites  | 5,280 feet            | 0   | -              | 1  | -              | 2  | -              | The Blue/Orange Route would not impact any known architectural sites within 5,280.   |
|  | State Scenic Byways           | 1,500 feet            | 1   | -              | 1  | -              | 1  | -              | All Alternatives would cross State Highway 11 - Waters of the Dancing Sky Scenic Byway.  |
|  | Trails                        |                       | 1   | -              | 1  | -              | 1  | -              | All Alternatives would cross one snowmobile trail.   |
|  | <b>Land Use Compatibility</b> |                       |   |                |  |                |  |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 7,350 ac of Forested and/or Swamp         | 84.9%          | 12,616 ac of Agricultural Land           | 78.2%          | 8,783 ac of Agricultural Land            | 63.8%          | The Blue/Orange Route's major land cover type is Forested and/or Swamp which would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 272). The Variations' major land cover type is Agriculture. |
|  | Land Ownership                | 200 feet              | 744 acres total                           |                | 1,069 acres total                        |                | 909 acres total                          |                | The Blue/Orange Route contains more acres of public land but would potentially impact the fewest private landowners.   |
|  | Public                        |                       | 453                                       | 60.9%          | 6  | 0.6%           | 145                                      | 15.9%          |  |
|  | Private                       |                       | 291                                       | 39.1%          | 1,063                                    | 99.4%          | 764                                      | 84.0%          |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 3,364                                     | 29.7%          | 12,616                                   | 78.2%          | 8,783                                    | 63.8%          | Variation 1 would potentially impact four times as many acres of agricultural land than the Blue/Orange Route.   |
|  | Forestry                      | 200 feet              | 334                                       | 44.9%          | 6  | 0.6%           | 52                                       | 5.7%           | The Blue/Orange Route contains more acres of State Forest land.  |
|  | Mining & Mineral Leases       |                       | 0   | 0.0%           | 0  | 0.0%           | 0  | 0.0%           | No Alternatives would impact any mining or mineral leases.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 0   | -              | 1  | -              | 2  | -              | The Blue/Orange Route would not impact any known architectural sites within 5,280 nor would it impact any known archaeological sites within 1,500 feet.  |
|  | Archaeological Sites          | 1,500 feet            | 0   | -              | 3  | -              | 3  | -              |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 2   | -              | 10                                       | -              | 3  | -              | All Alternatives would cross a number of waterbodies; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |                       | 23  | -              | 38                                       | -              | 33                                       | -              |  |
|  | Impaired Waters               |                       | 1   | -              | 2  | -              | 2  | -              |  |
|  | Floodplains                   |                       | 321                                       | 43.1%          | 202                                      | 18.9%          | 307                                      | 33.8%          | All Alternatives contain a similar number of acres of FEMA-designated floodplains and all will require structure placement within floodplains.   |

| Relative Merits                   |  |                                       | Roseau Lake WMA Variations                |                |  |                |  |  | Notes   |
|-----------------------------------|--|---------------------------------------|---|----------------|--|----------------|--|--|---|
| Factor                            | Element                                      | ROI                                   | Proposed Blue / Orange Route (30.7 miles) |                | Roseau Lake WMA Variation 1 (44.1 miles) |                | Roseau Lake WMA Variation 2 (37.5 miles) |  |   |
|                                   |  |                                       | Count / Acres                             | Percent of ROI | Count / Acres                            | Percent of ROI | Count / Acres                            | Percent of ROI   |   |
|                                   | NWI Wetlands                                 |                                       | 547                                       | 73.5%          | 102                                      | 9.5%           | 272                                      | 29.9%  | The Blue/Orange Route would potentially impact twice as many acres of NWI-mapped wetlands as Variation 2. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 279).   |
| Vegetation                        | North American Boreal Flooded & Swamp Forest | 200 feet                              | 388                                       | 52.1%          | 61                                       | 5.7%           | 185                                      | 18.1%  | The Blue/Orange Route contains a greater amount of forest land; the two Variations contain a greater amount of herbaceous agricultural vegetative cover. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 280).   |
|                                   | North American Boreal Forest                 |                                       | 73  | 9.8%           | 30                                       | 2.8%           | 57                                       | 6.3%   |   |
|                                   | Herbaceous Agricultural                      |                                       | 106                                       | 26.3%          | 666                                      | 81.0%          | 531                                      | 58.4%  |   |
|                                   | Other  |                                       | 87  | 11.7%          | 112                                      | 10.5%          | 156                                      | 17.2%  |   |
|                                   | WMAs   |                                       | 69  | 9.3%           | 0  | 0.0%           | 44                                       | 4.8%   |   |
| Wildlife                          | Grassland Bird Conservation Areas            | 200 feet                              | 131                                       | 17.6%          | 40                                       | 3.7%           | 220                                      | 24.2%  | The Blue/Orange Route and Variation 2 contain similar acres of WMA. Variation 2 contains the most acres of Grassland Bird Conservation Areas, however, ongoing vegetation management of the ROW in early successional vegetative state, would be compatible with grassland bird species' habitat requirements (pg. 282).  |
| Rare and Unique Natural Resources | Rare Species                                 | 1 mile (aquatic species not included) | 7   | -              | 2  | -              | 3  | -  | The Blue/Orange Route is located within one mile of seven documented rare species. Surveys will be performed on the final 200-foot ROW to determine if any of these species are present within the permitted ROW. Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through the use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 284). |
|                                   | State Rare Communities                       | 200 feet                              |   |                |  |                |  |  | The Blue/Orange Route contains more acres of MBS Sites of Biodiversity, HCVF, and MBS Native Plant communities.   |
|                                   | MBS Sites of Biodiversity                    |                                       | 107                                       | 14.4%          | 7  | 0.7%           | 77                                       | 8.5%   |   |
|                                   | High Conservation Value Forest               |                                       | 22  | 3.0%           | 6  | 0.6%           | 8  | 0.7%   |   |
|                                   | MBS Native Plant Communities                 |                                       | 39  | 5.2%           | 0  | 0.0%           | 22                                       | 2.4%   |   |
| Corridor Sharing                  | Paralleling Existing Infrastructure          | -                                     | -   | 33.0%          | -  | -              | 27.0%                                    | The Blue/Orange Route parallels existing transmission lines for approximately 1/3rd of its length. |   |

| Relative Merits               |            |     | Roseau Lake WMA Variations                |                |  |                |  |                |   |
|-------------------------------|------------|-----|---|----------------|--|----------------|--|----------------|---|
| Factor                        | Element    | ROI | Proposed Blue / Orange Route (30.7 miles) |                | Roseau Lake WMA Variation 1 (44.1 miles) |                | Roseau Lake WMA Variation 2 (37.5 miles) |                | Notes   |
|                               |            |     | Count / Acres                             | Percent of ROI | Count / Acres                            | Percent of ROI | Count / Acres                            | Percent of ROI |   |
| Electrical System Reliability |            | -   |   | -              |  | -              |  | -              | The Blue/Orange Route and Variation 2 both parallel one existing Manitoba - Minnesota tie line for part of their length, while Variation 1 does not parallel any existing Manitoba - Minnesota tie lines. |
| Cost                          | Total Cost | -   | \$33,247,088                              | -              |  | -              |  | -              | Variation 1 would cost the most to construct.   |



- 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
  - 89 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 5.



Map 4-5

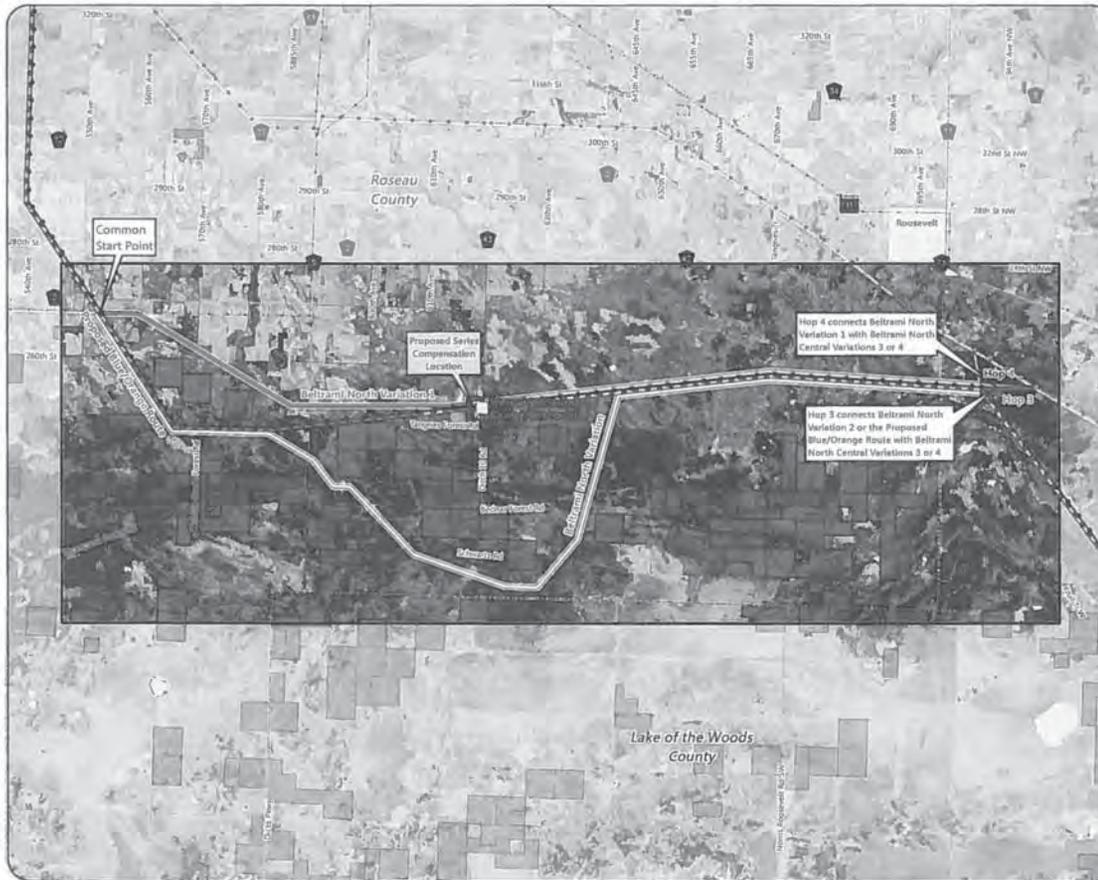
**CEDAR BEND WMA VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement



| Relative Merits                                  |                               | Cedar Bend WMA Variation |   |                 |                                       | Notes  |  |
|--|-------------------------------|--------------------------|---|-----------------|---------------------------------------|--|--|
| Factor   | Element                       | ROI                      | Proposed Blue / Orange Route (24.7 miles) |                 | Cedar Bend WMA Variation (19.6 miles) |  |  |
|  |                               |                          | Count / Acres                             | Percent of ROI  | Count / Acres                         |  | Percent of ROI   |
| Human Settlement                                 | <b>Aesthetics</b>             |                          |   |                 |                                       |  |  |
|  | Residences                    | 1,500 feet (within ROW)  | 11 (0)                                    | -               | -                                     | -  | The Cedar Bend WMA Variation would potentially impact ten times as many residences as the Blue/Orange Route and contains 4 homes within the ROW.   |
|  | Historic Architectural Sites  | 5,280 feet               | 0   | -               | 8                                     | -  | The Cedar Bend WMA Variation has a higher potential to impact eight known architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.  |
|  | State Scenic Byways           | 1,500 feet               | 1   | -               | 1                                     | -  | Both Alternatives would cross State Highway 11 - Waters of the Dancing Sky Scenic Byway. Both Alternatives would cross the scenic byway adjacent to existing transmission lines of similar design.   |
|  | Trails                        |                          | 2   | -               | 2                                     | -  | Both Alternatives would cross two snowmobile trails.   |
|  | <b>Land Use Compatibility</b> |                          |   |                 |                                       |  |  |
|  | Dominant Land Cover Type      | 1,500 feet               | 8,045 ac                                  | 88.1%           | 4,180 ac                              | 57.3%  | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 281). |
| Land Ownership                                   |                               | 599 acres total          |   | 475 acres total |                                       | The Blue/Orange Route contains more than five times as many acres of public land; however, it would potentially impact the fewest private land owners. |  |
| Public   | 200 feet                      | 447                      | 74.6%                                     | 84              | 17.7%                                 |  |  |
| Private  |                               | 152                      | 25.4%                                     | 391             | 82.3%                                 |  |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet               | 844                                       | 9.2%            | 2,625                                 | 36.0%  | The Cedar Bend WMA Variation would potentially impact three times as many acres of agricultural land than the Blue/Orange Route.   |
|  | Forestry                      | 200 feet                 | 372                                       | 62.1%           | 76                                    | 16.4%  | The Blue/Orange Route contains more than four times as many acres of State Forest land than the Variation.   |
|  | Mining & Mineral Leases       |                          | 97  | 16.2%           | 0                                     | 0.0%   | The Blue/Orange Route would potentially impact more mining and mineral lease lands.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet               | 0   | -               | 8                                     | -  | The Cedar Bend WMA Variation has a higher potential to impact eight known architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. The Cedar Bend WMA Variation also has a higher potential to impact two known archaeological sites within 1,500 feet.   |
|  | Archaeological Sites          | 1,500 feet               | 0   | -               | 2                                     | -  |  |
| Water Resources                                  | PWI Waters                    |                          | 4   | -               | 5                                     | -  | Both Alternatives would cross a number of waterbodies, however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.  |
|  | Non-PWI Waters                |                          | 12  | -               | 11                                    | -  |  |
|  | Impaired Waters               |                          | 2   | -               | 3                                     | -  |  |

| Relative Merits                   |                                   |                                       | Cedar Bend WMA Variation                  |                |                                       |                | Notes  |
|-----------------------------------|-----------------------------------|---------------------------------------|---|----------------|---------------------------------------|----------------|--|
| Factor                            | Element                           | ROI                                   | Proposed Blue / Orange Route (24.7 miles) |                | Cedar Bend WMA Variation (19.6 miles) |                |  |
|                                   |                                   |                                       | Count / Acres                             | Percent of ROI | Count / Acres                         | Percent of ROI |  |
| Water Resources                   | Floodplains                       | Crossings or 200 feet                 | 0   | 0.0%           | 32                                    | 6.7%           | The Cedar Bend WMA Variation would potentially impact a FEMA-designated floodplain as it would require construction and placement of transmission structures within Zone A of two floodplain areas. Impacts to floodplains are expected to be minimal (pg. 298).   |
|                                   | NWI Wetlands                      |                                       | 466                                       | 77.8%          | 154                                   | 32.4%          | The Blue/Orange Route would potentially impact three times as many acres of NWI-mapped wetlands and the Cedar Bend WMA Variation. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 299).  |
| Vegetation                        | Boreal Flooded & Swamp Forest     | 200 feet                              | 338                                       | 56.4%          | 117                                   | 24.8%          | The Blue/Orange Route contains a greater amount of forest land and Cedar Bend Variation contains a greater amount of agricultural land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 300).   |
|                                   | Boreal Forest                     |                                       | 110                                       | 18.4%          | 57                                    | 12.0%          |  |
|                                   | Cool Temperate Forest             |                                       | 37  | 6.2%           | 28                                    | 5.9%           |  |
|                                   | Eastern Flooded & Swamp Forest    |                                       | 58  | 9.7%           | 84                                    | 13.5%          |  |
|                                   | Herbaceous Agricultural           |                                       | 41  | 6.8%           | 186                                   | 39.1%          |  |
|                                   | Other                             |                                       | 15  | 2.5%           | 23                                    | 4.8%           |  |
| Wildlife                          | WMAs                              | 200 feet                              | 44  | 7.3%           | 0                                     | 0.0%           | The Blue/Orange Route contains more acres of WMA and crosses one DNR shallow lake. Both Alternatives contain similar amounts of Grassland Bird Conservation Areas; however, ongoing vegetation management of the ROW in early successional vegetative state, would be compatible with grassland bird species' habitat requirements (pg. 302).  |
|                                   | Shallow Lakes                     |                                       | 1   | 0.2%           | 0                                     | 0.0%           |  |
|                                   | Grassland Bird Conservation Areas |                                       | 50  | 8.4%           | 10                                    | 2.1%           |  |
| Rare and Unique Natural Resources | Rare Species                      | 1 mile (aquatic species not included) | 2   | -              | 0                                     | -              | The Blue/Orange Route is located within one mile of two documented vascular plants. Surveys will be performed on the final 200-foot ROW to determine if any of these species are present within the permitted ROW. Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 304). |
|                                   | Slate Rare Communities            | 200 feet                              |   |                |                                       |                | The Blue/Orange Route contains the most MBS Sites of Biodiversity, HCVF, and MBS Native Plant Communities.   |
|                                   | MBS Sites of Biodiversity         |                                       | 43  | 7.2%           | 0                                     | 0.0%           |  |
|                                   | High Conservation Value Forest    |                                       | 6   | 1.3%           | 0                                     | 0.0%           |  |

| Relative Merits  |                                     |     | Cedar Bend WMA Variation                  |                |                                       |                | Notes   |
|------------------|-------------------------------------|-----|---|----------------|---------------------------------------|----------------|---|
| Factor           | Element                             | ROI | Proposed Blue / Orange Route (24.7 miles) |                | Cedar Bend WMA Variation (19.6 miles) |                |   |
|                  |                                     |     | Count / Acres                             | Percent of ROI | Count / Acres                         | Percent of ROI |   |
|                  | MBS Native Plant Communities        |     | 22  | 3.7%           | 0                                     | 0.0%           |   |
| Corridor Sharing | Paralleling Existing Infrastructure | -   | -   | 100.0%         | -                                     | 100.0%         | Both Alternatives parallel existing transmission lines for 100% of their lengths.   |
|                  | Electrical System Reliability       | -   | -   | -              | -                                     | -              | Both Alternatives parallel one existing Manitoba – Minnesota tie line for their entire length, but the Cedar Bend WMA Variation would establish two new crossings of the existing 500 kV tie line that are not necessary for the Blue/Orange Route and is also routed unacceptably close to at least two existing transmission substations. |
| Cost             | Total Cost                          | -   | \$27,197,850                              | -              | \$23,202,312                          | -              | The Blue/Orange Route would cost the most to construct. Cost for the Cedar Bend WMA have been updated since the initial data request.   |



- 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 5.

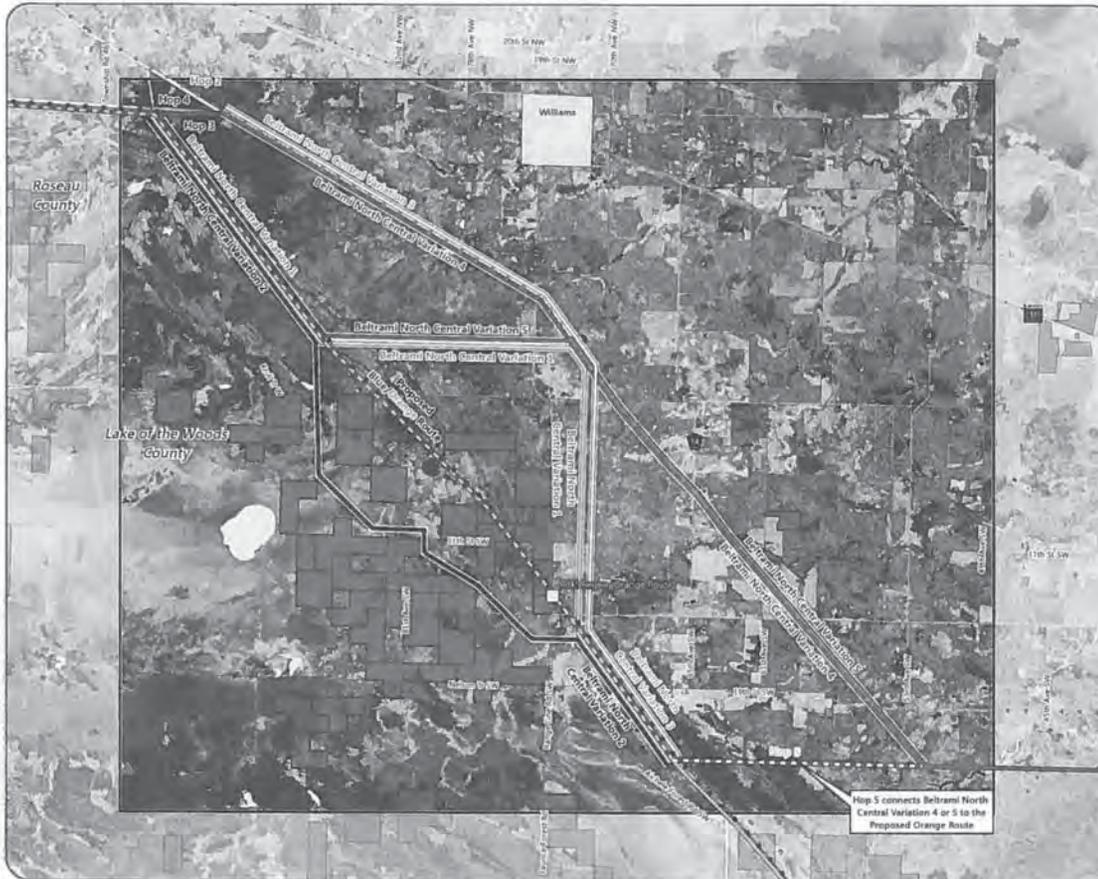


Map 4-6  
**BELTRAMI NORTH VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement

| Relative Merits                                  |                               |                       | Beltrami North Variations                 |                |   |                |   |                | Notes  |
|--|-------------------------------|-----------------------|---|----------------|---|----------------|---|----------------|--|
| Factor   | Element                       | ROI                   | Proposed Blue / Orange Route (16.5 miles) |                | Beltrami North Variation 1 (15.8 miles) |                | Beltrami North Variation 2 (19.7 miles) |                |  |
|  |                               |                       | Count / Acres                             | Percent of ROI | Count / Acres                           | Percent of ROI | Count / Acres                           | Percent of ROI |  |
|  |                               |                       |   |                |   |                |   |                |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |   |                |   |                |   |                |  |
|  | Residences                    | 1,500 feet            | 3   | -              | 6                                       | -              | 1                                       | -              | Variation 1 would potentially impact more residences than the other Alternatives.  |
|  | Historic Architectural Sites  | 5,280 feet            | 0   | -              | 0                                       | -              | 2                                       | -              | Variation 2 has a higher potential to impact 2 known architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Trails                        | 1,500 feet            | 2   | -              | 2                                       | -              | 2                                       | -              | All Alternatives would cross two snowmobile trails.  |
|  | <b>Land Use Compatibility</b> |                       |   |                |   |                |   |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 5,961 ac                                  | 97.0%          | 5,391 ac                                | 91.4%          | 7,190 ac                                | 98.5%          | All Alternatives' major land cover type is Forested and/or Swamp. All Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 311). |
|  | Land Ownership                | 200 feet              | 400 acres total                           |                | 383 acres total                         |                | 478 acres total                         |                | Variation 2 contains more acres of public land than the other Alternatives and the fewest acres of private land.   |
| Public   |                               | 372                   | 93.0%                                     | 297            | 77.5%                                   | 462            | 96.7%                                   |                |  |
| Private  |                               | 28                    | 7.0%                                      | 86             | 22.5%                                   | 16             | 3.4%                                    |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 84  | 1.4%           | 358                                     | 6.1%           | 22                                      | 0.3%           | Variation 1 would potentially impact four times as many acres of agricultural land than the Blue/Orange Route  |
|  | Forestry                      | 200 feet              | 372                                       | 93.0%          | 291                                     | 76.0%          | 462                                     | 96.7%          | Variation 2 contains the most acres of State Forest; Variation 1 contains the fewest.  |
|  | Mining & Mineral Leases       | 200 feet              | 97  | 24.3%          | 97                                      | 25.3%          | 152                                     | 31.8%          | Variation 2 would potentially impact more mining and mineral lease lands than the Blue/Orange Route and Variation 1.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 0   | -              | 0                                       | -              | 2                                       | -              | Variation 2 has a higher potential to impact two known architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. Variation 2 also has a higher potential to impact two known archaeological sites within 1,500 feet.   |
|  | Archaeological Sites          | 1,500 feet            | 0   | -              | 0                                       | -              | 2                                       | -              |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 4   | -              | 9                                       | -              | 3                                       | -              | All Alternatives would cross a number of waterbodies; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |                       | 7   | -              | 4                                       | -              | 12                                      | -              |  |
|  | Impaired Waters               |                       | 2   | -              | 6                                       | -              | 2                                       | -              |  |
|  | Floodplains                   |                       | 0   | 0.0%           | -                                       | 0.0%           | 0                                       | 0.0%           | No Alternatives would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                       | 323                                       | 80.8%          | 294                                     | 76.8%          | 391                                     | 81.9%          | All Alternatives would potentially impact a similar amount of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 316).   |

| Relative Merits                   |   |                                       | Beltrami North Variations                 |                |   |                |   |  | Notes  |
|-----------------------------------|---|---------------------------------------|---|----------------|---|----------------|---|--|--|
| Factor                            | Element                                       | ROI                                   | Proposed Blue / Orange Route (16.5 miles) |                | Beltrami North Variation 1 (15.8 miles) |                | Beltrami North Variation 2 (19.7 miles) |  |  |
|                                   |   |                                       | Count / Acres                             | Percent of ROI | Count / Acres                           | Percent of ROI | Count / Acres                           | Percent of ROI   |  |
| Vegetation                        | North American Boreal Flooded & Swamp Forest  | 200 feet                              | 242                                       | 80.5%          | 221                                     | 57.7%          | 300                                     | 62.8%  | All Alternatives would potentially impact a similar amount of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 318).  |
|                                   | North American Boreal Forest                  |                                       | 94  | 23.5%          | 84                                      | 21.9%          | 117                                     | 24.5%  |  |
|                                   | Eastern North American Cool Temperate Forest  |                                       | 27  | 6.8%           | 24                                      | 6.3%           | 21                                      | 4.4%   |  |
|                                   | Eastern North American Flooded & Swamp Forest |                                       | 26  | 6.5%           | 38                                      | 9.9%           | 35                                      | 7.3%   |  |
|                                   | Other   |                                       | 11  | 2.8%           | 54                                      | 14.1%          | 40                                      | 8.4%   |  |
| Wildlife                          | Shallow Lakes                                 | 200 feet                              | 1   | -              | 0                                       | -              | 1                                       | -  | Variation 2 contains more acres of land designated as an Important Bird Area and the Blue/Orange Route and Variation 2 both cross one DNR Shallow Lake. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 319).   |
|                                   | Important Bird Areas                          |                                       | 0   | 0.0%           | 0                                       | 0.0%           | 23                                      | 4.8%   |  |
| Rare and Unique Natural Resources | Rare Species                                  | 1 mile (aquatic species not included) | 2   |                | 1                                       | -              | 7                                       |  | Variation 2 is located within one mile of seven documented vascular plants. Surveys will be performed on the final 200-foot ROW to determine if any of these species are present within the permitted ROW. Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 322). |
|                                   | State Rare Communities                        | 200 feet                              |   |                |   |                |   |  |  |
|                                   | MBS Sites of Biodiversity                     |                                       | 0   | 0.0%           | 8                                       | 1.6%           | 30                                      | 6.3%   |  |
|                                   | High Conservation Value Forest                |                                       | 8   | 2.0%           | 0                                       | 0.0%           | 8                                       | 1.7%   |  |
| MBS Native Plant Communities      |   | 0                                     | 0.0%                                      | 0              | 0.0%                                    | 8              | 1.7%                                    | Variation 2 contains the most amount of MBS Sites of Biodiversity, Blue/Orange has the fewest. All Alternatives contain relatively few or no acres of HCVF and MBS Native Plant Communities. |  |

| Relative Merits               |                                     | Beltrami North Variations |   |                |   |                |   | Notes |  |
|-------------------------------|-------------------------------------|---------------------------|---|----------------|---|----------------|---|-------|--|
| Factor                        | Element                             | ROI                       | Proposed Blue / Orange Route (16.6 miles) |                | Beltrami North Variation 1 (15.8 miles) |                | Beltrami North Variation 2 (19.7 miles) |       |  |
|                               |                                     |                           | Count / Acres                             | Percent of ROI | Count / Acres                           | Percent of ROI | Count / Acres                           |       | Percent of ROI   |
| Corridor Sharing              | Paralleling Existing Infrastructure | -                         | -   | 100.0%         | -                                       | 72.0%          | -                                       | 53.0% | The Blue/Orange Route parallels existing transmission lines for 100% of its length; Variation 1 for 72%; and Variation 2 for 53%. All three Alternatives share a similar corridor for most of their lengths; when that similar corridor is removed from consideration; Variation 2 would not parallel any existing transmission lines. |
| Electrical System Reliability |                                     | -                         | -   | -              | -                                       | -              | -                                       | -     | All Alternatives all parallel one existing Manitoba – Minnesota tie line for a significant part of their length.   |
| Cost                          | Total Cost                          | -                         | \$18,984,370                              | -              | \$19,591,868                            | -              | -                                       | -     | Variation 2 would cost the most to construct. <i>Cost for Variation 1 have been updated since the initial data request.</i>  |



- 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 5.



**BELTRAMI NORTH CENTRAL VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement



| Relative Merits                                  |                              | Beltrami North Central Variations |   |                |   |                |   |                |   |                |   |                |   | Notes  |   |
|--|------------------------------|-----------------------------------|---|----------------|---|----------------|---|----------------|---|----------------|---|----------------|---|--------|---|
| Factor   | Element                      | ROI                               | Proposed Blue / Orange Route (11.6 miles) |                | Beltrami North Central Variation 1 (13.7 miles) |                | Beltrami North Central Variation 2 (12.6 miles) |                | Beltrami North Central Variation 3 (12.2 miles) |                | Beltrami North Central Variation 4 (13.5 miles) |                | Beltrami North Central Variation 5 (15.0 miles) |        |   |
|  |                              |                                   | Count / Acres                             | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   |        | Percent of ROI  |
| Human Settlement                                 | Aesthetics                   |                                   |   |                |   |                |   |                |   |                |   |                |   |        | Beltrami North Variation 4 would potentially impact the most residences within 1,500 feet.<br>Variations 4 and 5 have a potential to impact one known historic site within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.<br>All Alternatives would cross one snowmobile trail.   |
|  | Residences                   | 1,500 feet                        | 3   | —              | 2   | —              | 2   | —              | 4   | —              | 10  | —              | 8   | —      |   |
|  | Historic Architectural Sites | 5,280 feet                        | 0   | —              | 0   | —              | 0   | —              | 0   | —              | 1   | —              | 1   | —      |   |
|  | Trails                       | 1,500 feet                        | 1   | —              | 1   | —              | 1   | —              | 1   | —              | 1   | —              | 1   | —      |   |
|  | Land Use Compatibility       |                                   |   |                |   |                |   |                |   |                |   |                |   |        |   |
|  | Dominant Land Cover Type     | 1,500 feet                        | 4,304 ac                                  | 98.7%          | 5,005 ac  | 97.7%          | 4,553 ac  | 98.8%          | 4,460 ac  | 97.2%          | 4,874 ac  | 92.0%          | 5,219 ac  | 92.9%  |   |
| Land Ownership                                   |                              |                                   | 281 acres total                           |                | 332 acres total                                 |                | acres total                                     |                | 296 acres total                                 |                | 327 acres total                                 |                | 304 acres total                                 |        | All Alternatives' major land cover type is Forested and/or Swamp. All Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 336).  |
|  | Public                       | 200 feet                          | 242                                       | 86.1%          | 237   | 71.4%          | 56  | 83.8%          | 184   | 62.2%          | 178   | 54.4%          | 230   | 63.3%  |   |
|  | Private                      |                                   | 39  | 13.9%          | 95  | 28.6%          | 50  | 16.4%          | 112   | 37.9%          | 149   | 45.5%          | 154   | 42.4%  |   |
| Land-Based Economies                             | Agriculture                  | 1,500 feet                        | 1   | 0.0%           | 49  | 1.0%           | 0   | 0.0%           | 49  | 1.1%           | 278   | 5.4%           | 277   | 4.9%   | The Blue/Orange Route and Variation 2 would potentially impact the fewest acres of agricultural land whereas Variations 4 and 5 would potentially impact the most.<br>All Alternatives contain similar amounts of State Forest land.  |
|  | Forestry                     |                                   | 224                                       | 79.7%          | 237   | 71.4%          | 55  | 83.5%          | 184   | 62.2%          | 178   | 54.4%          | 230   | 63.3%  |   |
|  | Mining & Mineral Leases      | 200 feet                          | 0   | 0.0%           | 0   | 0.0%           | 0   | 0.0%           | 0   | 0.0%           | 0   | 0.0%           | 0   | 0.0%   |   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites | 5,280 feet                        | 0   | —              | 0   | —              | 0   | —              | 0   | —              | 1   | —              | 1   | —      | Variations 4 and 5 have a potential to impact one known historic site within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. No Alternatives would impact any known archaeological sites within 1,500 feet.  |
|  | Archaeological Sites         | 1,500 feet                        | 0   | —              | 0   | —              | 0   | —              | 0   | —              | 0   | —              | 0   | —      |   |
|  |                              |                                   | 8   | —              | 8   | —              | 1   | —              | 2   | —              | 8   | —              | 8   | —      | All Alternatives would cross a number of waterbodies; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.<br>All Alternatives would cross FEMA-designated floodplains; however, these crossings are spannable and structures would not be placed within the floodplain.<br>All Alternatives would potentially impact a similar amount of NW-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 337). |
|  |                              |                                   | 8   | —              | 8   | —              | 8   | —              | 8   | —              | 8   | —              | 7   | —      |   |
|  |                              |                                   | 1   | 0.4%           | 1   | 0.6%           | 1   | 0.6%           | 1   | 0.6%           | 1   | 0.6%           | 1   | 0.6%   |   |
|  |                              |                                   | 1   | 96.7%          | 1   | 94.5%          | 1   | 94.5%          | 1   | 94.5%          | 1   | 94.5%          | 1   | 92.7%  |   |
|  |                              |                                   | 60  | 62.9%          | 60  | 62.9%          | 78  | 81.7%          | 78  | 81.7%          | 100   | 104.2%         | 103   | 107.1% | All Alternatives would potentially impact similar amounts of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 338).  |
|  |                              |                                   | 16  | 23.5%          | 16  | 31.3%          | 78  | 81.7%          | 100   | 104.2%         | 118   | 123.5%         | 118   | 123.5% |   |
|  |                              |                                   | 38  | 10.7%          | 38  | 10.2%          | 42  | 11.8%          | 42  | 11.8%          | 52  | 14.5%          | 52  | 15.1%  |   |
|  |                              |                                   | 1   | 2.8%           | 1   | 4.2%           | 7   | 18.5%          | 7   | 18.5%          | 11  | 28.4%          | 11  | 28.4%  |   |

| Relative Merits                   |   |                                       | Beltrami North Central Variations         |                |   |                |   |                |   |                |   |                |   |                | Notes   |
|-----------------------------------|---|---------------------------------------|---|----------------|---|----------------|---|----------------|---|----------------|---|----------------|---|----------------|---|
| Factor                            | Element   | ROI                                   | Proposed Blue / Orange Route (11.6 miles) |                | Beltrami North Central Variation 1 (13.7 miles) |                | Beltrami North Central Variation 2 (12.6 miles) |                | Beltrami North Central Variation 3 (12.2 miles) |                | Beltrami North Central Variation 4 (13.5 miles) |                | Beltrami North Central Variation 5 (15.0 miles) |                |   |
|                                   |   |                                       | Count / Acres                             | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI | Count / Acres                                   | Percent of ROI |   |
| Wildlife                          | Important Bird Areas                                | 200 feet                              | 117                                       | 41.6%          | 31  | 9.3%           | 127   | 51.4%          | 31  | 10.5%          | 33  | 10.1%          | 33  | 9.1%           | The Orange/Blue Route and Variation 2 contain more acres of designated Important Bird Area lands than the other Variations. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 339).  |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 4   | -              | 4   | -              | 4   | -              | 4   | -              | 0   | -              | 3   | -              | All Alternatives (except Variation 4) are within one mile of three to four documented vascular plants. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 341). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 101                                       | 35.9%          | 15  | 4.5%           | 115   | 37.6%          | 15  | 5.1%           | 0   | 0.0%           | 6   | 0.0%           | The Blue/Orange and Variation 2 contain similar amounts of MBS Sites of Biodiversity; however it should be noted that not all biodiversity significance ranks have been determined for Lake of the Woods County.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 |                                       |   | 100.0%         |   | 48.0%          |   | 49.0%          |   | 70.0%          |   | 82.0%          |   | 70.0%          | The Blue/Orange Route parallels existing transmission lines for 100% of its length.   |
| Electrical System Reliability     |   |                                       |   | -              |   | -              |   | -              |   | -              |   | -              |   | -              | The Blue/Orange Route and the five Variations all parallel one existing Manitoba - Minnesota tie line for a significant part of their length. Variations 1 and 3 also establish two new crossings of the existing 500 kV tie line that are not necessary for the Blue/Orange Route.   |
| Cost                              | Total Cost  |                                       | \$12,574,123                              | -              | \$14,368,802                                    | -              | \$14,478,550                                    | -              | -   | -              | -   | -              | -   | -              | Variation 4 would cost the most to construct. Costs for Variations 1, 3, 4, and 5 have been updated since the initial data request.   |



- 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 only 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 5.



Map 4-9

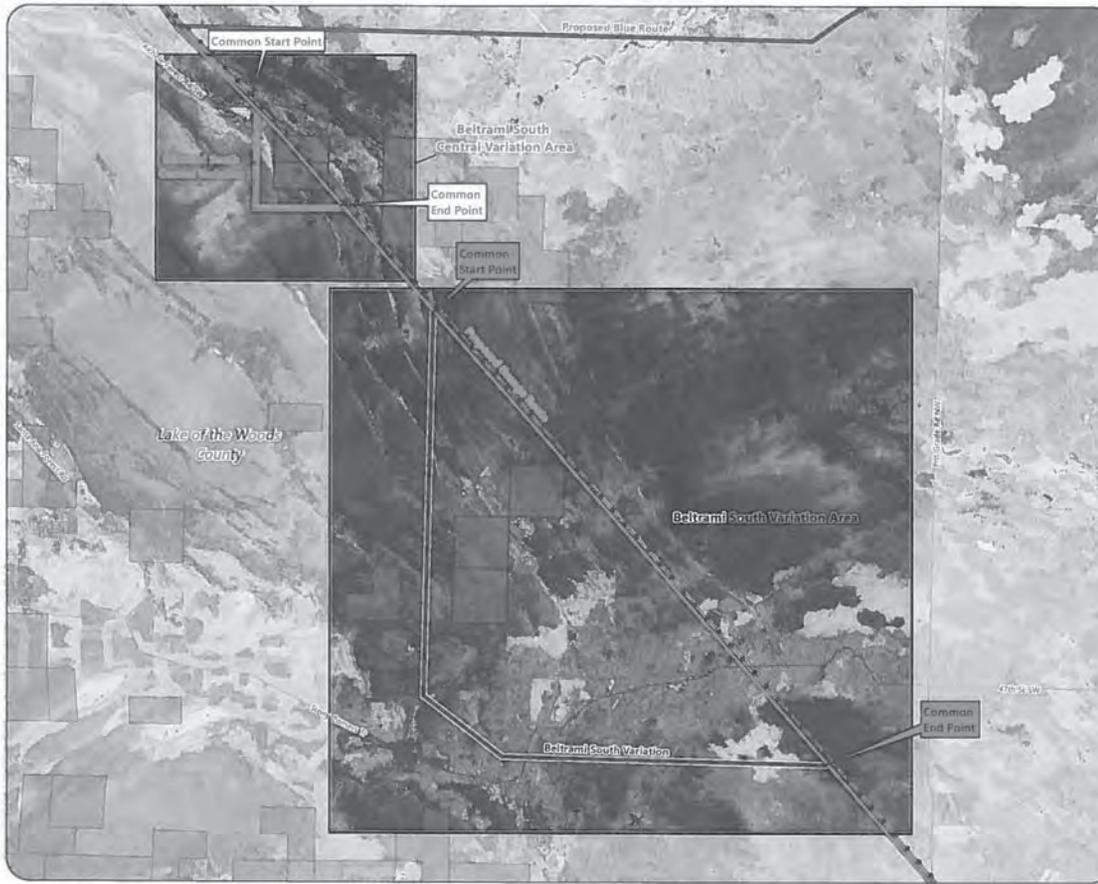
**PINE ISLAND VARIATION AREA**  
 Great Northern Transmission Line  
 Draft Environmental Impact Statement



| Relative Merits                                  |                               |                       | Pine Island Variation Area           |                |  |                | Notes  |
|--|-------------------------------|-----------------------|--------------------------------------|----------------|--|----------------|--|
| Factor   | Element                       | ROI                   | Proposed Blue Route<br>(109.8 miles) |                | Proposed Orange Route<br>(105.4 miles) |                |  |
|  |                               |                       | Count / Acres                        | Percent of ROI | Count / Acres                          | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |                                      |                |  |                |  |
|  | Residences                    | 1,500 feet            | 14                                   | -              | 2                                      | -              | The Blue Route would potentially impact more residences than the Orange Route.   |
|  | Historic Architectural Sites  | 5,280 feet            | 2                                    | -              | 7                                      | -              | The Orange Route has a higher potential to impact known historic architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Trails                        |                       | 5                                    |                | 8                                      |                | Both Alternatives would cross one state trail and one water trail. The Orange Route would cross one more snowmobile trail than the Blue Route.   |
|  | <b>Land Use Compatibility</b> |                       |                                      |                |  |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 38,203 ac                            | 95.4%          | 37,685 ac                              | 98.0%          | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 384-385). |
|  | Land Ownership                | 200 feet              | 2,662 acres total                    |                | 2,555 acres total                      |                | Both Alternatives contain similar amounts of public and private lands.   |
| Public   |                               | 2,299                 | 86.4%                                | 2,326          | 91.0%                                  |                |  |
| Private  |                               | 363                   | 13.6%                                | 229            | 9.0%                                   |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 985                                  | 2.5%           | 305                                    | 0.8%           | The Blue Route would potentially impact almost three times as many acres of agricultural land.   |
|  | Forestry                      |                       | 2,291                                | 86.1%          | 1,980                                  | 77.5%          | Both Routes contain similar amounts of State Forest lands.   |
|  | Mining & Mineral Leases       | 200 feet              | 1,205                                | 45.3%          | 370                                    | 14.5%          | The Blue Route would potentially impact over three times as many acres of mining and mineral leases than the Orange Route.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 2                                    | -              | 7                                      | -              | The Orange Route has a higher potential to impact known historic architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Archaeological Sites          | 1,500 feet            | 1                                    | -              | 0                                      | -              | The Blue Route is within 1,500 feet of a known archaeological site.  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 18                                   | -              | 25                                     | -              | Both Alternatives would a similar number of PWI, non-PWI, and impaired waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.  |
|  | Non-PWI Waters                |                       | 48                                   | -              | 46                                     | -              |  |
|  | Impaired Waters               |                       | 1                                    | -              | 1                                      | -              |  |
|  | Trout Stream                  |                       | 1                                    | -              | 0                                      | -              |  |
|  | Floodplains                   |                       | 20                                   | -              | 11                                     | -              | Both Routes would cross FEMA-designated floodplains; however, crossings would be less than the average spanning length of 1,250 feet and structures would not be placed in them.   |

| Relative Merits                   |   |                                       | Pine Island Variation Area           |                |  |                | Notes  |
|-----------------------------------|---|---------------------------------------|--------------------------------------|----------------|--|----------------|--|
| Factor                            | Element                                       | ROI                                   | Proposed Blue Route<br>(109.8 miles) |                | Proposed Orange Route<br>(105.4 miles) |                |  |
|                                   |   |                                       | Count / Acres                        | Percent of ROI | Count / Acres                          | Percent of ROI |  |
|                                   | NWI Wetlands                                  |                                       | 2,102                                | 79.0%          | 1,875                                  | 73.4%          | The Orange Route would potentially impact slightly more acres of NWI-mapped wetlands than the East Bear Lake Variation. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 391).  |
| Vegetation                        | North American Boreal Flooded & Swamp Forest  | 200 feet                              | 1,372                                | 51.5%          | 1,323                                  | 51.8%          | Both Alternatives would potentially impact a similar amount of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 393).   |
|                                   | North American Boreal Forest                  |                                       | 785                                  | 29.5%          | 760                                    | 30.1%          |  |
|                                   | Eastern North American Flooded & Swamp Forest |                                       | 386                                  | 13.8%          | 358                                    | 14.0%          |  |
|                                   | Other   |                                       | 139                                  | 5.2%           | 1,232                                  | 48.2%          |  |
| Wildlife                          | WMAs  | 200 feet                              | 49                                   | 1.8%           | 274                                    | 10.7%          | The Blue Route contains fewer acres of WMA than the Orange Route.  |
|                                   | Important Bird Areas                          |                                       | 1,405                                | 52.8%          | 1,722                                  | 67.4%          | Both Alternatives contain a similar amount of land designated as an Important Bird Area. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 395).  |
| Rare and Unique Natural Resources | Rare Species                                  | 1 mile (aquatic species not included) | 6                                    | -              | 13                                     | -              | The Orange Route is within one mile of more than twice as many documented rare species than the Blue Route. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 397). |
|                                   | Slate Rare Communities                        | 200 feet                              | -                                    | -              | -                                      | -              | Both Routes contain few acres of Ecologically Important Lowland Conifers; however, the Blue Route would pass through more acres than the Orange Route.   |
|                                   | Ecologically Important Lowland Conifers       |                                       | 29                                   | 1.1%           | 5                                      | 0.2%           |  |
|                                   | MBS Sites of Biodiversity                     |                                       | 1,514                                | 56.8%          | 1,839                                  | 64.1%          | Both Routes contain similar amounts of MBS Sites of Biodiversity.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure           | -                                     | -                                    | 39.0%          | -                                      | 23.0%          | The Blue Route parallels existing transmission lines for 39% of its length; the Orange Route for 23% of its length.  |

| Relative Merits               |            |     | Pine Island Variation Area           |                   |  |                   | Notes   |
|-------------------------------|------------|-----|--------------------------------------|-------------------|--|-------------------|---|
| Factor                        | Element    | ROI | Proposed Blue Route<br>(109.8 miles) |                   | Proposed Orange Route<br>(105.4 miles) |                   |   |
|                               |            |     | Count / Acres                        | Percent<br>of ROI | Count / Acres                          | Percent<br>of ROI |   |
| Electrical System Reliability |            | -   |                                      | -                 |  | -                 | Both proposed routes parallel one existing Manitoba – Minnesota tie line for a significant part of their length. The Blue Route also establishes two new crossings of the existing 500 kV tie line that are not necessary for the Orange Route. |
| Cost                          | Total Cost | -   | \$118,876,237                        | -                 | \$115,672,041                          | -                 | The Blue Route would cost the most to construct. <i>The cost of the Blue Route has been updated since the initial data request.</i>   |



- Proposed Routes**
- Blue/Orange Route
  - Blue Route
  - Orange Route
- Alternatives**
- Beltrami South Central Variation
  - Beltrami South Variation
  - 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 5.



**BELTRAMI SOUTH CENTRAL AND BELTRAMI SOUTH VARIATION AREAS**  
Great Northern Transmission Line  
Draft Environmental Impact Statement

| Relative Merits                                  |  | Beltrami South Central Variations |                                   |                |  | Notes  |  |
|--|--|-----------------------------------|-----------------------------------|----------------|--|--------|--|
| Factor   | Element                                      | ROI                               | Proposed Orange Route (1.2 miles) |                | Beltrami South Central Variation (1.7 miles) |        |  |
|  |  |                                   | Count / Acres                     | Percent of ROI | Count / Acres                                |        | Percent of ROI   |
| Human Settlement                                 | <b>Aesthetics</b>                            |                                   |                                   |                |  |        |  |
|  | Residences                                   | 1,500 feet                        | 0                                 | -              | 0  | -      | Neither Alternative would impact residences within 1,500 feet.   |
|  | Historic Architectural Sites                 | 5,280 feet                        | 0                                 | -              | 0  | -      | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Trails                                       | 1,500 feet                        | 1                                 | -              | 1  | -      | Both Alternatives would cross one snowmobile trail.  |
|  | <b>Land Use Compatibility</b>                |                                   |                                   |                |  |        |  |
|  | Dominant Land Cover Type                     | 1,500 feet                        | 596 ac                            | 98.8%          | 773 ac                                       | 98.2%  | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 402). |
|  | Land Ownership                               | 200 feet                          | 29 acres total                    |                | 41 acres total                               |        | Both Alternatives are entirely located within public lands and neither would impact private land owners.   |
| Public   |  | 30                                | 103.1%                            | 43             | 104.4%                                       |        |  |
| Private  |  | 0                                 | 0.0%                              | 0              | 0.0%   |        |  |
| Land-Based Economies                             | Agriculture                                  | 1,500 feet                        | 0                                 | 0.0%           | 0  | 0.0%   | Neither Alternative would impact agricultural land.  |
|  | Forestry                                     |                                   | 30                                | 103.1%         | 43   | 104.4% | Both Alternatives are entirely located within State Forest lands.  |
|  | Mining & Mineral Leases                      | 200 feet                          | 0                                 | 0.0%           | 0  | 0.0%   | Neither Alternative would impact any mining or mineral leases.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites                 | 5,280 feet                        | 0                                 | -              | 0  | -      | Neither Alternative would impact any known historic architectural sites or archaeological sites.   |
|  | Archaeological Sites                         | 1,500 feet                        | 0                                 | -              | 0  | -      |  |
| Water Resources                                  | PWI Waters                                   | Crossings or 200 feet             | 0                                 | -              | 0  | -      | Neither Alternative would cross any PWI, non-PWI, or impaired waters.  |
|  | Non-PWI Waters                               |                                   | 0                                 | -              | 0  | -      |  |
|  | Impaired Waters                              |                                   | 0                                 | -              | 0  | -      |  |
|  | Floodplains                                  |                                   | 0                                 | -              | 0  | -      | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                                 |                                   | 30                                | 103.1%         | 43   | 104.4% | Both Alternatives would potentially impact a similar amount of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 406).  |
| Vegetation                                       | North American Boreal Flooded & Swamp Forest | 200 feet                          | 24                                | 82.5%          | 32   | 77.7%  | Both Alternatives would potentially impact similar amounts of forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 406).  |
|  | Other  |                                   | 5                                 | 17.2%          | 9  | 21.8%  |  |

| Relative Merits                   |   |                                       | Beltrami South Central Variations |                |  |                | Notes  |
|-----------------------------------|---|---------------------------------------|-----------------------------------|----------------|--|----------------|--|
| Factor                            | Element   | ROI                                   | Proposed Orange Route (1.2 miles) |                | Beltrami South Central Variation (1.7 miles) |                |  |
|                                   |   |                                       | Count / Acres                     | Percent of ROI | Count / Acres                                | Percent of ROI |  |
| Wildlife                          | Important Bird Areas                                | 200 feet                              | 30                                | 103.1%         | 43   | 104.4%         | Both Alternatives are entirely located within lands designated as Important Bird Areas. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 409).   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 4                                 | -              | 4  | -              | Both Alternatives would be located within one mile of four vascular plants. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 409). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 30                                | 103.1%         | 43   | 104.4%         | Both Alternatives contain similar amounts of MBS Sites of Biodiversity.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                 | 100.0%         | -  | -              | The Orange Route parallels existing transmission lines for 100% of its length.   |
| Electrical System Reliability     |   | -                                     | -                                 | -              | -  | -              | The Orange Route parallels one existing Manitoba – Minnesota tie line for its entire length while the Variation does not parallel any existing Manitoba – Minnesota tie lines.   |
| Cost                              | Total Cost  | -                                     | \$1,214,573                       | -              | -  | -              | Beltrami South Central Variation would cost the most to construct. These costs have been updated since the initial information request.  |

| Relative Merits                                  |                               |                       | Beltrami South Variations            |                |   |                |  |
|--|-------------------------------|-----------------------|--------------------------------------|----------------|---|----------------|--|
| Factor   | Element                       | ROI                   | Proposed Orange Route<br>(5.6 miles) |                | Beltrami South Variation<br>(7.5 miles) |                | Notes  |
|  |                               |                       | Count / Acres                        | Percent of ROI | Count / Acres                           | Percent of ROI |  |
|  |                               |                       |                                      |                |   |                |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |                                      |                |   |                |  |
|  | Residences                    | 1,500 feet            | 0                                    | -              | 0                                       | -              | Neither Alternative would impact residences within 1,500 feet.   |
|  | Historic Architectural Sites  | 5,280 feet            | 0                                    | -              | 0                                       | -              | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Trails                        | 1,500 feet            | 0                                    | -              | 0                                       | -              | Neither Alternative would cross any trails.  |
|  | <b>Land Use Compatibility</b> |                       |                                      |                |   |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 2,186 ac                             | 99.5%          | 2,887 ac                                | 99.7%          | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 415). |
|  | Land Ownership                | 200 feet              | 136 acres total                      |                | 182 acres total                         |                | Both Alternatives are entirely located within public lands and neither would impact private land owners.   |
| Public   |                               | 136                   | 100.1%                               | 183            | 100.7%                                  |                |  |
| Private  |                               | 0                     | 0.0%                                 | 0              | 0.0%                                    |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 0                                    | 0.0%           | 0                                       | 0.0%           | Neither Alternative would impact agricultural land.  |
|  | Forestry                      |                       | 136                                  | 100.1%         | 183                                     | 100.7%         | Both Alternatives are entirely located within State Forest lands.  |
|  | Mining & Mineral Leases       | 200 feet              | 58                                   | 42.7%          | 267                                     | 157.9%         | There are more acres of mineral leases within Beltrami South Variation than the total number of acres within the ROW. Regardless, the Beltrami South Variation would potentially impact more mining and mineral leases than the Orange Route.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 0                                    | -              | 0                                       | -              | Neither Alternative would impact any known historic architectural sites or archaeological sites.   |
|  | Archaeological Sites          | 1,500 feet            | 0                                    | -              | 0                                       | -              |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 0                                    | -              | 0                                       | -              | Neither Alternative would cross any PWI, non-PWI, or impaired waters.  |
|  | Non-PWI Waters                |                       | 0                                    | -              | 0                                       | -              |  |
|  | Impaired Waters               |                       | 0                                    | -              | 0                                       | -              |  |
|  | Floodplains                   |                       | 0                                    | -              | 0                                       | -              | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                       |                                      | 136            | 100.1%                                  | 183            | 100.7%   |

| Relative Merits                   |   |                                       | Beltrami South Variations            |                |   |                |   |
|-----------------------------------|---|---------------------------------------|--------------------------------------|----------------|---|----------------|---|
| Factor                            | Element   | ROI                                   | Proposed Orange Route<br>(5.6 miles) |                | Beltrami South Variation<br>(7.5 miles) |                | Notes   |
|                                   |   |                                       | Count / Acres                        | Percent of ROI | Count / Acres                           | Percent of ROI |   |
| Vegetation                        | North American Boreal Flooded & Swamp Forest        | 200 feet                              | 114                                  | 83.9%          | 139                                     | 76.5%          | Both Alternatives would potentially impact similar amounts of forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 420).   |
|                                   | North American Boreal Forest                        |                                       | 18                                   | 11.6%          | 35                                      | 19.3%          |   |
|                                   | Other   |                                       | 22                                   | 16.2%          | 49                                      | 23.7%          |   |
| Wildlife                          | Important Bird Areas                                | 200 feet                              | 136                                  | 100.1%         | 183                                     | 100.7%         | Both Alternatives are entirely located on lands designated as Important Bird Areas. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 420).  |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 1                                    | -              | 2                                       | -              | Beltrami South Variation is within one mile of two vascular plants; the Orange Route is within one mile of one vascular plant. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 422). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 120                                  | 88.4%          | 181                                     | 88.6%          | Both Alternatives contain similar amounts of MBS Sites of Biodiversity.   |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                    | 100.0%         | -                                       | -              | The Orange Route parallels existing transmission lines for 100% of its length.  |
| Electrical System Reliability     |   | -                                     | -                                    | -              | -                                       | -              | The Orange Route parallels one existing Manitoba – Minnesota tie line for its entire length while the Beltrami South Variation does not parallel any existing Manitoba – Minnesota tie lines.   |
| Cost                              | Total Cost  | -                                     | \$5,805,518                          | -              | -                                       | -              | Beltrami South Variation would cost the most to construct. <i>These costs have been updated since the initial information request.</i>  |



- 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



| Relative Merits                                  |                               |                       | North Black River Variations    |                |   |                | Notes  |
|--|-------------------------------|-----------------------|---------------------------------|----------------|---|----------------|--|
| Factor   | Element                       | ROI                   | Proposed Blue Route (8.4 miles) |                | North Black River Variation (9.2 miles) |                |  |
|  |                               |                       | Count / Acres                   | Percent of ROI | Count / Acres                           | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |                                 |                |   |                |  |
|  | Residences                    | 1,500 feet            | 1                               | -              | 5                                       | -              | North Black River Variation would potentially impact more residences than the Blue Route.  |
|  | Historic Architectural Sites  | 5,280 feet            | 0                               | -              | 0                                       | -              | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Trails                        | 1,500 feet            | 2                               | -              | 2                                       | -              | Both Alternatives would cross two snowmobile trails.   |
|  | <b>Land Use Compatibility</b> |                       |                                 |                |   |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 3,190 ac                        | 99.4%          | 3,206 ac                                | 94.3%          | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 428). |
|  | Land Ownership                | 200 feet              | 204 acres total                 |                | 223 acres total                         |                | Both Alternatives contain a similar amount of public lands; however, the Blue Route would not impact any private land owners.  |
| Public   |                               | 188                   | 92.3%                           | 158            | 70.9%                                   |                |  |
| Private  |                               | 16                    | 7.9%                            | 65             | 29.1%                                   |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 0                               | 0.0%           | 69                                      | 2.0%           | The Blue Route would not impact agricultural land.   |
|  | Forestry                      |                       | 188                             | 92.3%          | 156                                     | 70.0%          | Both Alternatives contain a similar amount of State Forest land.   |
|  | Mining & Mineral Leases       | 200 feet              | 405                             | 198.9%         | 362                                     | 162.3%         | There are more acres of mineral leases within both Alternatives than the total number of acres within the 200-foot ROW.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 0                               | -              | 0                                       | -              | Neither Alternative would impact any known historic architectural sites or archaeological sites.   |
|  | Archaeological Sites          | 1,500 feet            | 0                               | -              | 0                                       | -              |  |
| Water Resources                                  | PWI Waters                    | Crossings of 200 feet | 0                               | -              | 0                                       | -              | Both Alternatives would cross few non-PWI waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |                       | 4                               | -              | 4                                       | -              |  |
|  | Impaired Waters               |                       | 0                               | -              | 0                                       | -              |  |
|  | Floodplains                   |                       | 0                               | -              | 0                                       | -              | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                       |                                 | 193            | 94.8%                                   | 198            | 88.8%  |

| Relative Merits                   |   |                                       | North Black River Variations       |                   |  |  | Notes   |
|-----------------------------------|---|---------------------------------------|------------------------------------|-------------------|--|--|---|
| Factor                            | Element   | ROI                                   | Proposed Blue Route<br>(8.4 miles) |                   | North Black River<br>Variation (9.2 miles) |  |   |
|                                   |   |                                       | Count / Acres                      | Percent<br>of ROI | Count / Acres                              | Percent<br>of ROI  |   |
| Vegetation                        | North American Boreal Flooded & Swamp Forest        | 200 feet                              | 144                                | 70.7%             | 114  | 51.1%  | Both Alternatives would potentially impact a similar amount of forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 435).  |
|                                   | North American Boreal Forest                        |                                       | 47                                 | 23.1%             | 46   | 22.0%  |   |
|                                   | Eastern North American Flooded Swamp & Forest       |                                       | 12                                 | 5.9%              | 29   | 13.0%  |   |
|                                   | Other   |                                       | 60                                 | 29.5%             | 109  | 48.9%  |   |
| Wildlife                          | Important Bird Areas                                | 200 feet                              | 191                                | 93.8%             | 214  | 96.0%  | Both Alternatives contain a similar amount of land designated as an Important Bird Area. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 436).   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 0                                  | -                 | 0  | -  | Neither Alternative is located within one mile of a documented rare species. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 437). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 165                                | 81.0%             | 109  | 48.9%  | Both Alternatives contain similar amounts of MBS Sites of Biodiversity.   |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                  | -                 | 100.0%                                     | The North Black River Variations parallels existing transmission lines for 100% of its length.   |   |
| Electrical System Reliability     | -   | -                                     | -                                  | -                 | -  | The North Black River Variation parallels one existing Manitoba – Minnesota tie line for its entire length while the Blue Route does not parallel any existing Manitoba – Minnesota tie lines. |   |
| Cost                              | Total Cost  | -                                     | \$9,895,500                        | -                 | \$10,552,560                               | -  | The North Black River Variations would cost the most to construct. This cost has been updated since the initial information request.  |



- 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 5.



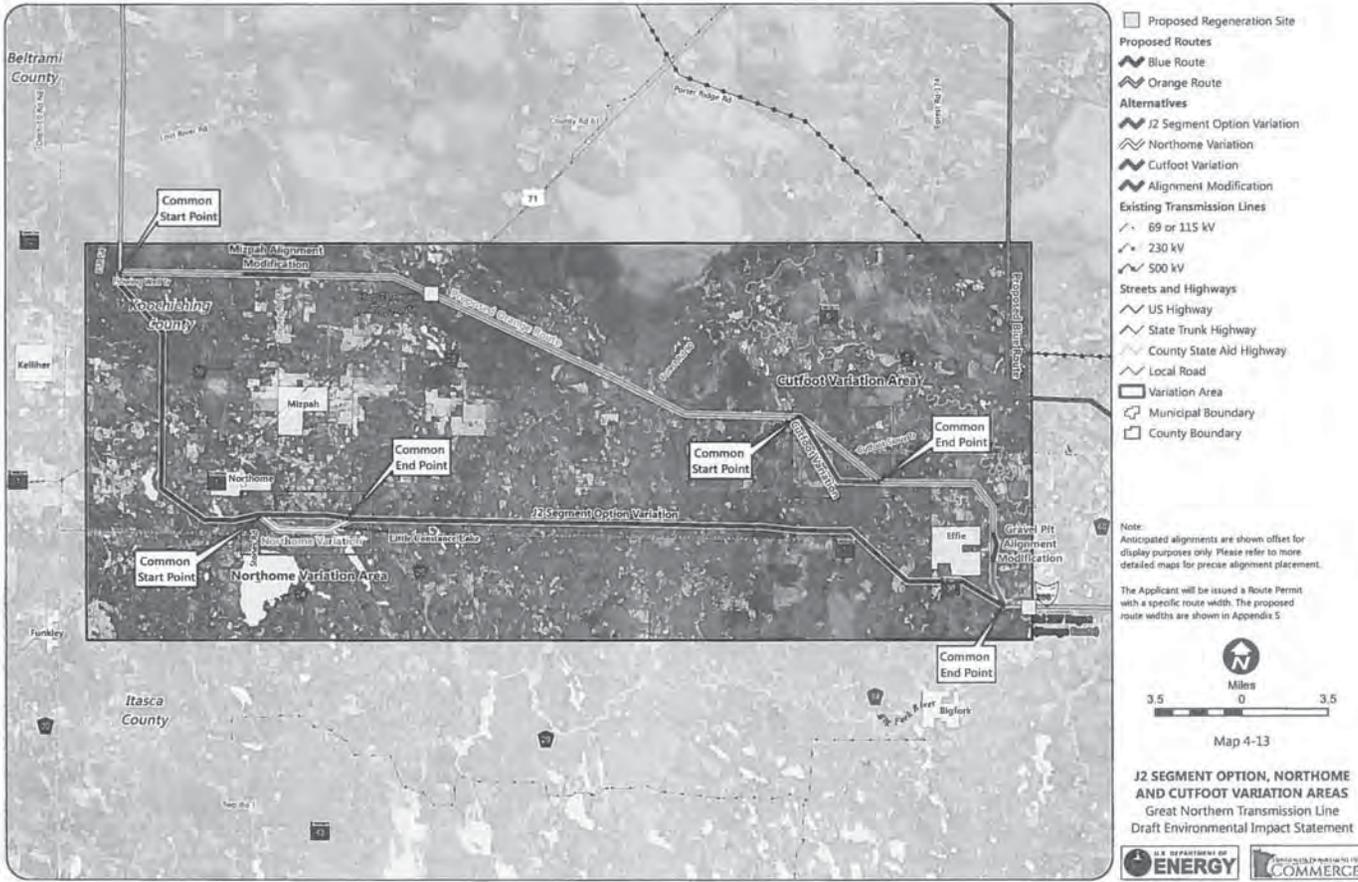
Map 4-12

**C2 SEGMENT OPTION  
VARIATION AREA**  
Great Northern Transmission Line  
Draft Environmental Impact Statement



| Relative Merits                                  |                               | C2 Segment Option Variation Area |                                  |                |                              | Notes |  |
|--|-------------------------------|----------------------------------|----------------------------------|----------------|------------------------------|-------|--|
| Factor   | Element                       | ROI                              | Proposed Blue Route (32.8 miles) |                | C2 Segment Option (46 miles) |       |  |
|  |                               |                                  | Count / Acres                    | Percent of ROI | Count / Acres                |       | Percent of ROI   |
| Human Settlement                                 | <b>Aesthetics</b>             |                                  |                                  |                |                              |       |  |
|  | Residences                    | 1,500 feet                       | 0                                | -              | 29                           | -     | C2 would potentially impact 29 more residences than the Blue Route.  |
|  | Historic Architectural Sites  | 5,280 feet                       | 0                                | -              | 0                            | -     | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Trails                        | 1,500 feet                       | 4                                | -              | 3                            | -     | Both Alternatives would cross one water trail and one state trail. The Blue Route would cross one more snowmobile trail than C2.   |
|  | <b>Land Use Compatibility</b> |                                  |                                  |                |                              |       |  |
|  | Dominant Land Cover Type      | 1,500 feet                       | 11,922 ac                        | 98.5%          | 16,121 ac                    | 95.5% | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 441-442). |
|  | Land Ownership                | 200 feet                         | 795 acres total                  |                | 1,115 acres total            |       | Both Alternatives contain a similar amount of public lands; however, the Blue Route would not impact any private land owners.  |
| Public   |                               | 797                              | 100.2%                           | 654            | 58.8%                        |       |  |
| Private  |                               | 0                                | 0.0%                             | 461            | 41.4%                        |       |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet                       | 0                                | 0.0%           | 167                          | 1.0%  | The Blue Route would not impact agricultural lands whereas C2 would potentially impact 167 acres.  |
|  | Forestry                      | 200 feet                         | 797                              | 100.2%         | 274                          | 24.6% | The Blue Route is located entirely within State Forest land.   |
|  | Mining & Mineral Leases       |                                  | 16                               | 2.0%           | 67                           | 6.0%  | C2 would potentially impact four times as many mining and mineral leases than the Blue Route.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet                       | 0                                | -              | 0                            | -     | Neither Alternative would impact any known historic architectural sites or archaeological sites.   |
|  | Archaeological Sites          | 1,500 feet                       | 0                                | -              | 0                            | -     |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet            | 5                                | -              | 3                            | -     | Both Alternatives would cross a number of PWI, non-PWI, and impaired waterways; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |                                  | 12                               | -              | 5                            | -     |  |
|  | Impaired Waters               |                                  | 1                                | -              | 2                            | -     |  |
|  | Floodplains                   |                                  | 6                                | -              | 28                           | -     | C2 would potentially impact more acres of FEMA-designated floodplain; however, both Alternatives would require construction and placement of transmission structures in Zone A floodplains of the Black and Big Fork Rivers, respectively (pg. 448).   |
|  | NWI Wetlands                  |                                  | 726                              | 91.5%          | 826                          | 74.3% | Both Alternatives would potentially impact similar amounts of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 449).   |

| Relative Merits                   |   |                                       | C2 Segment Option Variation Area |                |                              |  | Notes  |
|-----------------------------------|---|---------------------------------------|----------------------------------|----------------|------------------------------|--|--|
| Factor                            | Element                                       | ROI                                   | Proposed Blue Route (32.8 miles) |                | C2 Segment Option (46 miles) |  |  |
|                                   |   |                                       | Count / Acres                    | Percent of ROI | Count / Acres                | Percent of ROI   |  |
| Vegetation                        | North American Boreal Flooded & Swamp Forest  | 200 feet                              | 464                              | 60.9%          | 726                          | 65.3%  | C2 impacts almost twice as many acres of forest land than the Blue Route. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 450).   |
|                                   | North American Boreal Forest                  |                                       | 248                              | 31.2%          | 162                          | 14.5%  |  |
|                                   | Eastern North American Flooded Swamp & Forest |                                       | 56                               | 7.0%           | 185                          | 16.6%  |  |
|                                   | Other   |                                       | 311                              | 39.1%          | 387                          | 34.7%  |  |
| Wildlife                          | Important Bird Areas                          | 200 feet                              | 406                              | 59.0%          | 406                          | 36.4%  | Both Alternatives contain a similar amount of land designated as an Important Bird Area. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 452).  |
| Rare and Unique Natural Resources | Rare Species                                  | 1 mile (aquatic species not included) | 0                                | -              | 2                            | -  | C2 is within one mile of two document rare species. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 453). |
|                                   | State Rare Communities                        | 200 feet                              |                                  |                |                              |  | Both Routes would potentially impact similar amounts of the same DNR Ecologically Important Lowland Conifer stand.   |
|                                   | Ecological Important Lowland Conifers         |                                       | 7                                | 0.9%           | 6                            | 0.5%   |  |
|                                   | MBS Sites of Biodiversity                     |                                       | 642                              | 80.7%          | 510                          | 45.7%  | Both Alternatives contain similar amounts of MBS Sites of Biodiversity, the Blue Route contains slightly more acres than C2.   |
| Corridor Sharing                  | Paralleling Existing Infrastructure           | -                                     | -                                | -              | 81.0%                        | The Blue Route does not parallel existing transmission lines whereas C2 parallels existing transmission for 81% of its length.                               |  |
| Electrical System Reliability     |   | -                                     | -                                | -              | -                            | C2 parallels one existing Manitoba – Minnesota tie line for its entire length. The Blue Route does not parallel any existing Manitoba – Minnesota tie lines. |  |
| Cost                              | Total Cost                                    | -                                     | \$35,769,239                     | -              | -                            | C2 Segment would cost the most to construct.   |  |



| Relative Merits                                  |                               | J2 Segment Option Variation Area |                                    |                   |                                | Notes   |  |
|--|-------------------------------|----------------------------------|------------------------------------|-------------------|--------------------------------|---|--|
| Factor   | Element                       | ROI                              | Proposed Orange Route (42.2 miles) |                   | J2 Segment Option (45.2 miles) |   |  |
|  |                               |                                  | Count / Acres                      | Percent of ROI    | Count / Acres                  |   | Percent of ROI   |
| Human Settlement                                 | <b>Aesthetics</b>             |                                  |                                    |                   |                                |   |  |
|  | Residences                    | 1,500 feet                       | 0                                  | -                 | 6                              | -   | J2 would potentially impact six more residences than the Orange Route.   |
|  | Historic Architectural Sites  | 5,280 feet                       | 2                                  | -                 | 7                              | -   | J2 would potentially impact more known historical architectural sites, however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.  |
|  | Scenic Byway                  | 1,500 feet                       | 0                                  | -                 | 2                              | -   | J2 would cross Scenic Byways 46 and 38.  |
|  | Trails                        | 1,500 feet                       | 3                                  | -                 | 5                              | -   | Both Alternatives would cross one state trail; J2 would cross four snowmobile trails and the Orange Route would cross two.   |
|  | <b>Land Use Compatibility</b> |                                  |                                    |                   |                                |   |  |
|  | Dominant Land Cover Type      | 1,500 feet                       | 15,110 ac                          | 97.4%             | 15,860 ac                      | 94.1%   | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 458). |
| Land Ownership                                   | 200 feet                      | 1,023 acres total                |                                    | 1,096 acres total |                                | Both Alternatives are primarily located on public lands; however, J2 would potentially impact almost three times as many acres of private land than would the Orange Route. |  |
|  |                               | Public                           | 945                                | 92.4%             | 866                            |   | 79.2%  |
|  |                               | Private                          | 78                                 | 7.6%              | 228                            | 20.8%   |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet                       | 153                                | 1.0%              | 164                            | 1.0%  | Both Alternatives contain similar amounts of agricultural lands.   |
|  | Forestry                      |                                  | 851                                | 83.2%             | 715                            | 65.2%   | Both Alternatives contain similar amounts of State Forest lands.   |
|  | Mining & Mineral Leases       | 200 feet                         | 82                                 | 8.0%              | 73                             | 6.7%  | Both Alternatives would potentially impact a similar amount of mining and mineral lease land.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet                       | 2                                  | -                 | 7                              | -   | J2 would potentially impact more known historical architectural sites; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. Neither Alternative would impact any known archaeological sites.   |
|  | Archaeological Sites          | 1,500 feet                       | 0                                  | -                 | 0                              | -   |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet            | 6                                  | -                 | 3                              | -   | Both Alternatives would cross a number of PWI and non-PWI waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |                                  | 24                                 | -                 | 36                             | -   |  |
|  | Impaired Waters               |                                  | 0                                  | -                 | 0                              | -   |  |
|  | Floodplains                   |                                  | 3                                  | -                 | 0                              | -   | The Orange Route would cross a Zone A floodplain; however, crossings would be less than the average spanning length of 1,250 feet and structures would not be placed in them.  |
|  | NW Wetlands                   |                                  | 509                                | 49.8%             | 353                            | 32.2%   | The Orange Route would potentially impact slightly more acres of NWI-mapped wetlands than J2. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 466).  |

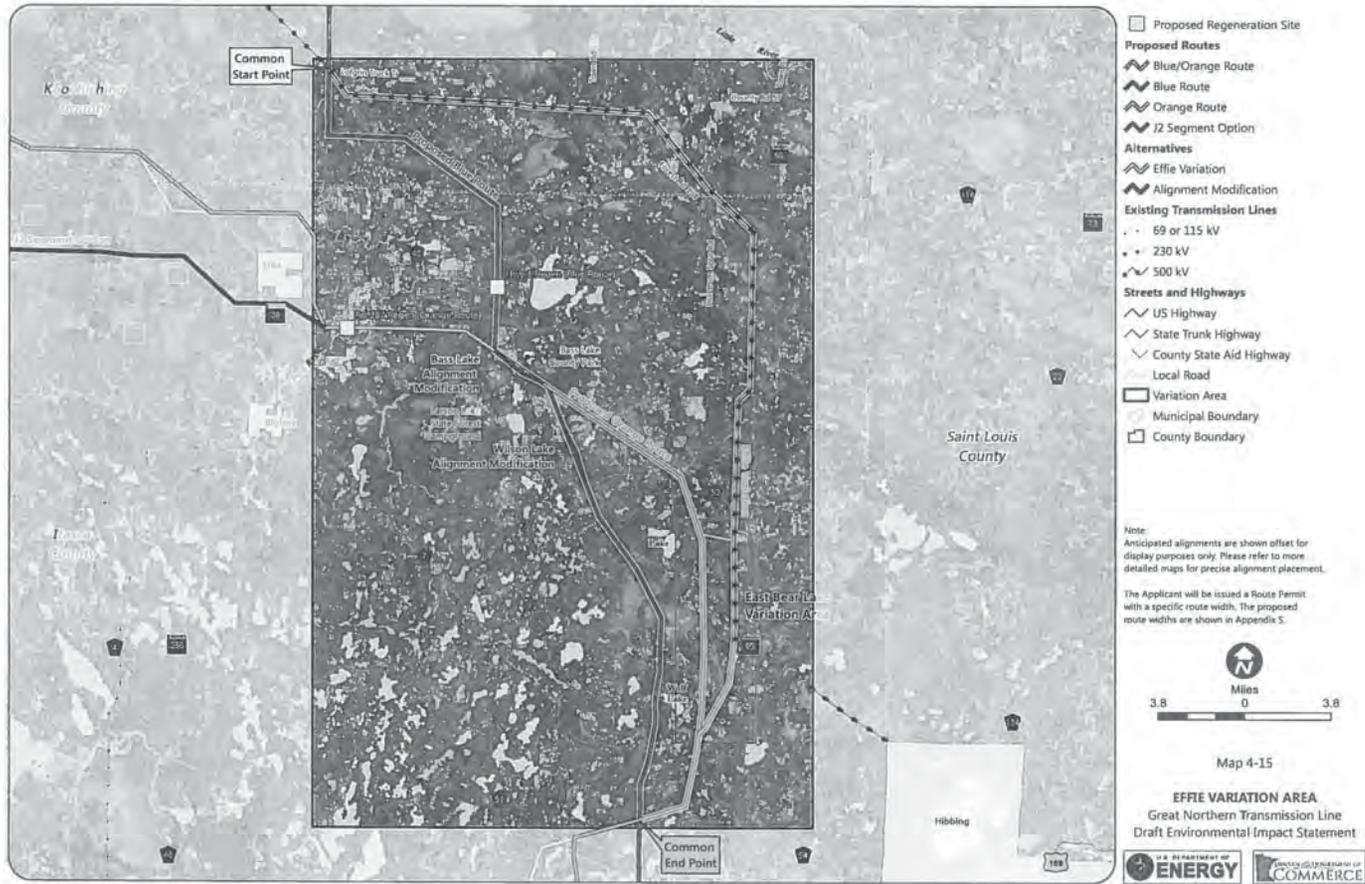
| Relative Merits                   |   |                                       | J2 Segment Option Variation Area   |                |                                |   | Notes  |
|-----------------------------------|---|---------------------------------------|------------------------------------|----------------|--------------------------------|---|--|
| Factor                            | Element   | ROI                                   | Proposed Orange Route (42.2 miles) |                | J2 Segment Option (45.2 miles) |   |  |
|                                   |   |                                       | Count / Acres                      | Percent of ROI | Count / Acres                  | Percent of ROI  |  |
| Vegetation                        | North American Boreal Flooded & Swamp Forest        | 200 feet                              | 319                                | 31.2%          | 124                            | 11.3%   | Both Alternatives would potentially impact a similar amount of forest land. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 467).  |
|                                   | North American Boreal Forest                        |                                       | 477                                | 46.6%          | 650                            | 59.3%   |  |
|                                   | Eastern North American Flooded Swamp & Forest       |                                       | 176                                | 17.2%          | 191                            | 17.4%   |  |
|                                   | Eastern North American Cool Temperate Forest        |                                       | 36                                 | 3.5%           | 98                             | 9.0%  |  |
|                                   | Other   |                                       | 704                                | 68.8%          | 972                            | 88.7%   |  |
| Wildlife                          | Important Bird Areas                                | 200 feet                              | 282                                | 25.6%          | 72                             | 6.6%  | The Orange Route contains more acres of land designated as an Important Bird Area. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 465).  |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 3                                  | -              | 2                              | -   | The Orange Route is within one mile of three vascular plant species whereas J2 is within one mile of one vascular plant species and one colonial water bird nesting site (animal assemblage). Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 470). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 489                                | 47.6%          | 185                            | 16.9%   | The Orange Route would potentially impact more acres of MBS Sites of Biodiversity Significance.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                  | -              | -                              | Neither Alternative parallels existing transmission lines.                            |  |
| Electrical System Reliability     |   | -                                     | -                                  | -              | -                              | Neither Alternative parallels or crosses any existing Manitoba - Minnesota tie lines. |  |
| Cost                              | Total Cost  | -                                     | \$48,706,641                       | -              | \$52,128,879                   | -   | J2 Segment would cost the most to construct.   |

| Relative Merits                                  |                                     |                       | Northome Variation Area       |                |                              |   | Notes  |
|--|-------------------------------------|-----------------------|-------------------------------|----------------|------------------------------|---|--|
| Factor   | Element                             | ROI                   | J2 Segment Option (3.7 miles) |                | Northome Variation (4 miles) |   |  |
|  |                                     |                       | Count / Acres                 | Percent of ROI | Count / Acres                | Percent of ROI  |  |
| Human Settlement                                 | <b>Aesthetics</b>                   |                       |                               |                |                              |   |  |
|  | Residences                          | 1,500 feet            | 0                             | -              | 0                            | -   | Neither Alternative would impact any residences within 1,500 feet.   |
|  | Historic Architectural Sites        | 5,280 feet            | 0                             | -              | 0                            | -   | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Scenic Byway                        | 1,500 feet            | 0                             | -              | 0                            | -   | Neither Alternative would cross a Scenic Byway.  |
|  | Trails                              | 1,500 feet            | 0                             | -              | 0                            | -   | Neither Alternative would cross any trails.  |
|  | <b>Land Use Compatibility</b>       |                       |                               |                |                              |   |  |
|  | Land Cover of Forested and/or Swamp | 1,500 feet            | 1,418 ac                      | 93.1%          | 1,555 ac                     | 95.3%   | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 474). |
| Land Ownership                                   | 200 feet                            | 90 acres total        |                               | 97 acres total |                              | The Northome Variation contains more public lands than private lands; J2 contains more acre of private lands than Northome Variation. |  |
|  |                                     | Public                | 67                            | 74.7%          | 81                           |   | 83.5%  |
|  |                                     | Private               | 23                            | 25.6%          | 16                           |   | 16.5%  |
| Land-Based Economies                             | Agriculture                         | 1,500 feet            | 64                            | 4.2%           | 0                            | 0.0%  | J2 would impact few acres of agricultural land whereas the Northome Variation does not impact agricultural lands.  |
|  | Forestry                            | 200 feet              | 0                             | 0.0%           | 0                            | 0.0%  | Neither Alternative contains State Forest lands.   |
|  | Mining & Mineral Leases             |                       | 0                             | 0.0%           | 0                            | 0.0%  | Neither Alternative would impact mining or mineral leases.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites        | 5,280 feet            | 0                             | -              | 0                            | -   | Neither Alternative would impact any known architectural sites. Northome Variation would potentially impact one archeological site; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Archaeological Sites                | 1,500 feet            | 0                             | -              | 1                            | -   |  |
| Water Resources                                  | PWI Waters                          | Crossings or 200 feet | 0                             | -              | 1                            | -   | Both Alternatives would cross very few PWI and non-PWI waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.  |
|  | Non-PWI Waters                      |                       | 8                             | -              | 1                            | -   |  |
|  | Impaired Waters                     |                       | 0                             | -              | 0                            | -   |  |
|  | Floodplains                         |                       | 0                             | -              | 0                            | -   | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                        |                       | 23                            | 25.8%          | 14                           | 14.4%   | Both Alternatives would potentially impact very few acres of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 479).  |

| Relative Merits                   |   |                                       | Northome Variation Area       |                |                              |                |  |
|-----------------------------------|---|---------------------------------------|-------------------------------|----------------|------------------------------|----------------|--|
| Factor                            | Element   | ROI                                   | J2 Segment Option (3.7 miles) |                | Northome Variation (4 miles) |                | Notes  |
|                                   |   |                                       | Count / Acres                 | Percent of ROI | Count / Acres                | Percent of ROI |  |
| Vegetation                        | North American Boreal Forest                        | 200 feet                              | 71                            | 79.2%          | 81                           | 83.5%          | Both Alternatives would potentially impact a similar amount of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (pg. 480)   |
|                                   | Eastern North American Cool Temperate Forest        |                                       | 10                            | 11.1%          | 10                           | 10.3%          |  |
|                                   | Other   |                                       | 19                            | 21.2%          | 16                           | 16.5%          |  |
| Wildlife                          | Shallow Lakes                                       | 200 feet                              | 0                             | -              | 1                            | -              | The Northome Variation would cross one DNR Shallow Lake.   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 1                             | -              | 2                            | -              | One colonial waterbird nesting site is listed within one mile of J2 and two nesting sites are listed within one mile of the Northome Variation. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 482). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 0                             | 0.0%           | 0                            | 0.0%           | There are no MBS Sites of Biodiversity within either Alternative.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                             | -              | -                            | -              | Neither Alternative parallels existing transmission lines.   |
| Electrical System Reliability     | -   | -                                     | -                             | -              | -                            | -              | Neither Alternative parallels or crosses any existing Manitoba – Minnesota tie lines.  |
| Cost                              | Total Cost  | -                                     | \$4,192,642                   | -              | -                            | -              | The Northome Variation would cost the most to construct.   |

| Factor   | Element                       | RDI                   | Cutfoot Variation Area            |                |                               |                | Notes  |
|--|-------------------------------|-----------------------|-----------------------------------|----------------|-------------------------------|----------------|--|
|  |                               |                       | Proposed Orange Route (4.2 miles) |                | Cutfoot Variation (4.8 miles) |                |  |
|  |                               |                       | Count / Acres                     | Percent of ROI | Count / Acres                 | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |                                   |                |                               |                |  |
|  | Residences                    | 1,500 feet            | 0                                 | -              | 0                             | -              | Neither Alternative would impact any residences within 1,500 feet.   |
|  | Historic Architectural Sites  | 5,280 feet            | 0                                 | -              | 0                             | -              | Neither Alternative would impact any known architectural sites within 5,280 feet.  |
|  | Scenic Byway                  | 1,500 feet            | 0                                 | -              | 0                             | -              | Neither Alternative would cross a Scenic Byway.  |
|  | Trails                        | 1,500 feet            | 0                                 | -              | 0                             | -              | Neither Alternative would cross any trails.  |
|  | <b>Land Use Compatibility</b> |                       |                                   |                |                               |                |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 1,652 ac                          | 97.3%          | 1,674 ac                      | 99.3%          | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 485). |
| Land Ownership                                   |                               | 200 feet              | 102 acres total                   |                | 116 acres total               |                | Both Alternatives are located entirely within public land.   |
| Public   | 103                           |                       | 101.2%                            | 116            | 99.7%                         |                |  |
| Private  | 0                             |                       | 0.0%                              | 0              | 0.0%                          |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 0                                 | 0.0%           | 0                             | 0.0%           | Neither Alternative would impact agricultural land.  |
|  | Forestry                      | 200 feet              | 103                               | 101.2%         | 116                           | 99.7%          | Both Alternatives are entirely located within State Forest lands.  |
|  | Mining & Mineral Leases       |                       | 29                                | 28.5%          | 4                             | 3.4%           | The Orange Route contains more acres of mining and mineral leases than the Cutfoot Variation; however both would impact aggregate mining resources.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 0                                 | -              | 0                             | -              | Neither Alternative would impact any known historic architectural or archaeological sites.   |
|  | Archaeological Sites          | 1,500 feet            | 0                                 | -              | 0                             | -              |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 0                                 | -              | 0                             | -              | The Orange Route would cross very few, if any, PWI and non-PWI waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them. The Cutfoot Variation would not cross any waterbodies.   |
|  | Non-PWI Waters                |                       | 2                                 | -              | 0                             | -              |  |
|  | Impaired Waters               |                       | 0                                 | -              | 0                             | -              |  |
|  | Floodplains                   |                       | 0                                 | -              | 0                             | -              | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                       | 57                                | 58.0%          | 67                            | 57.6%          | Both Alternatives would potentially impact very few acres of NW-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 490).   |

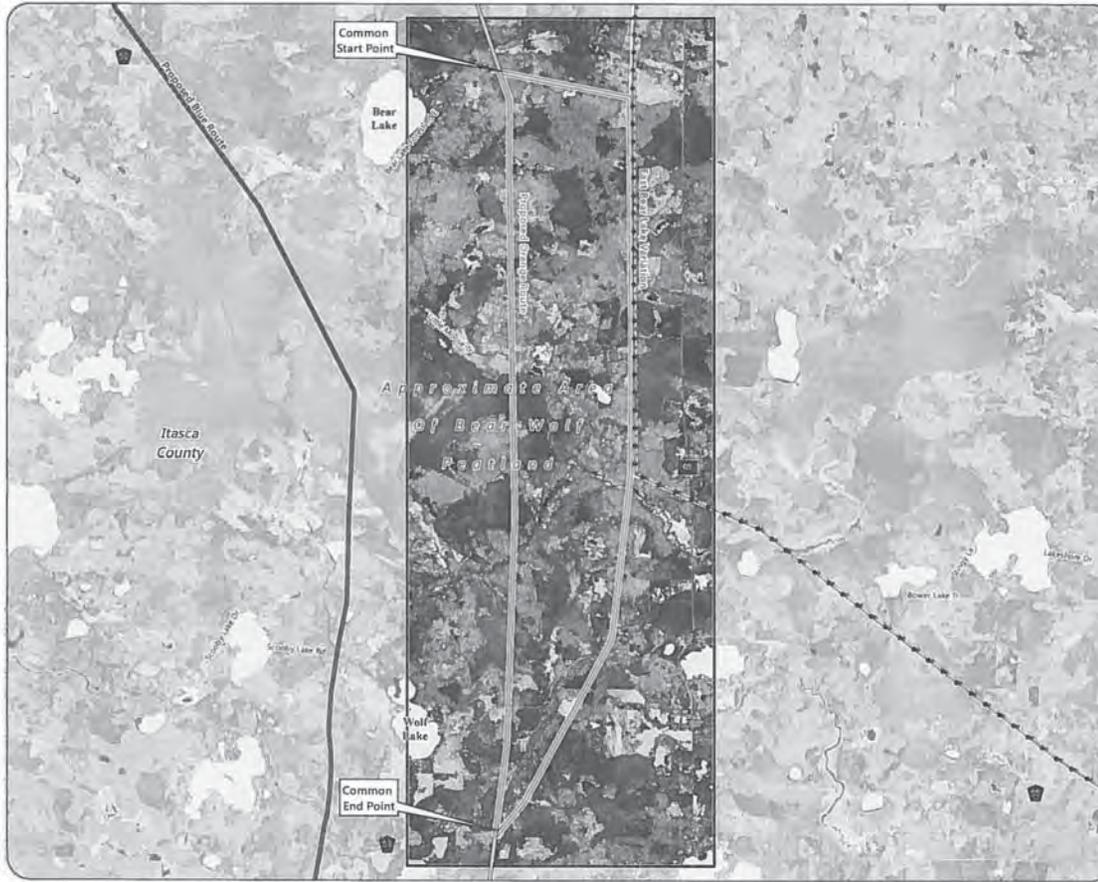
| Relative Merits                   |   |                                       | Cutfoot Variation Area            |                |                               |                | Notes  |
|-----------------------------------|---|---------------------------------------|-----------------------------------|----------------|-------------------------------|----------------|--|
| Factor                            | Element   | ROI                                   | Proposed Orange Route (4.2 miles) |                | Cutfoot Variation (4.8 miles) |                |  |
|                                   |   |                                       | Count / Acres                     | Percent of ROI | Count / Acres                 | Percent of ROI |  |
| Vegetation                        | North American Boreal Flooded & Swamp Forest        | 200 feet                              | 28                                | 27.5%          | 30                            | 25.8%          | Both Alternatives would potentially impact a similar amount of forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 4B2). |
|                                   | North American Boreal Forest                        |                                       | 30                                | 29.5%          | 64                            | 55.0%          |  |
|                                   | Eastern North American Flooded & Swamp Forest       |                                       | 39                                | 38.3%          | 20                            | 17.2%          |  |
|                                   | Other   |                                       | 74                                | 72.7%          | 86                            | 73.9%          |  |
| Wildlife                          | All/Any   | 200 feet                              | 0                                 | 0.0%           | 0                             | 0.0%           | Neither Alternative would impact recognized wildlife resource areas.   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 0                                 | -              | 0                             | -              | Neither Alternative is located within one mile of a documented rare species.   |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 43                                | 42.2%          | 60                            | 51.5%          | Both Alternatives would potentially impact similar amounts of MBS Sites of Biodiversity.   |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                 | -              | -                             | -              | Neither Alternative parallels existing transmission lines.   |
| Electrical System Reliability     | -   | -                                     | -                                 | -              | -                             | -              | Neither Alternative parallels or crosses any existing Manitoba - Minnesota tie lines.  |
| Cost                              | Total Cost  | -                                     | \$5,940,638                       | -              | \$6,222,257                   | -              | The Cutfoot Variation would cost the most to construct.  |



| Relative Merits                                  |                               |            | Effie Variation                  |                |                                    |                |                              |                | Notes  |
|--|-------------------------------|------------|----------------------------------|----------------|------------------------------------|----------------|------------------------------|----------------|--|
| Factor   | Element                       | ROI        | Proposed Blue Route (41.1 miles) |                | Proposed Orange Route (44.6 miles) |                | Effie Variation (49.8 miles) |                |  |
|  |                               |            | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI | Count / Acres                | Percent of ROI |  |
| Human Settlement                                 | <b>Aesthetics</b>             |            |                                  |                |                                    |                |                              |                |  |
|  | Residences                    | 1,500 feet | 4                                | -              | 5                                  | -              | 14                           | -              | The Effie Variation impacts generally three times as many residences as the Blue or Orange Routes.   |
|  | Historic Architectural Sites  | 5,280 feet | 1                                | -              | 1                                  | -              | 3                            | -              | Both the Blue and Orange Routes would potentially impact one historic architectural site within 5,280 feet. The Effie Variation would potentially impact three sites; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Parks                         | 1,500 feet | 1                                | -              | 1                                  | -              | 0                            | -              | Both the Blue and Orange Routes would potentially impact one County Park; the Effie Variation would not.   |
|  | Trails                        | 1,500 feet | 8                                | -              | 7                                  | -              | 5                            | -              | All Alternatives would cross at least five state or snowmobile trails.   |
|  | Water Access                  | 1,500 feet | 0                                | -              | 0                                  | -              | 1                            | -              | The Blue and Orange Routes would not impact any water access points; the Effie Variation would potentially impact one water access.  |
|  | <b>Land Use Compatibility</b> |            |                                  |                |                                    |                |                              |                |  |
|  | Dominant Land Cover Type      | 1,500 feet | 14,723 ac                        | 97.6%          | 15,801 ac                          | 96.7%          | 17,898 ac                    | 96.8%          | All Alternatives' major land cover type is Forested and/or Swamp. All Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 465, 555).        |
|  | Land Ownership                | 200 feet   | 996 acres total                  |                | 1,081 acres total                  |                | 1,207 acres total            |                | All Alternatives are almost entirely located on public lands. The Effie Variation contains the most acres of private land.   |
|  | Public                        |            | 819                              | 92.2%          | 962                                | 89.0%          | 1,088                        | 90.0%          |  |
| Private  |                               | 77         | 7.7%                             | 119            | 11.0%                              | 121            | 10.0%                        |                |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet | 0                                | 0.0%           | 0                                  | 0.0%           | 0                            | 0.0%           | None of the Alternatives would impact agricultural land.   |
|  | Forestry                      |            | 909                              | 91.2%          | 958                                | 88.6%          | 1,086                        | 90.0%          | All Alternatives are mostly located within State Forests; the Effie Variation would potentially impact the most acres of State Forest.   |
|  | Mining & Mineral Leases       | 200 feet   | 847                              | 84.9%          | 819                                | 75.7%          | 824                          | 68.3%          | All Alternatives contain numerous acres of mining and mineral leases; the Effie Variation contains the most acres of mining and mineral leases.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet | 1                                | -              | 1                                  | -              | 3                            | -              | Both the Blue and Orange Routes would potentially impact one historic architectural site within 5,280 feet. The Effie Variation would potentially impact three sites; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. The Blue and Orange Routes would not impact any known archaeological sites; the Effie Variation would potentially impact two sites. |
|  | Archaeological Sites          | 1,500 feet | 0                                | -              | 0                                  | -              | 2                            | -              |  |
| Water Resources                                  | PWI Waters                    |            | 10                               | -              | 13                                 | -              | 13                           | -              | All Alternatives will require crossing a number of waterbodies; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.   |
|  | Non-PWI Waters                |            | 8                                | -              | 11                                 | -              | 15                           | -              |  |
|  | Impaired Waters               |            | 0                                | -              | 0                                  | -              | 0                            | -              |  |

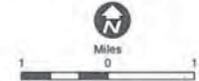
| Relative Merits                   |   |                                       | Effie Variation                  |                |                                    |                |                              |                |  |
|-----------------------------------|---|---------------------------------------|----------------------------------|----------------|------------------------------------|----------------|------------------------------|----------------|--|
| Factor                            | Element                                       | ROI                                   | Proposed Blue Route (41.1 miles) |                | Proposed Orange Route (44.6 miles) |                | Effie Variation (49.8 miles) |                | Notes  |
|                                   |   |                                       | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI | Count / Acres                | Percent of ROI |  |
| Water Resources                   | Floodplains                                   | Crossings or 200 feet                 | 3                                | 0.3%           | 3                                  | 0.3%           | 0                            | 0.0%           | The Effie Variation would not impact any FEMA-designated floodplains. The Blue and Orange Routes would cross a Zone A floodplain; however, the crossings would be less than the average spanning length of 1,250 feet. Therefore, it would be expected that the floodplain crossings would be spanned and transmission structures would not be placed in them (pg. 544).   |
|                                   | NWI Wetlands                                  |                                       | 443                              | 44.5%          | 391                                | 36.2%          | 413                          | 34.2%          | All Alternatives would potentially impact similar acres of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 544).  |
| Vegetation                        | North American Boreal Forest                  | 200 feet                              | 473                              | 47.5%          | 569                                | 52.6%          | 558                          | 46.1%          | All Alternatives would potentially impact a similar amount of forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 546).  |
|                                   | North American Boreal Flooded & Swamp Forest  |                                       | 399                              | 40.0%          | 338                                | 31.4%          | 364                          | 30.1%          |  |
|                                   | Eastern North American Cool Temperate Forest  |                                       | 25                               | 2.5%           | 40                                 | 3.7%           | 35                           | 2.9%           |  |
|                                   | Eastern North American Flooded & Swamp Forest |                                       | 81                               | 8.1%           | 99                                 | 9.2%           | 208                          | 17.2%          |  |
|                                   | Other   |                                       | 18                               | 1.8%           | 133                                | 12.3%          | 252                          | 20.9%          |  |
| Wildlife                          | Important Bird Areas                          | 200 feet                              | 69                               | -              | 69                                 | -              | 0                            | -              | The Blue and Orange Routes contain 69 acres of land designated as an Important Bird Area. Short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13) (pg. 547).   |
| Rare and Unique Natural Resources | Rare Species                                  | 1 mile (aquatic species not included) | 3                                | -              | 4                                  | -              | 2                            | -              | All Alternatives are within one mile of a colonial waterbird nesting site and at least one vascular plant. The Orange Route is within one mile of the greatest number of species. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 550). |
|                                   | MBS Sites of Biodiversity                     | 200 feet                              | 422                              | 42.4%          | 490                                | 45.3%          | 427                          | 35.4%          | All Alternatives would potentially impact a similar number of acres of MBS Sites of Biodiversity; the Orange Route would pass through the most acres (pg. 551).  |

| Relative Merits               |                                     |     | Effie Variation                  |                |                                    |                | Notes |  |                |
|-------------------------------|-------------------------------------|-----|----------------------------------|----------------|------------------------------------|----------------|-------|--|----------------|
| Factor                        | Element                             | ROI | Proposed Blue Route (41.1 miles) |                | Proposed Orange Route (44.6 miles) |                |       | Effie Variation (49.8 miles)   |                |
|                               |                                     |     | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI |       | Count / Acres  | Percent of ROI |
| Corridor Sharing              | Paralleling Existing Infrastructure | -   | -                                | -              | -                                  | -              | 80.0% | The Blue and Orange Routes would not parallel any existing transmission lines, however the Effie Variation would parallel two existing transmission line for approximately 80% of its length.  |                |
| Electrical System Reliability |                                     | -   | -                                | -              | -                                  | -              | -     | The Blue and Orange Routes do not parallel any existing Manitoba – Minnesota tie lines. The Blue Route would establish one new crossing of the existing 500 kV tie line. The Effie Variation would establish one new crossing of the existing 500 kV tie line and, more significantly, parallel both the 500 kV tie line and the 230 kV tie line in the same corridor for a significant part of its length, which would result in unacceptable risk to northern Minnesota loads. |                |
| Cost                          | Total Cost                          | -   | \$46,840,800                     | -              | \$49,488,323                       | -              | -     | Both the Orange Route and Effie Variation would cost more to construct than the Blue Route.  |                |



- 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 of set 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 5.

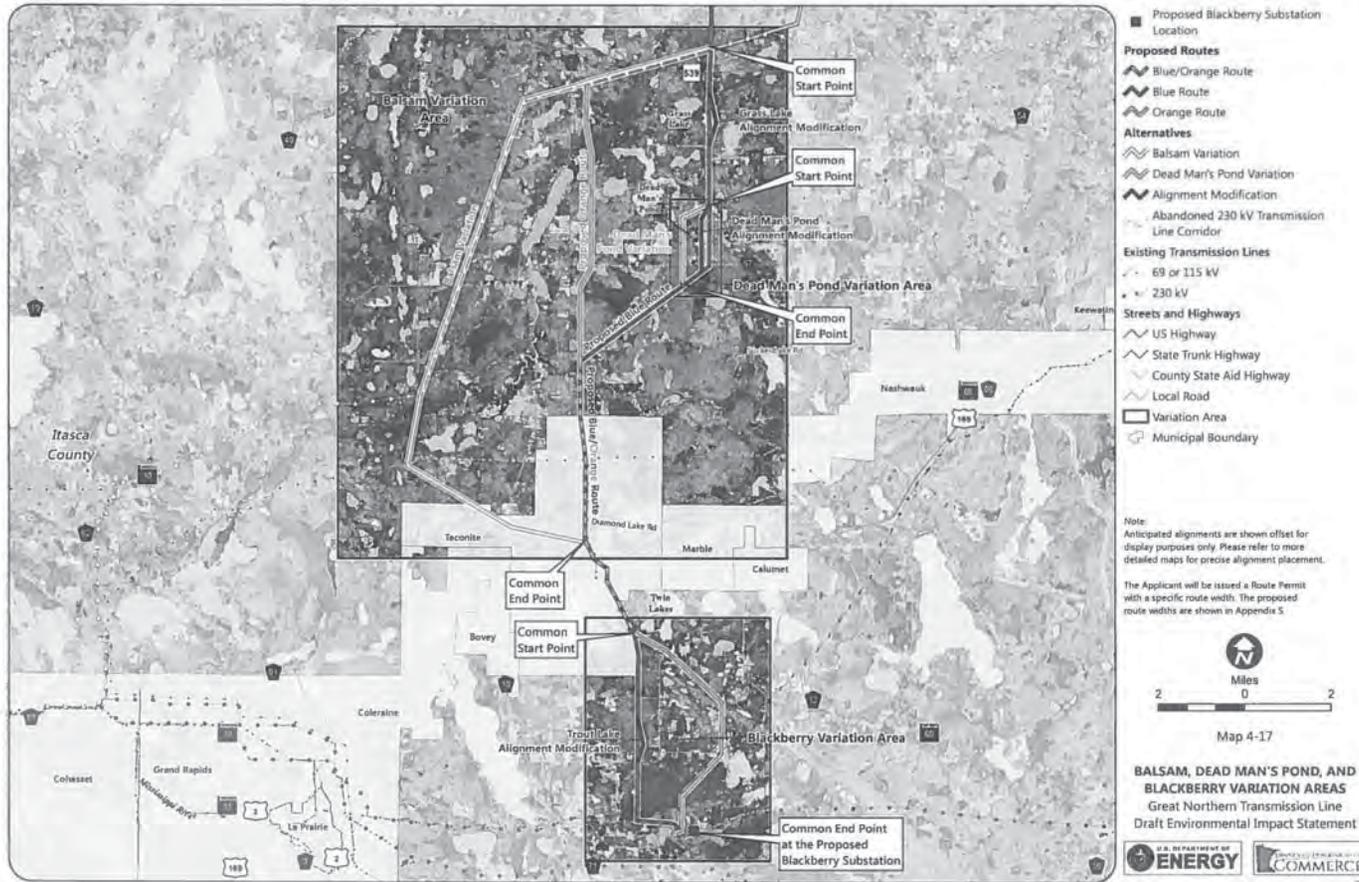


Map 4-16  
**EAST BEAR LAKE VARIATION AREA**  
 Great Northern Transmission Line  
 Draft Environmental Impact Statement  



| Relative Merits                                  |                               | East Bear Lake Variation Area |                                      |                |  | Notes  |   |
|--|-------------------------------|-------------------------------|--------------------------------------|----------------|--|--------|---|
| Factor   | Element                       | ROI                           | Proposed Orange Route<br>(8.9 miles) |                | East Bear Lake Variation<br>(10.5 miles) |        |   |
|  |                               |                               | Count / Acres                        | Percent of ROI | Count / Acres                            |        | Percent of ROI  |
| Human Settlement                                 | <b>Aesthetics</b>             |                               |                                      |                |  |        |   |
|  | Residences                    | 1,500 feet                    | 0                                    | -              | 0  | -      | Neither Alternative would impact any residences.  |
|  | Historic Architectural Sites  | 5,280 feet                    | 0                                    | -              | 0  | -      | Neither Alternative would impact any known historic architectural sites.  |
|  | Scenic Byway                  |                               | 0                                    |                | 0  |        | Neither Alternative would impact any Scenic Byways  |
|  | Trails                        | 1,500 feet                    | 4                                    |                | 4  |        | Both Alternatives would potentially impact one state trail and three snowmobile trails.   |
|  | Water Access Points           |                               | 0                                    | -              | 1  | -      | The East Bear Lake Variation would potentially impact one water access point.   |
|  | <b>Land Use Compatibility</b> |                               |                                      |                |  |        |   |
|  | Dominant Land Cover Type      | 1,500 feet                    | 3,381 ac                             | 99.2%          | 3,910 ac                                 | 98.2%  | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area, so these changes are expected to have a minimal impact on land use (pg. 555) |
|  | Land Ownership                | 200 feet                      | 218 acres total                      |                | 255 acres total                          |        | Both Alternatives are entirely located within public lands.   |
|  | Public                        |                               | 217                                  | 100.6%         | 256                                      | 100.6% |   |
| Private  | 0                             |                               | 0.0%                                 | 0              | 0.0%                                     |        |   |
| Land-Based Economies                             | Agriculture                   | 1,500 feet                    | 0                                    | 0.0%           | 0  | 0.0%   | Neither Alternative would impact agricultural land.   |
|  | Forestry                      |                               | 217                                  | 100.6%         | 256                                      | 100.6% | Both Alternatives are entirely located within State Forest lands.   |
|  | Mining & Mineral Leases       | 200 feet                      | 96                                   | 44.5%          | 193                                      | 75.8%  | The East Bear Lake Variation would potentially impact nearly double the acres of mining and mineral leases than the Orange Route.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet                    | 0                                    | -              | 0  | -      | Neither Alternative would impact any known historic architectural or archaeological sites.  |
|  | Archaeological Sites          | 1,500 feet                    | 0                                    | -              | 0  | -      |   |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet         | 4                                    | -              | 2  | -      | Both Alternatives would cross a small number of PWI and non-PWI waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.  |
|  | Non-PWI Waters                |                               | 0                                    | -              | 3  | -      |   |
|  | Impaired Waters               |                               | 0                                    | -              | 0  | -      |   |
|  | Floodplains                   |                               | 0                                    | -              | 0  | -      |   |

| Relative Merits                   |  |                                       | East Bear Lake Variation Area        |                |  |                | Notes   |
|-----------------------------------|--|---------------------------------------|--------------------------------------|----------------|--|----------------|---|
| Factor                            | Element                                      | ROI                                   | Proposed Orange Route<br>(8.9 miles) |                | East Bear Lake Variation<br>(10.5 miles) |                |   |
|                                   |  |                                       | Count / Acres                        | Percent of ROI | Count / Acres                            | Percent of ROI |   |
|                                   | NWI Wetlands                                 |                                       | 104                                  | 48.2%          | 89                                       | 35.0%          | The Orange Route would potentially impact slightly more acres of NWI-mapped wetlands than the East Bear Lake Variation. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 561).   |
| Vegetation                        | North American Boreal Forest                 | 200 feet                              | 103                                  | 47.7%          | 140                                      | 55.0%          | Both Alternatives would potentially impact a similar amount of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 562).  |
|                                   | North American Boreal Flooded & Swamp Forest |                                       | 84                                   | 43.6%          | 77                                       | 30.3%          |   |
|                                   | Other  |                                       | 103                                  | 52.4%          | 105                                      | 45.2%          |   |
| Wildlife                          | All/Any                                      | 200 feet                              | 0                                    | 0.0%           | 0  | 0.0%           | Neither Alternative would impact recognized wildlife resource areas.  |
| Rare and Unique Natural Resources | Rare Species                                 | 1 mile (aquatic species not included) | 1                                    | -              | 1  | -              | Both Alternatives would be located within one mile of a state-listed special concern vascular plant. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 564). |
|                                   | State Rare Communities                       |                                       |                                      |                |  |                |   |
|                                   | MBS Sites of Biodiversity                    | 200 feet                              | 217                                  | 100.6%         | 255                                      | 100.2%         |   |
| Corridor Sharing                  | Paralleling Existing Infrastructure          |                                       | -                                    |                | -  | 42.0%          | The East Bear Lake Alternative parallels existing transmission line for approximately 42% of its length.  |
| Electrical System Reliability     |  |                                       |                                      |                |  |                | The Orange Route does not parallel any existing Manitoba - Minnesota tie lines. The East Bear Lake Variation would parallel both the 500 kV tie line and the 230 kV tie line in the same corridor for a significant part of its length, which would result in unacceptable risk to northern Minnesota loads.  |
| Cost                              | Total Cost                                   |                                       | \$8736760                            |                |  |                | The East Bear Lake Variation would cost the most to construct.  |



| Relative Merits                                  |                                     |                 | Balsam Variation Area            |                 |                                    |                 |                               |  | Notes  |
|--|-------------------------------------|-----------------|----------------------------------|-----------------|------------------------------------|-----------------|-------------------------------|--|--|
| Factor   | Element                             | ROI             | Proposed Blue Route (12.9 miles) |                 | Proposed Orange Route (13.7 miles) |                 | Balsam Variation (17.8 miles) |  |  |
|  |                                     |                 | Count / Acres                    | Percent of ROI  | Count / Acres                      | Percent of ROI  | Count / Acres                 | Percent of ROI   |  |
| Human Settlement                                 | <b>Aesthetics</b>                   |                 |                                  |                 |                                    |                 |                               |  |  |
|  | Residences                          | 1,500 feet      | 7                                | -               | 21                                 |                 | 11                            | -  | The Orange Route has the highest potential to impact residences; the Balsam Variation has 11 residences within 1,500 feet and the Blue Route has the lowest potential impact to residences.  |
|  | Historic Architectural Sites        | 5,280 feet      | 13                               | -               | 24                                 |                 | 28                            | -  | The Orange Route and Balsam Variation have the highest potential to impact architectural sites; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Scenic Byway                        |                 | 0                                |                 | 0                                  |                 | 0                             |  | No Alternatives would impact Scenic Byways.  |
|  | Trails                              | 1,500 feet      | 2                                |                 | 2                                  |                 | 3                             |  | The Blue and Orange Routes would potentially impact two snowmobile trails. Balsam Variation would impact three.  |
|  | <b>Land Use Compatibility</b>       |                 |                                  |                 |                                    |                 |                               |  |  |
|  | Land Cover of Forested and/or Swamp | 1,500 feet      | 4,541 ac                         | 93.5%           | 4,828 ac                           | 94.1%           | 6,189 ac                      | 93.2%  | All Alternatives' major land cover type is Forested and/or Swamp. All Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 572). |
| Land Ownership                                   | 200 feet                            | 313 acres total |                                  | 332 acres total |                                    | 432 acres total |                               | All Alternatives are generally located on a majority of private lands. The Balsam Variation would potentially impact the most acres of private land. |  |
| Public   |                                     | 67              | 21.4%                            | 53              | 16.0%                              | 107             | 24.8%                         |  |  |
| Private  |                                     | 246             | 78.7%                            | 279             | 84.0%                              | 325             | 75.2%                         |  |  |
| Land-Based Economies                             | Agriculture                         | 1,500 feet      | 4                                | 0.1%            | 70                                 | 1.4%            | 72                            | 1.1%   | The Blue Route would potentially impact the fewest acres of agricultural land; the Balsam Variation would impact the most.   |
|  | Forestry                            |                 | 0                                | 0.0%            | 0                                  | 0.0%            | 0                             | 0.0%   | No Alternatives would be located in State Forest lands.  |
|  | Mining & Mineral Leases             | 200 feet        | 0                                | 0.0%            | 0                                  | 0.0%            | 69                            | 20.6%  | The Blue and Orange Routes would not impact mining and mineral leases; the Balsam Variation would potentially impact 69 acres. It should be noted that an active mine would impede the construction and operation of the Balsam Variation and therefore it is no longer feasible.  |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites        | 5,280 feet      | 13                               | -               | 24                                 |                 | 28                            | -  | The Orange Route and Balsam Variation have the highest potential to impact known architectural sites. The Blue and Orange Routes would not impact any known archaeological sites; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Archaeological Sites                | 1,500 feet      | 0                                | -               | 0                                  |                 | 1                             | -  |  |
| PWV Waters                                       | PWV Waters                          |                 | 7                                | -               | 5                                  |                 | 4                             | -  | All Alternatives would cross a small number of PWV and non-PWV waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them.  |
|  | Non-PWV Waters                      |                 | 1                                | -               | 4                                  |                 | 3                             | -  |  |
|  | Impaired Waters                     |                 | 0                                | -               | 0                                  |                 | 0                             | -  |  |

| Relative Merits                   |  |                                       | Balsam Variation Area            |                |                                    |                |                               |                | Notes  |
|-----------------------------------|--|---------------------------------------|----------------------------------|----------------|------------------------------------|----------------|-------------------------------|----------------|--|
| Factor                            | Element  | ROJ                                   | Proposed Blue Route (12.9 miles) |                | Proposed Orange Route (13.7 miles) |                | Balsam Variation (17.8 miles) |                |  |
|                                   |  |                                       | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI | Count / Acres                 | Percent of ROI |  |
| Water Resources                   | Floodplains  | Crossings or 200 feet                 | 0                                | --             | 26                                 |                | 22                            | -              | The Blue Route would not impact FEMA-designated floodplains whereas the Orange Route and Balsam Variation would require construction and placement of transmission structures within Zone A floodplain.  |
|                                   | NWI Wetlands   |                                       | 54                               | 17.3%          | 69                                 | 20.8%          | 96                            | 22.2%          | The Balsam Variation would potentially impact the most acres of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 578).   |
| Vegetation                        | North American Boreal Forest                                 | 200 feet                              | 205                              | 65.6%          | 208                                | 62.6%          | 234                           | 54.2%          | The Balsam Variation would pass through more forested land than the Blue and Orange Routes. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 580).   |
|                                   | North American Boreal Flooded & Swamp Forest                 |                                       | 12                               | 3.8%           | 15                                 | 4.5%           | 40                            | 9.3%           |  |
|                                   | Eastern North American Cool Temperate Forest                 |                                       | 53                               | 16.9%          | 47                                 | 14.2%          | 60                            | 13.9%          |  |
|                                   | Eastern North American Cool Temperate Flooded & Swamp Forest |                                       | 29                               | 9.3%           | 47                                 | 14.2%          | 68                            | 15.8%          |  |
|                                   | Other  |                                       | 108                              | 34.5%          | 124                                | 37.3%          | 196                           | 45.9%          |  |
| Wildlife                          | All/Any  | 200 feet                              | 0                                | 0.0%           | 0                                  | 0.0%           | 0                             | 0.0%           | No Alternatives would impact recognized wildlife resource areas.   |
| Rare and Unique Natural Resources | Rare Species   | 1 mile (aquatic species not included) | 1                                |                | 0                                  | 0.0%           | 0                             | -              | The Blue Route is located within one mile of a state-listed special concern vascular plant. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 582). |
|                                   | State Rare Communities                                       | 200 feet                              |                                  |                |                                    |                |                               |                |  |
|                                   | MBS Sites of Biodiversity                                    |                                       | 78                               | 24.9%          | 105                                | 31.8%          | 95                            | 22.0%          | The Orange Route would potentially impact the most acres of MBS Sites of Biodiversity; the Blue Route would potentially impact the fewest.   |
| Corridor Sharing                  | Paralleling Existing Infrastructure                          |                                       |                                  | 15.0%          |                                    | 14.0%          |                               |                | The Blue and Orange Routes would parallel existing transmission lines for 15 and 14% of their lengths, respectively; the Balsam Variation would not parallel existing transmission lines.  |

| Relative Merits               |            |     | Balsam Variation Area            |                |                                    |                |                               |                | Notes  |
|-------------------------------|------------|-----|----------------------------------|----------------|------------------------------------|----------------|-------------------------------|----------------|--|
| Factor                        | Element    | ROI | Proposed Blue Route (12.9 miles) |                | Proposed Orange Route (13.7 miles) |                | Balsam Variation (17.8 miles) |                |  |
|                               |            |     | Count / Acres                    | Percent of ROI | Count / Acres                      | Percent of ROI | Count / Acres                 | Percent of ROI |  |
| Electrical System Reliability |            | -   |                                  | -              |                                    |                |                               | -              | No Alternatives parallel or cross any existing Manitoba – Minnesota tie lines.             |
| Cost                          | Total Cost | -   | \$15,121,621                     | -              | \$18,018,490                       |                |                               |                | Both the Orange and the Balsam Variation would cost more to construct than the Blue Route. |

| Relative Merits                                  |                               |                       | Dead Man's Pond Variation Area     |                   |  |  | Notes  |
|--|-------------------------------|-----------------------|------------------------------------|-------------------|--|--|--|
| Factor   | Element                       | ROI                   | Proposed Blue Route<br>(2.2 miles) |                   | Dead Man's Pond<br>Variation (2.3 miles) |  |  |
|  |                               |                       | Count / Acres                      | Percent<br>of ROI | Count / Acres                            | Percent<br>of ROI  |  |
| Human Settlement                                 | <b>Aesthetics</b>             |                       |                                    |                   |  |  |  |
|  | Residences                    | 1,500 feet            | 2                                  | -                 | 4  | -  | Dead Man's Pond Variation would potentially impact more residences within 1,500 feet.  |
|  | Historic Architectural Sites  | 5,280 feet            | 1                                  | -                 | 1  | -  | Both Alternatives would potentially impact a historic architectural site within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Scenic Byway                  | 1,500 feet            | 0                                  | -                 | 0  | -  | Neither Alternative would cross a Scenic Byway.  |
|  | Trails                        | 1,500 feet            | 0                                  | -                 | 0  | -  | Neither Alternative would cross any trails.  |
|  | <b>Land Use Compatibility</b> |                       |                                    |                   |  |  |  |
|  | Dominant Land Cover Type      | 1,500 feet            | 905 ac                             | 94.2%             | 925 ac                                   | 93.7%  | Both Alternatives' major land cover type is Forested and/or Swamp. Both Alternatives would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 588). |
| Land Ownership                                   | 200 feet                      | 53 acres total        |                                    | 56 acres total    |  | The Blue Route is mostly located on private land whereas the Dead Man's Pond Variation is mostly located on public land. |  |
| Public   |                               | 19                    | 35.8%                              | 37                | 66.3%                                    |  |  |
| Private  |                               | 34                    | 63.8%                              | 19                | 34.1%                                    |  |  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet            | 0                                  | 0.0%              | 2  | 0.2%   | The Blue Route would not impact agricultural land.   |
|  | Forestry                      | 1,500 feet            | 0                                  | 0.0%              | 0  | 0.0%   | Neither Alternative would impact State Forest lands.   |
|  | Mining & Mineral Leases       | 200 feet              | 0                                  | 0.0%              | 0  | 0.0%   | Neither Alternative would impact any mining or mineral leases.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet            | 1                                  | -                 | 1  | -  | Both Alternatives would potentially impact a historic architectural site within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. There are no known archaeological sites within one mile of either Alternative.  |
|  | Archaeological Sites          | 1,500 feet            | 0                                  | -                 | 0  | -  |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet | 0                                  | -                 | 0  | -  | Neither Alternative would cross any PWI, non-PWI, or impaired waters.  |
|  | Non-PWI Waters                |                       | 0                                  | -                 | 0  | -  |  |
|  | Impaired Waters               |                       | 0                                  | -                 | 0  | -  |  |
|  | Floodplains                   |                       | 0                                  | -                 | 0  | -  | Neither Alternative would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                       | 14                                 | 26.3%             | 4  | 7.2%   | Both Alternatives would potentially impact very few acres of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 592).  |

| Relative Merits                   |   |                                       | Dead Man's Pond Variation Area  |                |                                       |                | Notes  |
|-----------------------------------|---|---------------------------------------|---------------------------------|----------------|---------------------------------------|----------------|--|
| Factor                            | Element   | ROI                                   | Proposed Blue Route (2.2 miles) |                | Dead Man's Pond Variation (2.3 miles) |                |  |
|                                   |   |                                       | Count / Acres                   | Percent of ROI | Count / Acres                         | Percent of ROI |  |
| Vegetation                        | North American Boreal Forest                        | 200 feet                              | 34                              | 63.8%          | 43                                    | 77.1%          | Both Alternatives would potentially impact a similar amount for forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (pg. 593). |
|                                   | Eastern North American Cool Temperate Forest        |                                       | 14                              | 26.3%          | 6                                     | 10.8%          |  |
|                                   | Other   |                                       | 19                              | 35.6%          | 13                                    | 23.3%          |  |
| Wildlife                          | All/Any   | 200 feet                              | 0                               | 0.0%           | 0                                     | 0.0%           | Neither Alternative would impact recognized wildlife resource areas.   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 0                               | -              | 0                                     | -              | Neither Alternative is located within one mile of a documented rare species.   |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 0                               | 0.0%           | 0                                     | 0.0%           | There are no MBS Sites of Biodiversity within either Alternative.  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                               | -              | -                                     | -              | Neither Alternative parallels existing transmission lines.   |
| Electrical System Reliability     |   | -                                     | -                               | -              | -                                     | -              | Neither Alternative parallels or crosses any existing Manitoba - Minnesota tie lines.  |
| Cost                              | Total Cost  | -                                     | \$2,673,223                     | -              | -                                     | -              | The Dead Man's Pond Variation would cost the most to construct.  |

| Relative Merits                                  |                               | Blackberry Variation Area |                                    |                 |                                      | Notes  |  |
|--|-------------------------------|---------------------------|------------------------------------|-----------------|--------------------------------------|--|--|
| Factor   | Element                       | ROI                       | Proposed Blue Route<br>(5.4 miles) |                 | Proposed Orange Route<br>(6.1 miles) |  |  |
|  |                               |                           | Count / Acres                      | Percent of ROI  | Count / Acres                        |  | Percent of ROI   |
| Human Settlement                                 | <b>Aesthetics</b>             |                           |                                    |                 |                                      |  |  |
|  | Residences                    | 1,500 feet                | 11                                 | -               | 22                                   | -  | The Orange Route has twice as many homes (22) within 1,500 feet as the Blue Route (11).  |
|  | Historic Architectural Sites  | 5,280 feet                | 8                                  | -               | 1                                    | -  | The Blue Route has a higher potential to impact historic architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted.   |
|  | Scenic Byway                  | 1,500 feet                | 0                                  | -               | 0                                    | -  | Neither Route would cross a Scenic Byway.  |
|  | Trails                        | 1,500 feet                | 1                                  | -               | 1                                    | -  | Both Routes would cross one snowmobile trail.  |
|  | <b>Land Use Compatibility</b> |                           |                                    |                 |                                      |  |  |
|  | Dominant Land Cover Type      | 1,500 feet                | 2,004 ac                           | 94.2%           | 1,982 ac                             | 84.2%  | Both Routes' major land cover type is Forested and/or Swamp. Both Routes would result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use (pg. 599). |
| Land Ownership                                   | 200 feet                      | 131 acres total           |                                    | 148 acres total |                                      | Both Routes contain a similar number of acres of public and private lands. |  |
|  |                               | Public                    | 41                                 | 31.3%           | 54                                   |  | 36.5%  |
|  |                               | Private                   | 90                                 | 68.8%           | 94                                   |  | 63.6%  |
| Land-Based Economies                             | Agriculture                   | 1,500 feet                | 50                                 | 2.4%            | 192                                  | 8.2%   | The Blue Route would potentially impact fewer acres of agriculture than the Orange Route.  |
|  | Forestry                      |                           | 0                                  | 0.0%            | 0                                    | 0.0%   | Neither Route would impact State Forest lands.   |
|  | Mining & Mineral Leases       | 200 feet                  | 37                                 | 28.3%           | 33                                   | 22.3%  | Both Routes would potentially impact a similar acres of mining and mineral leases.   |
| Archaeology and Historic Architectural Resources | Historic Architectural Sites  | 5,280 feet                | 8                                  | -               | 1                                    | -  | The Blue Route has a higher potential to impact historic architectural sites within 5,280 feet; however, the permitted Route width will be less than 5,280 feet so some sites may not be impacted. There are no known archaeological sites within one mile of either Route.  |
|  | Archaeological Sites          | 1,500 feet                | 0                                  | -               | 0                                    | -  |  |
| Water Resources                                  | PWI Waters                    | Crossings or 200 feet     | 0                                  | -               | 0                                    | -  | Both Routes would cross a small number non-PWI and impaired waters; however, it is anticipated that these crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and structures would not be placed in them (pg. 603-604).   |
|  | Non-PWI Waters                |                           | 1                                  | -               | 3                                    | -  |  |
|  | Impaired Waters               |                           | 1                                  | -               | 1                                    | -  |  |
|  | Floodplains                   |                           | 0                                  | -               | 0                                    | -  | Neither Route would impact FEMA-designated floodplains.  |
|  | NWI Wetlands                  |                           | 51                                 | 39.0%           | 40                                   | 27.0%  | Both Routes would potentially impact very few acres of NWI-mapped wetlands. While direct, adverse impacts to forested and shrub wetlands are permanent and may change wetland functions within the ROW, they are expected to be minimal because of the amount of surrounding forested and shrub wetlands in the region (pg. 604).  |

| Relative Merits                   |   |                                       | Blackberry Variation Area          |                   |                                      |                   | Notes  |
|-----------------------------------|---|---------------------------------------|------------------------------------|-------------------|--------------------------------------|-------------------|--|
| Factor                            | Element   | ROI                                   | Proposed Blue Route<br>(5.4 miles) |                   | Proposed Orange Route<br>(6.1 miles) |                   |  |
|                                   |   |                                       | Count / Acres                      | Percent<br>of ROI | Count / Acres                        | Percent<br>of ROI |  |
| Vegetation                        | North American Boreal Forest                        | 200 feet                              | 60                                 | 45.8%             | 62                                   | 35.2%             | The Blue and Orange Routes would pass through a similar amount of forested land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the Project (pg. 606)   |
|                                   | North American Boreal Flooded & Swamp Forest        |                                       | 30                                 | 22.9%             | 26                                   | 17.6%             |  |
|                                   | Eastern North American Cool Temperate Forest        |                                       | 33                                 | 25.2%             | 49                                   | 33.1%             |  |
|                                   | Other   |                                       | 71                                 | 54.2%             | 86                                   | 64.9%             |  |
| Wildlife                          | All/Any   | 200 feet                              | 0                                  | 0.0%              | 0                                    | 0.0%              | Neither Route would impact recognized wildlife resource areas.   |
| Rare and Unique Natural Resources | Rare Species  | 1 mile (aquatic species not included) | 2                                  | -                 | 3                                    | -                 | Both Routes are within one mile of two threatened vascular plants; the Orange Route is within one mile of a special-concern bird listing. Surveys will be performed on the final 200-foot ROW to determine if any rare species are present within the permitted ROW. Any indirect impacts to rare species are expected to be minimal because of the amount of the surrounding habitat. Through use of Applicant-proposed avoidance and minimization measures, direct impacts to rare species are not expected (pg. 608). |
|                                   | State Rare Communities<br>MBS Sites of Biodiversity | 200 feet                              | 57                                 | 43.5%             | 79                                   | 53.4%             | Loss or conversion of native vegetation would likely be similar between the Blue and Orange Routes (pg. 608).  |
| Corridor Sharing                  | Paralleling Existing Infrastructure                 | -                                     | -                                  | 20.0%             | -                                    | 37.0%             | The Orange Route parallels existing transmission lines for 37% of its length; the Blue Route parallels existing transmission lines for 20%.  |
| Electrical System Reliability     | -   | -                                     | -                                  | -                 | -                                    | -                 | Neither Alternative parallels or crosses any existing Manitoba – Minnesota tie lines.  |
| Cost                              | Total Cost  | -                                     | \$8,380,690                        | -                 | -                                    | -                 | The Orange Route would cost the most to construct.   |



August 4, 2015

Eric F. Swanson  
 Direct Dial: (612) 604-6511  
 Direct Fax: (612) 604-6811  
 eswanson@winthrop.com

VIA E-FILING

The Honorable Ann O'Reilly  
 Office of Administrative Hearings  
 P.O. Box 64620  
 St. Paul, MN 55164-0620

RE: In the Matter of the Request of Minnesota Power for a Route Permit for the Great  
 Northern Transmission Line  
 MPUC Docket No. E-015/TL-14-21  
 OAH Docket No. 65-2500-31637

Dear Judge O'Reilly:

On behalf of Minnesota Power, enclosed please find the Relative Merits Table to be filed in the  
 above-referenced docket. Also attached is our Affidavit of Service.

Very truly yours,

WINTHROP & WEINSTINE, P.A.

/s/ Eric F. Swanson

Eric F. Swanson

Enclosure

10704676v1

0193-1

The relative merits table provided by the Applicant used different methodology and is included in the comment appendix of the EIS.

No changes are made to the EIS in response to this comment.

BEFORE THE MINNESOTA OFFICE OF ADMINISTRATIVE HEARINGS  
600 North Robert Street  
St. Paul, Minnesota 55101

FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION  
121 Seventh Place East, Suite 350  
St. Paul, Minnesota 55101-2147

In the Matter of the Request by Minnesota  
Power for a Route Permit for the Great  
Northern Transmission Line

MPUC Docket No. E-015/TL-14-21

OAH Docket No. 65-2500-31637

**AFFIDAVIT OF SERVICE**

STATE OF MINNESOTA     )  
                                  ) ss.  
COUNTY OF HENNEPIN    )

Mary G. Holly, of the City of Lake Elmo, County of Washington, the State of  
Minnesota, being first duly sworn, deposes and says that on the 4<sup>th</sup> day of August, 2015,  
she served the attached **Relative Merits Table** to all said persons on the attached Service  
List, true and correct copies thereof, by E-Filing.

/s/ Mary G. Holly  
MARY G. HOLLY

Subscribed and sworn to before me this  
4<sup>th</sup> day of August, 2015.

/s/ Jane E. Justice  
Notary Public

My Commission Expires: January 31, 2020

10704728v1

| First Name | Last Name      | Email                         | Company Name                       | Address  | Delivery Method           | View Trade Secret | Service List Name                        |
|------------|----------------|-------------------------------|------------------------------------|--|---------------------------|-------------------|--|
| Bret       | Eknes          | bret.eknes@state.mn.us        | Public Utilities Commission        | Suite 350<br>121 7th Place East<br>St. Paul,<br>MN<br>551012147            | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Linda      | Jensen         | linda.s.jensen@ag.state.mn.us | Office of the Attorney General-DOJ | 1800 BRM Tower 445<br>Minnesota Street<br><br>St. Paul,<br>MN<br>551012134 | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Michael    | Kaluzniak      | mike.kaluzniak@state.mn.us    | Public Utilities Commission        | Suite 350<br>121 Seventh Place East<br>St. Paul,<br>MN<br>55101            | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| David      | Moeller        | dmoeller@allte.com            | Minnesota Power                    | 30 W Superior St.<br><br>Duluth,<br>MN<br>558022093                        | Electronic Service        | No                | OFF_SL_14-21_Official CC<br>Service List |
| Ann        | O'Reilly       | ann.oreilly@state.mn.us       | Office of Administrative Hearings  | PO Box 64820<br><br>St. Paul,<br>MN<br>55101                               | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Deborah    | Pile           | Deborah.Pile@state.mn.us      | Department of Commerce             | Suite 50035 7th Place East<br><br>St. Paul,<br>MN<br>551012198             | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Janet      | Shaddix Elling | jshaddix@janetshaddix.com     | Shaddix And Associates             | Ste 122<br>9100 W Bloomington<br>Bloomington,<br>MN<br>55431               | Electronic Service<br>Fwy | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Tracy      | Smetana        | tracy.smetana@state.mn.us     | Public Utilities Commission        | 121 7th Place East<br>Suite 350<br>St. Paul,<br>MN<br>55101                | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| William    | Storm          | bill.storm@state.mn.us        | Department of Commerce             | Room 500<br>85 7th Place East<br>St. Paul,<br>MN<br>551012198              | Electronic Service        | Yes               | OFF_SL_14-21_Official CC<br>Service List |
| Eric       | Swanson        | eswanson@winthrop.com         | Winthrop Weinstine                 | 225 5th St Ste 3500<br>Capella Tower<br>Minneapolis,<br>MN<br>554024829    | Electronic Service        | No                | OFF_SL_14-21_Official CC<br>Service List |

| First Name | Last Name | Email                | Company Name                | Address   | Delivery Method    | View Trade Secret | Service List Name                        |
|------------|-----------|----------------------|-----------------------------|---|--------------------|-------------------|--|
| Daniel P   | Wolf      | dan.wolf@state.mn.us | Public Utilities Commission | 121 7th Place East<br>Suite 350<br>St. Paul,<br>MN<br>551012147 | Electronic Service | Yes               | OFF_SL_14-21_Official CC<br>Service List |

| First Name | Last Name  | Email                           | Company Name                                 | Address   | Delivery Method    | View Trade Secret | Service List Name                 |
|------------|------------|---------------------------------|--|---|--------------------|-------------------|-----------------------------------|
| Sarah      | Belmers    | sarah.belmers@mnhs.org          | Minnesota Historical Society                 | 345 Kellogg Boulevard West<br><br>St. Paul,<br>MN<br>55102  | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Tamara     | Cameron    | tamara_e.cameron@usace.army.mil | U.S. Army Corps of Engineers                 | 180 6th St # 700<br><br>Saint Paul,<br>MN<br>55101  | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Travis     | Germundson | travis.germundson@state.mn.us   |  | Board of Water & Soil Resources<br>520 Lafayette Rd<br>Saint Paul,<br>MN<br>55155                     | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Susan      | Heffron    | susan.heffron@state.mn.us       | MN Pollution Control Agency                  | 520 Lafayette Rd<br><br>Saint Paul,<br>MN<br>55155  | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Karl       | Howe       | karl.howe@state.mn.us           | DEED   | 332 Minnesota St, #E200<br>1ST National Bank Bldg<br>St. Paul,<br>MN<br>55101                         | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Ray        | Kirsch     | Raymond.Kirsch@state.mn.us      | Department of Commerce                       | 85 7th Place E Ste 500<br><br>St. Paul,<br>MN<br>55101  | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Stacy      | Kotch      | Stacy.Kotch@state.mn.us         | MINNESOTA<br>DEPARTMENT OF<br>TRANSPORTATION | 395 John Ireland Blvd.<br><br>St. Paul,<br>MN<br>55155  | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Debra      | Moynihan   | debra.moynihan@state.mn.us      | MN Department of Transportation              | 395 John Ireland Blvd MS<br>620<br><br>St. Paul,<br>MN<br>55155-1889                                  | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Bob        | Patton     | bob.patton@state.mn.us          | MN Department of Agriculture                 | 625 Robert St N<br><br>Saint Paul,<br>MN<br>55155-2538  | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Margaret   | Rheude     | Margaret_Rheude@fws.gov         | U.S. Fish and Wildlife Service               | Twin Cities Ecological Services Field Office<br>4101 American Blvd. E.<br>Bloomington,<br>MN<br>55425 | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |

| First Name | Last Name | Email                         | Company Name                              | Address  | Delivery Method    | View Trade Secret | Service List Name                 |
|------------|-----------|-------------------------------|---|--|--------------------|-------------------|-----------------------------------|
| Jamie      | Schrenzel | jamie.schrenzel@state.mn.us   | Minnesota Department of Natural Resources | 500 Lafayette Road<br>Saint Paul,<br>MN<br>55155                             | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| David      | Seykora   | dave.seykora@state.mn.us      | MN Department of Transportation           | 385 John Ireland Boulevard<br>Mail Stop 130<br>St. Paul,<br>MN<br>55155-1899 | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Bruce      | West      | Bruce.West@state.mn.us        | Department of Public Safety               | Box 145<br>444 Cedar Street<br>St. Paul,<br>MN<br>55151                      | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |
| Jonathan   | Wolfgram  | Jonathan.Wolfgram@state.mn.us | Department of Public Safety               | 445 Minnesota Street Suite 147<br>St. Paul,<br>MN<br>55101-1547              | Electronic Service | No                | SPL_SL_14-21_Agency<br>Reps 14-21 |