

6.0 Comparative Environmental Consequences

6.1 Introduction

While Chapter 5 of this Environmental Impact Statement (EIS) describes the affected environment for each resource and general impacts from the construction, operation, maintenance and connection of the proposed transmission line Project, this chapter describes the relevant resource components of the affected environment that could be markedly impacted by the proposed Project and related alternatives, or that could affect the alternatives if implemented. This chapter also presents the applicable environmental impacts in comparative form to help define the issues and provide a basis for decision makers and the public to consider and choose among options.⁷⁹ According to Council on Environmental Quality (CEQ) guidance, data and analyses presented in Chapter 6 are commensurate with the relevance of the impact and with the level of concern raised during the scoping process.⁸⁰ As a result, the following resource areas are presented and analyzed further in this chapter: human settlement (aesthetics, land use compatibility, land-based economies), water resources, vegetation, wildlife, rare species and communities, archaeological and historic architectural resources, the reliability of the electrical system, and the costs of constructing, operating, and maintaining the facility which are dependent on design and route.

The background discussions in Chapter 5 provide context for the assessment of potential impacts from the proposed Project and alternatives discussed in Chapter 6. The No Action alternative, discussed in Chapter 3 reflects the status quo and serves as a benchmark against which the proposed Project and other alternative actions are evaluated under the National Environmental Policy Act (NEPA) and for the purposes of federal agency decision-making. This chapter of the EIS presents analyses of the direct and indirect impacts,⁸¹ including short-term and long-term impacts from the proposed Project and alternatives within each relevant resource section. Short-term impacts are defined for this proposed Project as those that would take place during the construction phase. The construction

phase would be expected to last three years. Long-term impacts are defined for this proposed Project as those that would take place during the operation, maintenance, and emergency repairs of the transmission line. Sections 6.2.6, 6.3.9, and 6.4.6 provide a relative merits analysis to assist the Minnesota Public Utilities Commission (MN PUC) and the public in evaluating alternative routes and route segments for the Project under Minnesota Power Plant Siting Act (PPSA).

The cumulative impacts for each resource are discussed in Chapter 7. A summary of unavoidable adverse impacts and irreversible and irretrievable commitments of resources is provided in Section 7.6. Chapter 5, Chapter 6, and Chapter 7 collectively include detailed descriptions for impacts and resources relevant to identified issues of concern during the scoping process (Section 1.3.1.3).

6.2 West Section

Chapter 5 provides a discussion of general impacts for each resource, and that discussion provides the general nature of the impacts, such as the duration, extent, whether it is direct or indirect and whether it is adverse or beneficial. It also describes the general nature of the disturbances such as tree clearing, soil disturbance, structure placement, access road construction, and other impacts related to components of the proposed Project. Those general details are not repeated in Chapter 6, which focuses on site specific resources and impacts and refers back to the general details of Chapter 5.

As described in Section 4.3.1 and identified on Map 4-2, the West Section is composed of five Variation Areas: Border Crossing, Roseau Lake WMA, Cedar Bend WMA, Beltrami North, and Beltrami North Central. The international border crossings are shown on Map 4-2. Section 5.3 previously described, in general, the human settlement, land-based economies, archaeological and historic architectural resources, natural environment, rare and unique natural resources, corridor sharing, electric system reliability, and costs of constructing, operating, and maintaining the facilities as they relate to the West Section and the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project. The following sections provide a more detailed description and analysis of the resources present and potential impacts from the proposed Project within the variation areas in the West Section.

79 See the CEQ NEPA implementing regulations at 40 Code of Federal Regulations (CFR) Section 1502.14 and CFR Section 1502.16.

80 See CEQ's NEPA implementing regulations at 40 CFR Section 1502.15.

81 According to CEQ's NEPA implementing regulations at 40 CFR Section 1508.8, effects and impacts are synonymous terms. Direct impacts are caused by the proposed federal action and occur at the same time and place as the action; while indirect effects (or impacts) are caused by the action and are later in time and farther removed in distance, but are still reasonably foreseeable.

6.2.1 Border Crossing Variation Area

There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area: the Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, Border Crossing Hwy 310 Variation, Border Crossing 500 kV Variation, and Border Crossing 230 kV Variation (Map 4-3); each international border crossing also has a transmission line route associated with it, as described in Section 4.3.1.1.

The following sections provide a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Border Crossing Variation Area for each of the international border crossings and transmission lines associated with the route alternatives. The potential impacts for the border crossings were assessed within an area that is 20 feet from the border crossing (north to south) and includes the 200-feet right-of-way (ROW). The region of influence (ROI) for analyses of each resource at the border crossing is the same as those identified for each resource in Chapter 5. The potential impacts for the transmission lines were assessed based on the ROI identified for each resource in Chapter 5.

6.2.1.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Border Crossing Variation Area and the potential impacts to those factors from the proposed Project. Potential impacts are discussed for the international border crossings and along their associated transmission line routes or variations.

Aesthetics

Impacts on aesthetic resources within the Border Crossing Variation Area would be determined based largely on the level of increased contrast in views by sensitive viewers as a result of the proposed Project. These impacts are based on the number of visual resources, including residences, with high visual sensitivity in close proximity to the transmission line that are likely to have views of and be affected by the proposed Project. Aesthetic impacts are likely to be greatest for views of the proposed Project by sensitive viewers at close distances (e.g., in the foreground distance zone), but may also be substantial for views from greater distances. The vegetation surrounding high visual sensitivity areas can also affect the degree of aesthetic impact from the proposed Project. Areas with high visual

sensitivity located in densely forested areas may be less likely to have views of the transmission line, even at a close distance, than high visual sensitivity areas located in open, agricultural areas and at greater distances from the transmission line. Because of the difference in site-specific landscape characteristics (e.g., the amount of screening provided by vegetation or terrain) among areas deemed as having a high visual sensitivity, the actual impact of the proposed Project could vary widely.

Residences and other aesthetic resources (i.e., sensitive visual resource areas, including parks, trails, and other features that may have viewers with high concern for or awareness of aesthetics or changes to views) within 1,500 feet from the anticipated alignment of the proposed Project could have a high probability of having views of the proposed Project and, as described in Section 5.3.1.1, this distance is considered the ROI for aesthetic resources. Also, within this distance, there is a high probability that the proposed Project would produce high contrast in the landscape. If existing large transmission lines would be followed, a new transmission line would not require clearing of new corridors, but rather an expansion of existing corridors. By paralleling an existing transmission line with structures of similar design and height, a new transmission line would produce less contrast than a transmission line that does not parallel an existing large transmission line.

Data related to aesthetic resources in the Border Crossing Variation Area, the international border crossing and the transmission lines associated with each crossing, are summarized in Table 6-1 and shown on Maps 6-1, 6-2, 6-3, and 6-5. Table 6-1 is all inclusive in that data related to the international border crossings are combined with their associated transmission line routes or variations; refer to Maps 6-1, 6-2, 6-3, and 6-5 for additional information.

International Border Crossings

For each international border crossing, the presence of existing corridors, residences, historic architectural sites, state forests, state scenic byways, and snowmobile trails were identified. There are no residences or scenic byways within 1,500 feet of the anticipated alignment for any of the international border crossings (Maps 5-5, 6-1, and 6-2).

The border crossing for the Border Crossing Hwy 310 Variation is located within 1,500 feet of a historic architectural site (RO-ROC-018, previously recommended as not eligible for the National Register of Historic Places [NRHP]) and snowmobile trail, while the border crossings associated with the Proposed Border Crossing-Blue/Orange Route

Table 6-1 Aesthetic Resources within the ROI in the Border Crossing Variation Area

| Resource | Evaluation Parameter ⁽²⁾ | Border Crossing Variation Area ⁽¹⁾ | | | | |
|---|--|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| Associated Transmission Line | Length (mi) | 25.0 | 25.7 | 18.6 | 10.1 | 8.2 |
| Existing Transmission Line ⁽³⁾ | Percent of Total Length ⁽⁴⁾ | 7 | 7 | 10 | 100 | 100 |
| Residences | Count within 0–500 ft | 2 | 2 | 0 | 0 | 0 |
| | Count within 0–1,000 ft | 2 | 3 | 0 | 0 | 1 |
| | Count within 0–1,500 ft | 4 | 5 | 2 | 3 | 5 |
| Historic Architectural Sites | Count within 0–1,500 ft | 0 | 0 | 1 | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 0 | 1 | 0 | 0 |
| State Forests | Acres within ROW | 394 | 339 | 294 | 120 | 96 |
| | Count within 0–1,500 ft | 1 | 1 | 1 | 1 | 1 |
| State Scenic Byways | Count within 0–1,500 ft | 1 | 1 | 1 | 1 | 1 |
| Snowmobile Trails | Count within 0–1,500 ft | 1 | 1 | 1 | 1 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146), SHPO 2014, reference (147); MnDNR 2003, reference (148); MnDOT 2013, reference (149); MnDNR 2010, reference (150)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (3) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (4) Percent of total length was calculated by rounding any values less than 0.5 to 0; this may result in a total of slightly more or less than 100 percent.

and all border crossing variations within the Border Crossing Variation Area are located more than 1,500 feet from these resources.

The border crossing for the Proposed Border Crossing-Blue/Orange Route and all border crossing variations, with the exception of the Border Crossing Pine Creek Variation, are located on state forest land. While the border crossings for the Border Crossing 500 kV Variation and Border Crossing 230 kV Variation are located on state forest land, they are likely to produce less contrast because their entire lengths parallel existing transmission lines (i.e., existing 500 kilovolt (kV) and 230 kV transmission lines, respectively); therefore, these border crossing

locations would be expected to result in less contrast and less aesthetic impact than the other three border crossings.

The border crossings for the Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation would not follow any existing corridors, but due to the lack of residences and historic architectural sites within 1,500 feet, potential impacts are expected to be minimal. The border crossing for the Border Crossing Hwy 310 Variation is located on state forest and within 450 feet of a historic architectural site but one that has not been previously determined as NRHP eligible. The border crossing for the Border Crossing Hwy 310 Variation

is located within 1,000 feet of a snowmobile trail. Potential aesthetic impacts are expected to be minimal due to the corridor sharing and lack of residences and recommended NRHP eligibility of historic architectural sites.

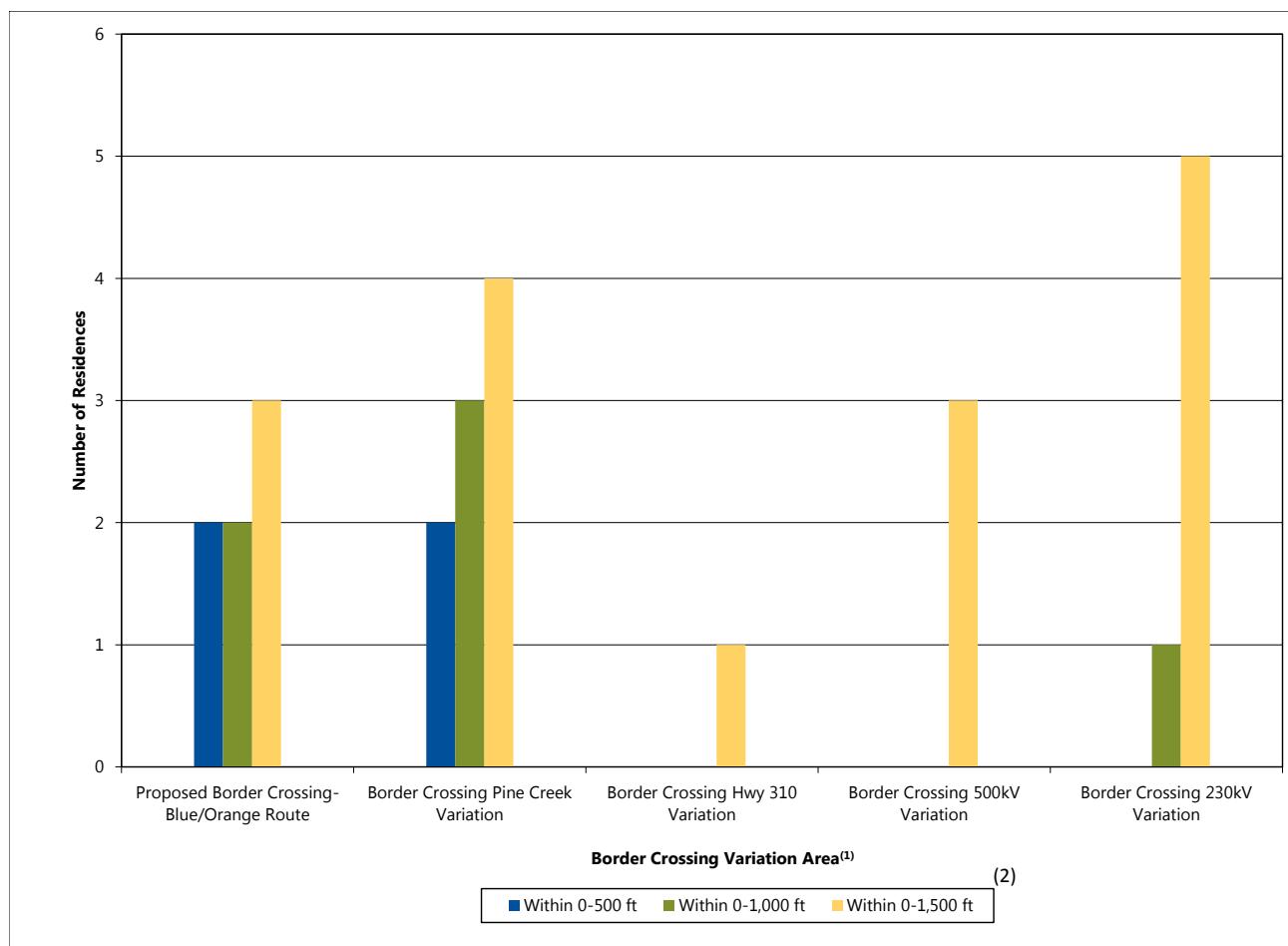
Transmission Line Routes and Variations

The presence of existing corridors, residences, historic architectural sites, state forests, state scenic byways, and snowmobile trails were identified for the transmission lines associated with the alternatives in the Border Crossing Variation Area.

As indicated in Table 6-1 for the Border Crossing Variation Area, the alternatives would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including one state forest, one scenic byway, and one snowmobile trail (Map 6-3 and 6-5). In addition, the anticipated alignment of the transmission line for the alternatives would be

located within 1,500 feet of one or more residences, which also could have high visual sensitivity (Figure 6-1). The Border Crossing 230 kV Variation would affect the greatest number residences within 1,500 feet of the anticipated alignment (five) but only one within 1,000 feet of the anticipated alignment and none within 500 feet and the Border Crossing Hwy 310 Variation would affect the fewest residences (two), none within 1,000 feet or 500 feet of the anticipated alignment. The Proposed Border Crossing-Blue/Orange Route would have four residences within 1,500 feet of the anticipated alignment, with two of those within 500 feet. The Border Crossing 500 kV Variation would affect three residences within 1,500 feet of the anticipated alignment (none within 1,000 or 500 feet) while the Border Crossing Pine Creek Variation would affect five residences within 1,500 feet, three of which are within 1,000 feet and two of those that are within 500 feet.

Figure 6-1 Residences within the ROI in the Border Crossing Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the figure represents both the proposed international border crossings and each associated transmission line route.
- (2) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

Although the transmission line associated with the Border Crossing Hwy 310 Variation would affect the fewest residences (**two**), it also follows a road for a portion of its route that would potentially provide more travelers with views of that variation than the proposed route or other variations. The Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation also follow roads for portions of their lengths. All three of the transmission line variations associated with these border crossing alternatives are substantially longer than either the Border Crossing 500 kV Variation or Border Crossing 230 kV Variation; therefore they are likely to be more noticeable to more people in open landscapes with broad vistas in the Border Crossing Variation Area.

The transmission lines associated with the Border Crossing 500 kV Variation and Border Crossing 230 kV Variation are likely to produce less contrast because they parallel existing transmission lines of similar size and design along the entirety of their proposed lengths and are short in length, 10.1 and 8.2 miles, respectively; therefore, these variations would result in less aesthetic impact than the other three alternatives that only parallel existing large transmission lines for 10 percent or less of their lengths. Although they are similar in length to each other, the Border Crossing 500 kV Variation affects fewer residences (three) than the Border Crossing 230 kV Variation (five) and parallels an existing 500 kV transmission line of similar design. Therefore the Border Crossing 500 kV Variation would result in less aesthetic impact than the Border Crossing 230 kV Variation, as well as the other three alternatives.

The transmission line associated with the Border Crossing 500 kV Variation and the Border Crossing 230 kV Variation parallel existing transmission lines for their entire length, are shorter than the other three alternatives, and affect a minimal number of residences (less than five) and other sensitive visual resources, therefore, the aesthetic impacts of these two variations are expected to be minimal (Table 6-1).

Although the transmission lines associated with the Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation affect few residences and other sensitive visual resources, they are nearly twice as long in length than the Border Crossing 500 kV Variation and Border Crossing 230 kV Variation, at 25.0, 25.7, and 18.6 miles, respectively, and only parallel existing transmission lines for short portions (7-10 percent) of their overall lengths (Table 6-1). Depending on the surrounding landscape, this could create an opportunity for the transmission line to be

more noticeable to more people. For these reasons, potential aesthetic impacts of the Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation are expected to be significant.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

Land Uses

Table 6-2 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment in the Border Crossing Variation Area and Figure 6-2 shows the percentage of land cover within 1,500 feet of the border crossings and associated transmission lines in the Border Crossing Variation Area. The various land uses present in the Border Crossing Variation Area are shown in Map 5-5 and residences, churches, cemeteries, and airports near the proposed route and variations are shown on Table 6-2. Table 6-2 is all inclusive in that data related to the international border crossings are combined with their associated transmission line routes or variations; refer to Map 5-5 for additional information.

International Border Crossings

The border crossings for the Proposed Border Crossing-Blue/Orange Route, Border Crossing Hwy 310 Variation, Border Crossing 500 kV Variation, and Border Crossing 230 kV Variation are all forested, while the proposed border crossing for the Border Crossing Pine Creek Variation is agricultural.

Transmission Line Routes and Variations

The transmission line routes associated with the Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation would impact more land than the other variations (Figure 6-2). Forested and/or swamp land is the predominant land cover type and agricultural is the second most common land cover type in the ROI. The Border Crossing Pine Creek Variation would impact the least forested and/or swamp land compared to the other alternatives in the ROI. The Border Crossing 500 kV

Table 6-2 Land Uses within the ROI in the Border Crossing Variation Area

| Resource | Type ⁽²⁾ | Evaluation Parameter ⁽³⁾ | Border Crossing Variation Area ⁽¹⁾ | | | | |
|--|------------------------|-------------------------------------|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 9,160 | 9,414 | 6,850 | 3,725 | 3,047 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 206 | 273 | 200 | 91 | 82 |
| | Agricultural | Acres within 0–1,500 ft | 2,784 | 3,609 | 1,901 | 819 | 1,057 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 5,837 | 5,249 | 4,456 | 2,797 | 1,896 |
| | Other | Acres within 0–1,500 ft | 333 | 283 | 293 | 18 | 12 |

Source: USGS 2001, reference (151)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) Other category includes: Open water, Great Plains Grassland & Shrubland and Introduced & Semi Natural Vegetation. See detailed summary of all types in Appendix E.
- (3) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Variation would impact the greatest amount of forested and/or swamp land.

Land Ownership and Management

Table 6-3 identifies the amount of land by ownership or management category for the border crossings and associated transmission lines in the Border Crossing Variation Area. Table 6-3 is all inclusive in that data related to the international border crossings are combined with their associated transmission line routes or variations; refer to Map 5-5 for additional information.

International Border Crossings

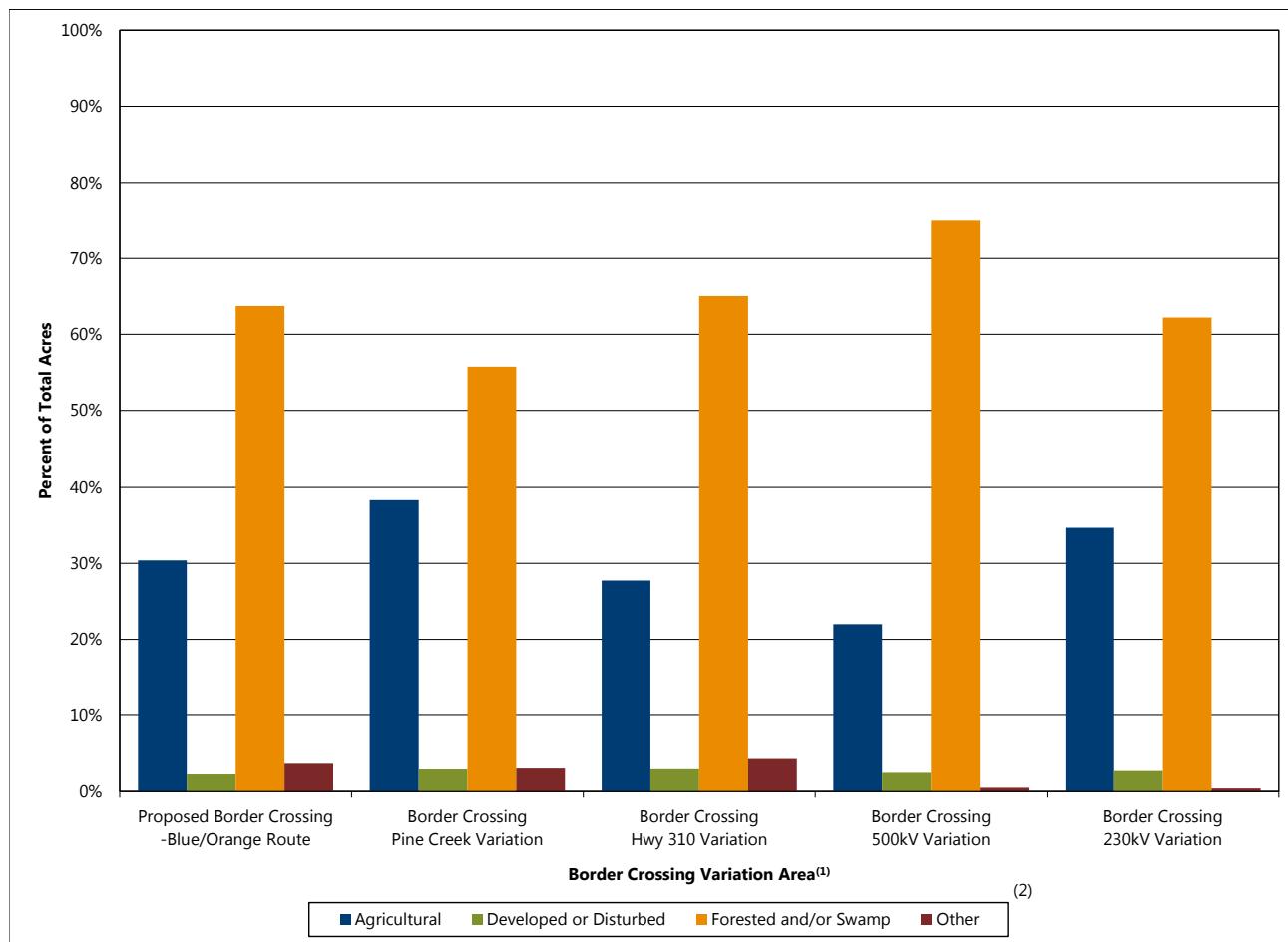
The border crossing for the Proposed Border Crossing-Blue/Orange Route is located on trust fund state fee lands. The border crossings for the Border Crossing Hwy 310 Variation, Border Crossing 500 kV Variation, and Border Crossing 230 kV Variation are located on consolidated conservation state fee lands. The border crossing for the Border Crossing Pine Creek Variation is not located on state fee lands and is instead located on agricultural land. No county lands, state conservation easements, or U.S. Fish and Wildlife Service (USFWS) Interest lands are located within 1,500 feet of any of the border crossings.

Transmission Line Routes and Variations

The Proposed Border Crossing-Blue/Orange Route ROW would include more state forest and state fee lands than the variations (Figure 6-3). The Border Crossing Pine Creek Variation would include the second greatest amount of state forest and state fee land, while the Border Crossing 230 kV Variation would impact the least amount of this land type. No impacts to county lands, state conservation easements, or USFWS Interest Lands would result from any of the alternatives considered. The Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation would parallel an existing corridor for 10 percent or less of their length. Both the Border Crossing 500 kV and Border Crossing 230 kV variations would parallel an existing corridor for their entire length (see Section 6.2.1.6); therefore these alternatives would be more compatible with surrounding land uses.

Direct impacts to land use are typically considered significant when they would result in extensive, long-term change in land use. For the proposed Project, potential impacts to land use are considered to be greater for forested and/or swamp land use categories, including state forests and state fee lands because of the predominance of that land use type in the Border Crossing Variation Area. Changes in the forested and swamp land use would result

Figure 6-2 Land Uses within the ROI in the Border Crossing Variation Area



Source(s): USGS 2001, reference (151)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the figure represents both the proposed international border crossings and each associated transmission line route.
- (2) Other category includes: Open water, Great Plains Grassland & Shrubland and Introduced & Semi Natural Vegetation. See detailed summary of all types in Appendix E.

from the removal of existing woody vegetation and brush from the ROW as well as the long-term maintenance of vegetation at or slightly above ground surface over the life of the transmission line. This removal of forested land in state forests would be a long-term conversion that would impact any timber, forestry, hunting activities, or other planned uses allowable within state forests. The removal of forested land from state fee lands would result in a reduction in revenues that contribute to the School Trust Land program.⁸² Long-term conversion of swamp land in state forests could result in a removal of important habitat for sensitive species. Agriculture uses would be allowed within the ROW after construction of the proposed Project; therefore, potential direct impacts to agricultural land within the ROW from the proposed Project would be localized and short-term.

⁸² More information available at: http://www.dnr.state.mn.us/aboutdnr/school_lands/index.html

Adverse impacts are not expected from construction or operation and maintenance of the proposed Project on developed or disturbed land classifications as no change in land use would be expected on developed or disturbed lands, however there would be some restrictions for allowing future structures within the ROW. Land owners would be compensated for allowing construction and operation of the proposed Project on their privately-owned land.

Indirect impacts to all land uses within the ROW and up to 1,500 feet on either side of the anticipated alignment would result from a temporary increase in dust and noise during construction. Developed land uses and residences may be more sensitive to these impacts, but they would be localized, short-term. Long-term aesthetic impacts to land uses near the ROW would result from operation of the Project and are discussed in Section 5.3.1.2.

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Table 6-3 Land Ownership/Management within the Anticipated ROW in the Border Crossing Variation Area

| Resource | Type | Evaluation Parameter | Border Crossing Variation Area ⁽¹⁾ | | | | |
|--|---|----------------------|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| Total Lands | -- | Acres within ROW | 608 | 624 | 453 | 244 | 199 |
| State Forests | -- | Acres within ROW | 394 | 339 | 294 | 120 | 96 |
| State Fee Lands ⁽²⁾ Total | -- | Acres within ROW | 436 | 381 | 300 | 131 | 97 |
| State Fee Lands ⁽²⁾ by Type | Consolidated Conservation | Acres within ROW | 309 | 308 | 274 | 62 | 87 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 13 | 13 | 1 | 2 | 1 |
| | Trust Fund | Acres within ROW | 114 | 61 | 24 | 67 | 9 |
| | Federal - State Lease | Acres within ROW | 0 | 0 | 0 | 0 | 0 |
| County Lands | -- | Acres within ROW | 0 | 0 | 0 | 0 | <0.5 |
| Private Lands ⁽³⁾ | -- | Acres within ROW | 172 | 243 | 153 | 113 | 102 |

Source: MnDNR 2003, reference (148); MnDNR 2014, reference (152); Itasca County 2014, reference (153)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) 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.
- (3) Acreage for private lands was calculated as the difference between total lands and public lands.

Impacts from the proposed Project are expected to be minimal in areas where the proposed Project would parallel an existing ROW or property line. Paralleling an existing ROW would minimize or prevent habitat fragmentation in forested and/or swamp land. Structures on the edge of agricultural fields would also be less obtrusive to farm equipment and related operations than structures located in the middle of a field.

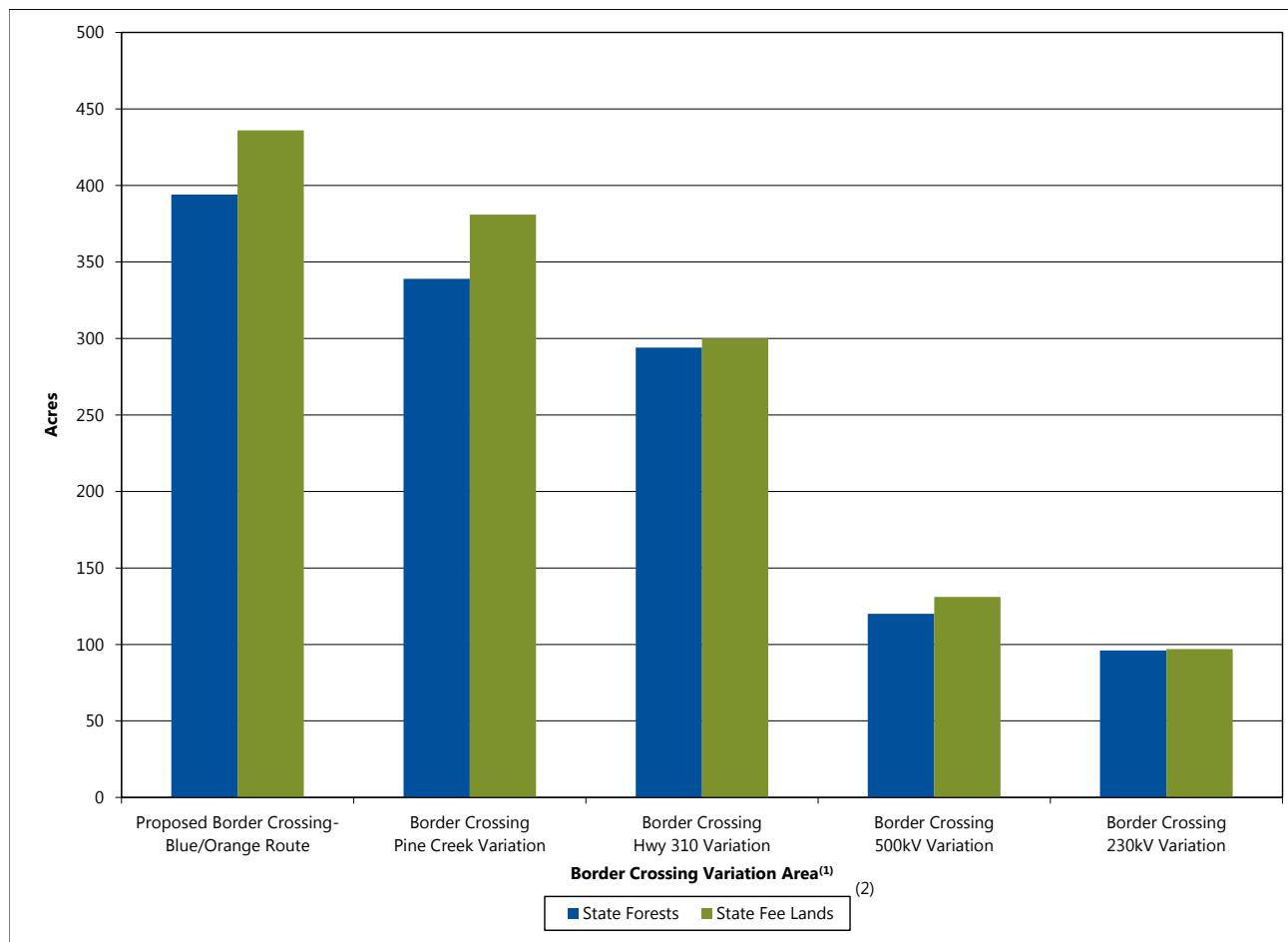
Transmission line ROWs would be a permitted land use within the Border Crossing Variation Area. Conditional permits may be required in some areas, however a MN PUC Route Permit would supersede all local zoning, building, or land use regulations. The Applicant would work with applicable local, state, and federal agencies to ensure compliance with all applicable regulations.

The Proposed Border Crossing-Blue/Orange Route and variations 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 remaining in the surrounding area. The overall length of the transmission line associated with each border crossing alternative that would parallel an existing ROW is an important consideration when comparing the alternatives. Within the Border Crossing Variation Area, the transmission lines associated with the Border Crossing 500 kV Variation and Border Crossing 230 kV Variation would parallel an existing ROW for their entire length as opposed to less than 10 percent for the Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek, and Border Crossing Hwy 310 variations. Finally, the transmission lines associated with the proposed variations also avoid more state forest and state fee lands than the transmission line associated with the Proposed Border Crossing-Blue/Orange Route and therefore fewer impacts would be expected for the variations from the long-term changes to land use.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1.

Figure 6-3 Public Land Ownership/Management within the ROI in the Border Crossing Variation Area



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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the figure represents both the proposed international border crossings and each associated transmission line route.
- (2) 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.

Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts to these resources from the proposed Project.

6.2.1.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Border Crossing Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Border Crossing Variation Area are summarized in Table 6-4. Table 6-4 includes data related to the international border crossings and their associated transmission line routes or variations.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the

transmission line. Table 6-4 and Figure 6-4 show the acreage of U.S. Department of Agriculture (USDA)-Natural Resources Conservation Service (NRCS) classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Border Crossing-Blue/Orange Route and Border Crossing variations in the ROI.

International Border Crossings

The border crossings for the Proposed Border Crossing-Blue/Orange Route, Border Crossing 500 kV Variation, and Border Crossing Hwy 310 Variation are not designated as prime farmland, while the border crossings for the Border Crossing Pine Creek Variation and Border Crossing 230 kV Variation are located on areas that are designated prime farmland if drained.

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Table 6-4 Land-Based Economy Resources within the Anticipated ROW in the Border Crossing Variation Area

| Resource | Type | Evaluation Parameter | Border Crossing Variation Area ⁽¹⁾ | | | | |
|---|----------------------------------|--|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| Associated Transmission Line | -- | Length (mi) | 25.0 | 25.7 | 18.6 | 10.1 | 8.2 |
| Existing Transmission Line ⁽²⁾ | -- | Percent of Total Length ⁽³⁾ | 7 | 7 | 10 | 100 | 100 |
| Farmland | Not Farmland | Acres within ROW | 497 | 452 | 355 | 158 | 121 |
| | Prime Farmland If Drained | Acres within ROW | 103 | 164 | 89 | 76 | 72 |
| | Farmland Of Statewide Importance | Acres within ROW | 4 | 4 | 4 | 0 | <0.5 |
| | All Areas Are Prime Farmland | Acres within ROW | 3 | 3 | 3 | 9 | 5 |
| State Forest | -- | Acres within ROW | 394 | 339 | 294 | 120 | 96 |

Source: Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

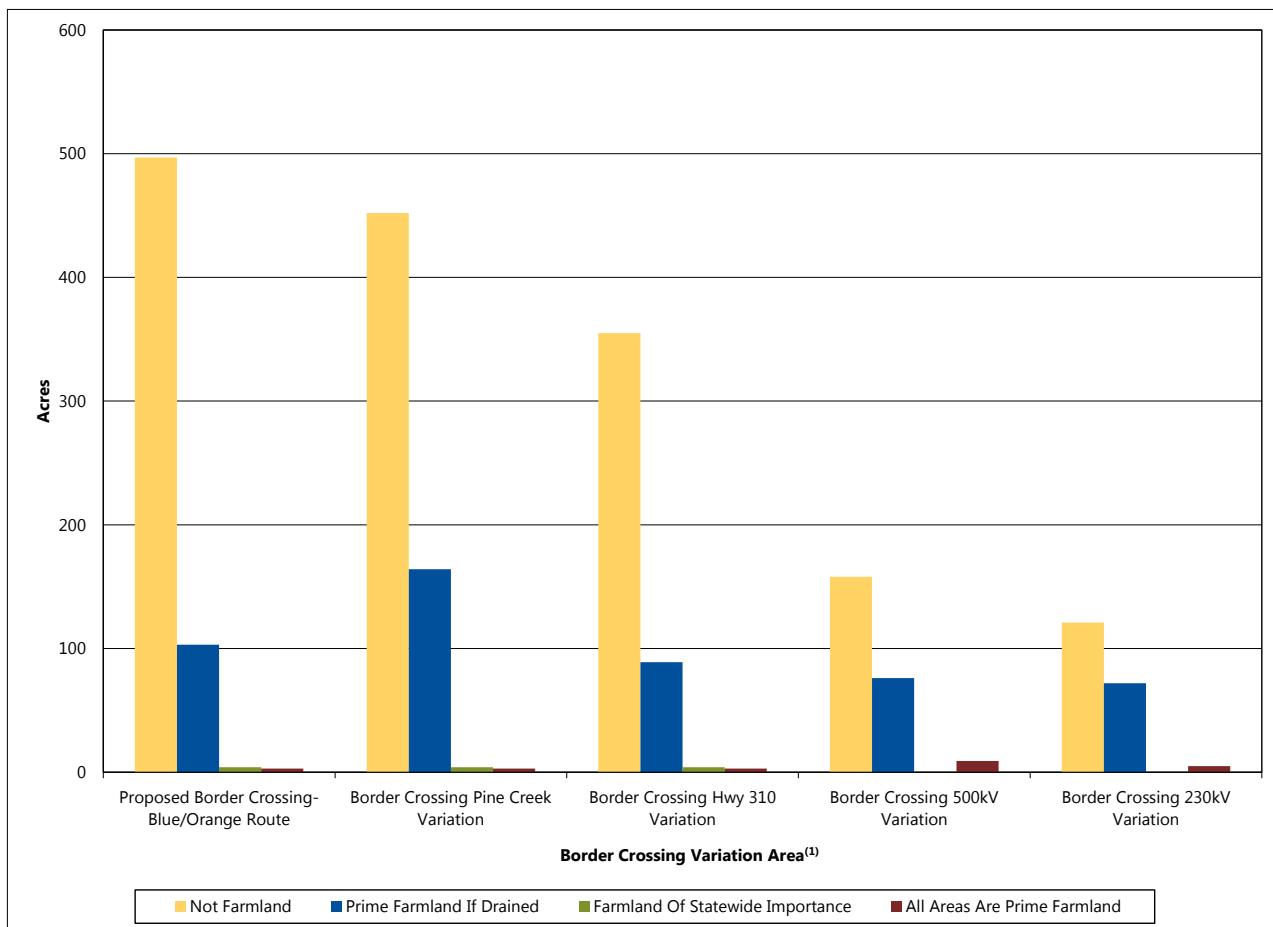
Construction activities associated with the border crossings for the Border Crossing Pine Creek Variation and Border Crossing 230 kV Variation could limit the use of fields or affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the physical presence of transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment. As the border crossings for the Proposed Border Crossing-Blue/Orange Route, Border Crossing 500 kV Variation, and Border Crossing Hwy 310 Variation are not located on prime farmlands, potential impacts are expected to be minimal.

Transmission Line Routes and Variations

The Border Crossing Pine Creek Variation has the longest transmission line route associated with it and would pass through the most acres of farmland, including the most acres of prime farmland if drained (Table 6-4, Figure 6-4). The Border Crossing 230 kV Variation has the shortest transmission line route of the proposed route and variations in the Border Crossing Variation Area and parallels an existing 230 kV transmission line corridor for its entire length. The Border Crossing 230 kV Variation would therefore be expected to result in the least amount of impact to farmland, including the least acres of prime farmland if drained.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term

Figure 6-4 Acres of Farmland by Type within the Anticipated ROW in the Border Crossing Variation Area



Source(s): USDA NRCS 2014, reference (154)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the figure represents both the proposed international border crossings and each associated transmission line route.

adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-4 identifies the acreage of state forest land

that would be impacted in the ROI by the Proposed Border Crossing Blue/Orange Route and the variations. There are no USDA-U.S. Forest Service (USFS) national forest lands within the ROI of the border crossings or the associated transmission line alternatives in the Border Crossing Variation Area.

International Border Crossings

Forestry impacts for the border crossings were determined within the 200-foot ROW of the proposed transmission line route. Maps 6-3 and 5-5 depict the vegetation at the proposed border crossings.

The border crossings for the Proposed Border Crossing-Blue/Orange Route, Border Crossing Hwy 310 Variation, Border Crossing 500 KV Variation, and Border Crossing 230 KV Variation are all forested areas within the Lost River State Forest. The Border Crossing Pine Creek Variation is the only border

6.0 Comparative Environmental Consequences

crossing that is not forested and is not state forest land.

The border crossings for the Border Crossing 500 kV Variation and Border Crossing 230 kV Variation, which both parallel existing transmission lines at the border crossing, would have the least impact on the Lost River State Forest as they would only require widening the ROW and not creating a new one.

While direct, adverse impacts to forested areas would be long-term, they are expected to be minimal because of the large amount of surrounding contiguous forest that would still exist in the region.

Transmission Line Routes and Variations

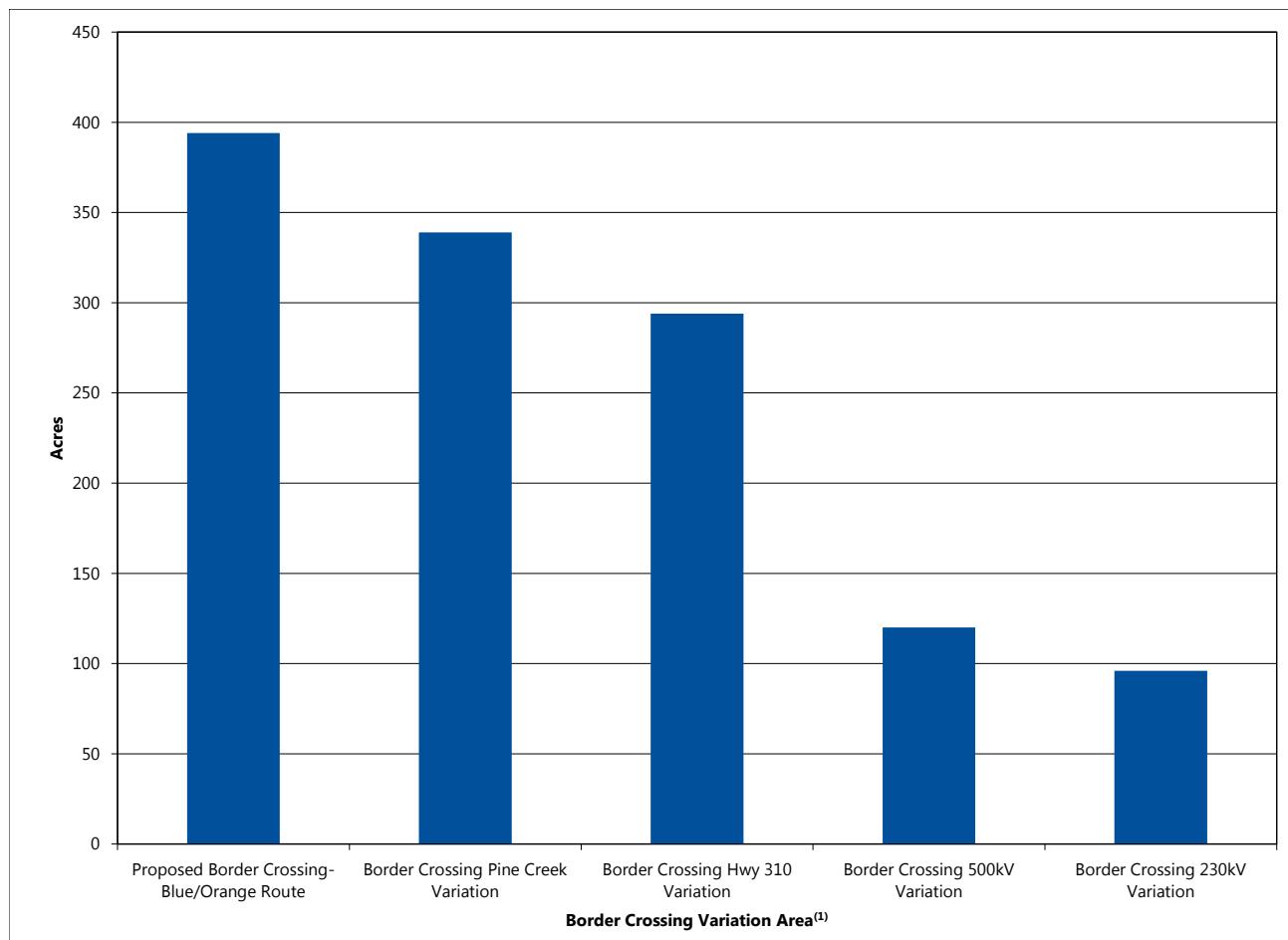
The Proposed Border Crossing-Blue/Orange Route, which has the second longest transmission line route associated with it in this variation area, would pass through the most acres of state forest lands - Lost River State Forest (Figure 6-5, Map 6-3). The Border Crossing 230 kV Variation, which parallels

an existing 230 kV transmission line corridor for its entire length and has the shortest length, would be expected to have the fewest impacts on timber activities in the Lost River State Forest.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts and affect timber stands and soil compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and soil compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-

Figure 6-5 Acres of State Forest Land within the Anticipated ROW in the Border Crossing Variation Area



Source(s): MnDNR 2003, reference (148)

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

(1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the figure represents both the proposed international border crossings and each associated transmission line route.

proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Although a number of variables may drive impacts on mining and mineral resources, such as the distribution of the resource through the area, or its accessibility, the volume of state mineral lease lands crossed represents the best available indicator of total resource potential that may be encumbered. Therefore, a review of total acreage of state mineral lease lands has been conducted to provide an indication of potential impacts. There are no active or expired/terminated state mineral leases, records of current mineral mining, or known aggregate resources that would be impacted by the border crossings or associated transmission line alternatives within the Border Crossing Variation Area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. However, such impacts are not expected from the proposed Project because such activities do not exist nor are planned in this area.

6.2.1.3 Archaeology and Historic Architectural Resources

Impacts on cultural resources, which include archaeological sites, historic architectural resources, and/or Native American resources, and effects on historic properties are evaluated based upon their proximity to the proposed Project. The currently proposed direct area of potential effects (APE), described in Section 5.3.3, is consistent with the ROI and, for archaeological resources, historic architectural resources, and Native American resources, includes the 200-foot ROW of the proposed transmission line and the footprint of the other elements of the proposed Project described in Section 2.1. The proposed direct APE (i.e., the ROW) is the area where cultural resources would be directly impacted by the proposed Project. The analysis of direct impacts on archaeological resources and historic architectural properties in the EIS is based on those resources and properties located within the 200-foot-wide ROW currently identified for the proposed Project, which is within the wider (approximately 1,500-foot-wide) route width. The proposed indirect APE for historic architectural resources, as proposed by DOE as part

of the Section 106 process, is the area within one mile on either side of the proposed transmission center line, where cultural resources, primarily historic architectural resources or Native American resources such as TCPs or TCLs, would be subject to indirect impacts that could include indirect visual and noise impacts. In general, the proposed Project would not result in indirect impacts on NRHP-eligible archaeological resources because the setting of archaeological resources, which could be affected by the proposed Project, typically is not a character-defining feature that contributes to the significance of archaeological resources.

Resources that would be directly impacted by the proposed Project are located within a direct APE, e.g., the ROW. Resources that would be indirectly impacted by construction and operation of the proposed Project and located outside of the ROW but within one mile of the anticipated alignment are located within the indirect APE.

Table 6-5 provides a summary of the previously recorded archaeological sites and historic architectural resources within the ROW (direct APE), 1,500 feet of the anticipated alignment for cultural resources, and within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the proposed route and variations in the Border Crossing Variation Area. A more detailed description of these sites and resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE), 1,500 feet of the anticipated alignment, or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the proposed route and variations in the Border Crossing Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

International Border Crossings

There are no previously recorded historic architectural resources located within the direct APE (200-foot ROW) for any of the border crossings in the Border Crossing Variation Area and with the exception of the border crossing for the Border Crossing Hwy 310 Variation, there are no historic architectural sites within the indirect APE (within one mile of the anticipated alignment) associated with the border crossings. There is a historic architectural

6.0 Comparative Environmental Consequences

Table 6-5 Archaeological and Historic Architectural Resources within the Border Crossing Variation Area

| Resource | Evaluation Parameter ⁽²⁾ | Border Crossing Variation Area ⁽¹⁾ | | | | |
|------------------------------|-------------------------------------|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| Historic Architectural Sites | Count within ROW | 0 | 0 | 0 | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 | 1 | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 0 | 1 | 0 | 0 |
| Archaeological Sites | Count within ROW | 0 | 1 | 0 | 1 | 0 |
| | Count within 0–1,500 ft | 0 | 2 | 0 | 1 | 0 |

Source: SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

site (RO-ROC-018, previously recommended not NRHP-eligible) within the indirect APE (450 feet from the anticipated alignment) of the border crossing for the Border Crossing Hwy 310 Variation.

There are no archaeologic sites within the direct APE of any of the border crossings, with the exception of the border crossing for the Border Crossing Pine Creek Variation. Archaeological site 21ROaa (Precontact Artifact Scatter – unknown NRHP status) is located within 100 feet of the border crossing location for the Border Crossing Pine Creek Variation.

There are no anticipated direct, adverse, long-term impacts on previously recorded historic architectural resources at the border crossings for any of the associated transmission line alternatives in the Border Crossing Variation Area since none were identified in the direct APE. The border crossing for the Border Crossing Hwy 310 Variation is the only border crossing that would potentially indirectly impact a historic architectural resource; however, this architectural resource has not been evaluated for NRHP eligibility and the significance of these impacts or their effects under Section 106 of the NHPA are unknown, pending additional cultural resources investigations implemented consistent with the terms of the Draft PA (Appendix V) for the proposed Project. However, these indirect impacts could be considered significant if this historic architectural resource is determined NRHP-eligible and if setting is determined to be a character-

defining feature that contributes to the significance of the resource. There is potential for direct, adverse, long-term significant impacts on the archaeological resource in the location of the border crossing for the Border Crossing Pine Creek Variation as a result of the presence of an archaeological resource within the ROW; this resource could be affected by ground disturbing activities associated with construction of the proposed Project. Because the direct APE for the Border Crossing Pine Creek Variation contains an archaeological resource that has not been evaluated for NRHP-eligibility, the proposed Project may result in direct impacts to this resource, which could be considered an adverse effect under Section 106 of the NHPA if this archaeological resource is determined NRHP-eligible.

As the proposed international border crossings have not, yet, been surveyed for cultural resources, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for cultural resources. These cultural resources investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential adverse impacts on historic properties

as a result of construction and operation of the proposed Project.

Potential short-term and long-term adverse impacts from construction, operation, maintenance, and emergency-repair related activities to cultural resources and historic properties are summarized in Section 5.3.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to cultural resources from the Proposed Project.

Transmission Line Routes and Variations

Within the Border Crossing Variation Area, neither the Proposed Border Crossing-Blue/Orange Route nor the Border Crossing Hwy 310 Variation nor Border Crossing 230 kV Variation have any documented archaeological sites or historic architectural resources within the direct APE (Table 6-5). Both the Border Crossing Pine Creek Variation and Border Crossing 500 kV Variation have one **previously recorded** archaeological site located within the ROW which could be affected. Site 21ROaa, a precontact artifact scatter with an undetermined NRHP-eligibility status, is located within the ROW of the Border Crossing Pine Creek Variation. Site 21Rod, a precontact site with an unknown NRHP-eligibility status, is located within the **ROW of the Border Crossing 500 kV Variation**. The Border Crossing Hwy 310 Variation is the only variation potentially indirectly impacting one **previously recorded** historic architectural resource, although this site (RO-ROC-018) has been previously recommended not NRHP-eligible.

There is currently no identified potential for direct, adverse, long-term impacts on archaeological sites or historic architectural resources for the Proposed Border Crossing-Blue/Orange Route, Border Crossing Hwy 310 Variation, and Border Crossing 230 kV Variation as there were **no previously recorded archaeological sites or historic architectural resources** located within the direct APE of these routes and variations, although detailed cultural resource investigations have not yet occurred for the Proposed Route or variations. Potential for direct, adverse, long-term impacts on archaeological resources is possible for the Border Crossing Pine Creek Variation and the Border Crossing 500 kV Variation as a result of the presence of an archaeological resource being present within the ROW which could be affected by ground disturbing activities associated with construction of the proposed Project. Because the direct APEs for the Border Crossing Pine Creek Variation and the Border Crossing 500 kV Variation contain **previously recorded** archaeological resources that have not

been evaluated for NRHP-eligibility, the proposed Project may result in direct impacts to these resources that could be considered an adverse effect under Section 106 of the NHPA if these archaeological resources are determined NRHP-eligible.

Indirect, long-term, adverse visual impacts on **one previously recorded historic architectural resource**, RO-ROC-018 (**previously recommended not NRHP-eligible**), which is located within the indirect APE of the Border Crossing Hwy 310 Variation could occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resource or within views to and from the architectural resources; however since this resource has been **previously recommended as not NRHP-eligible**, these impacts are expected to be minimal. No known **Native American resources**, including resources of traditional religious and cultural importance to a federally recognized Indian tribe, TCPs, or TCLs, have been identified for the proposed routes or variations within the Border Crossing Variation Area.

The proposed route and variations have not, yet, been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for **Native American resources** or assessments would be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resource investigations would be implemented as part of the DOE's **Draft PA (Appendix V)** that will establish a process to identify, cultural resources within the direct and indirect APEs for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate adverse impacts to historic architectural sites, including traditional cultural resources, during construction of the proposed Project.

Potential **short- and long-term** adverse impacts from construction, operation, maintenance, and emergency-repair related **activities** to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including traditional cultural properties (TCPs), from the proposed Project.

6.2.1.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Border Crossing

Table 6-6 Water Resources within the Anticipated ROW in the Border Crossing Variation Area

| Resource | Evaluation Parameter | Border Crossing Variation Area ⁽¹⁾ | | | | |
|-------------------------------|----------------------|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| Associated Transmission Line | Length (mi) | 25.0 | 25.7 | 18.6 | 10.1 | 8.2 |
| PWI Waters ⁽²⁾ | Number of Crossings | 2 | 3 | 2 | 0 | 0 |
| Non-PWI Waters ⁽³⁾ | Number of Crossings | 17 | 22 | 15 | 7 | 9 |
| Impaired Waters | Number of Crossings | 1 | 1 | 1 | 0 | 0 |
| Floodplains ⁽⁴⁾ | Acres within ROW | 334 | 343 | 213 | 0 | 0 |
| NWI Wetlands | Acres within ROW | 464 | 415 | 310 | 172 | 102 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); MPCA 2014, reference (119); MPCA 2014, reference (118); Minnesota Power 2014, reference (163)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (3) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.
- (4) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the border crossings and associated transmission line alternatives in the Border Crossing Variation Area are summarized in Table 6-6 and shown on Map 6-3. Table 6-6 is all inclusive in that data related to the international border crossings are combined with their associated transmission line routes or variations; refer to Map 6-3 for additional information. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

International Border Crossings

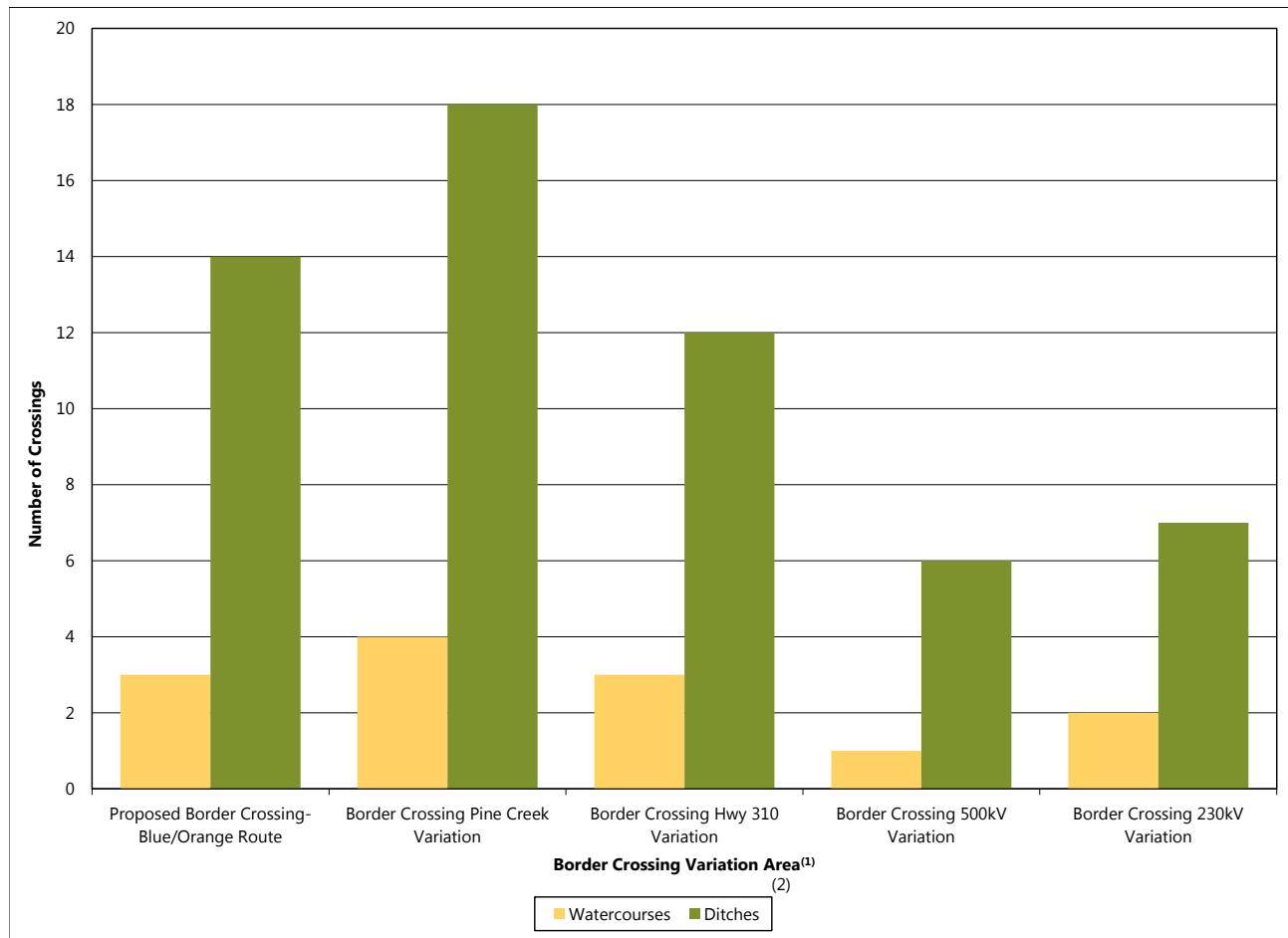
Water resources within the 200-foot ROW of the border crossings for the Proposed Border Crossing-Blue/Orange Route and all Border Crossing variations, are depicted on Map 6-3. There are no watercourse crossings at any of the border crossings. The Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, Border Crossing Hwy 310 Variation, Border Crossing 500 kV Variation, and Border Crossing

230 kV Variation are all located within a mapped National Wetland Inventory (NWI) wetland or a portion of the ROW overlaps with an NWI wetland. The border crossing for the Border Crossing Pine Creek Variation is also within a Federal Emergency Management Agency (FEMA) floodplain.

The border crossing for the Proposed Border Crossing-Blue/Orange Route is located in forested wetland and would result in conversion of forested wetland to an herbaceous wetland type through removal of woody vegetation in the ROW. Wetlands in the border crossings for the Border Crossing Variations are already open herbaceous wetlands and would not require conversion to another wetland type.

Wetlands within the border crossings for the Proposed Border Crossing-Blue/Orange Route, Pine Creek Variation, Border Crossing Hwy 310 Variation, and Border Crossing 230 kV Variation are greater than the average spanning length allowable for structures. Similarly, the FEMA floodplain in the border crossing for the Border Crossing Pine Creek Variation is also greater than the average spanning length allowable for structures. Impacts associated with wetland type conversion and placement

Figure 6-6 Non-PWI Water Crossings by Type in the Border Crossing Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the figure represents both the proposed international border crossings and each associated transmission line route.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

of structures in wetlands and floodplains are summarized below.

Transmission Line Routes and Variations

The number of watercourse crossings, need to place transmission structures in floodplains and wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ across the Proposed Border Crossing-Blue/Orange Route and Border Crossing variations.

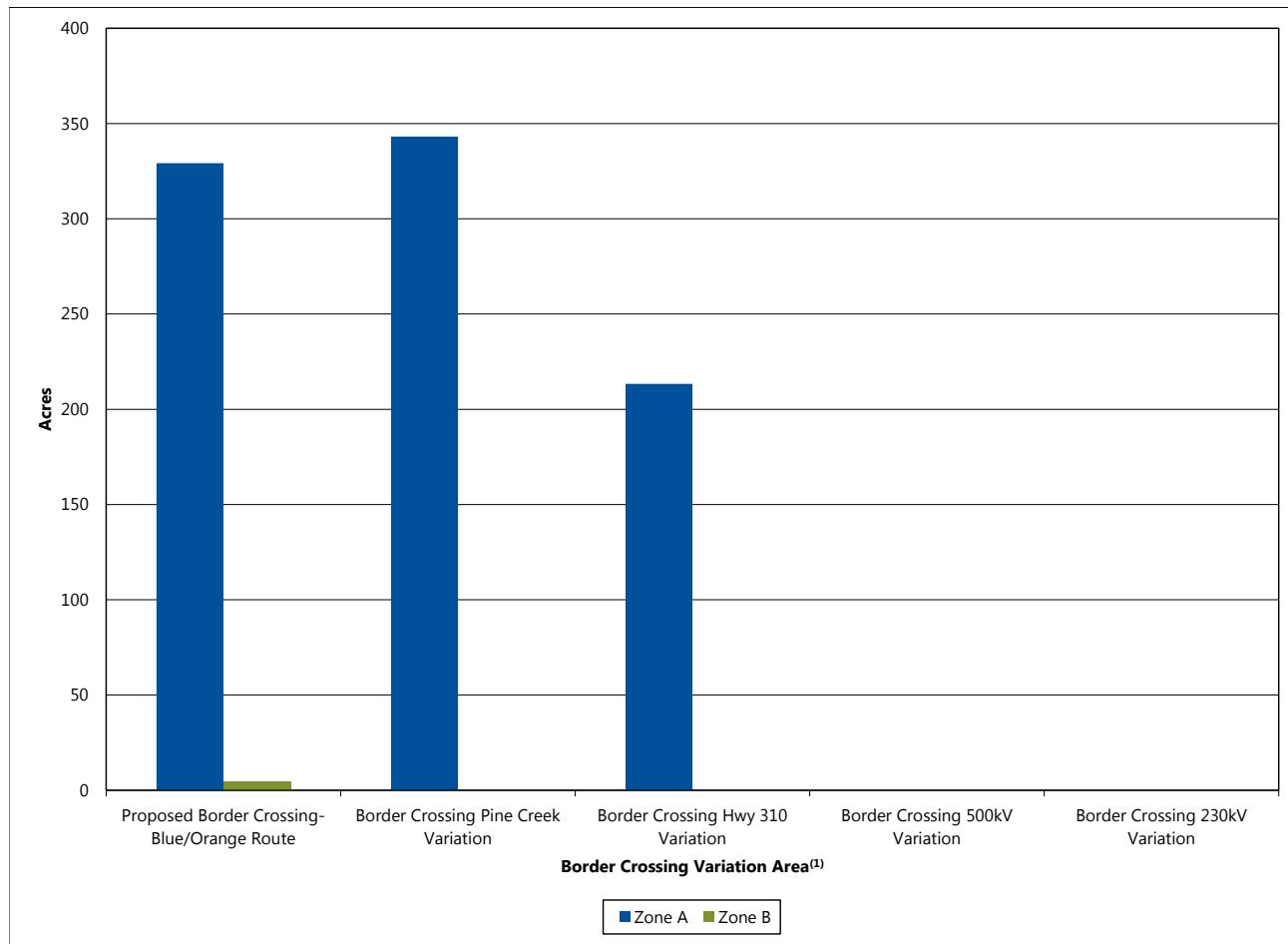
The Proposed Border Crossing-Blue/Orange Route and the Border Crossing Pine Creek and Border Crossing Hwy 310 variations would require crossing Sprague Creek and the Roseau River, both of which are Public Water Inventory (PWI) watercourses. The Border Crossing Pine Creek Variation would also cross a third PWI stream, Pine Creek. The Border Crossing 500 kV Variation and Border Crossing 230 kV Variation would not cross any PWI waters.

The Proposed Border Crossing-Blue/Orange Route and all of the Border Crossing variations would require crossing non-PWI watercourses and ditches. Figure 6-6. Crossings would primarily include ditches, and also include the Lost River, and several smaller, unnamed watercourses (Figure 6-6). No waterbodies would be crossed by the Proposed Border Crossing-Blue/Orange Route or Border Crossing variations.

The Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation would all require crossing Sprague Creek, a Minnesota Pollution Control Agency (MPCA) listed impaired water, as shown in Table 5-24.

It is anticipated that PWI crossings, non-PWI water crossings, and impaired waters are spannable (crossings would be less than the average spanning

Figure 6-7 Acres of Floodplain by Type within the Anticipated ROW in the Border Crossing Variation Area



Source(s): Minnesota Power 2014, reference (163)

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

(1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the figure represents both the proposed international border crossings and each associated transmission line route.

length of 1,250 feet) and transmission structures would not be placed within them.

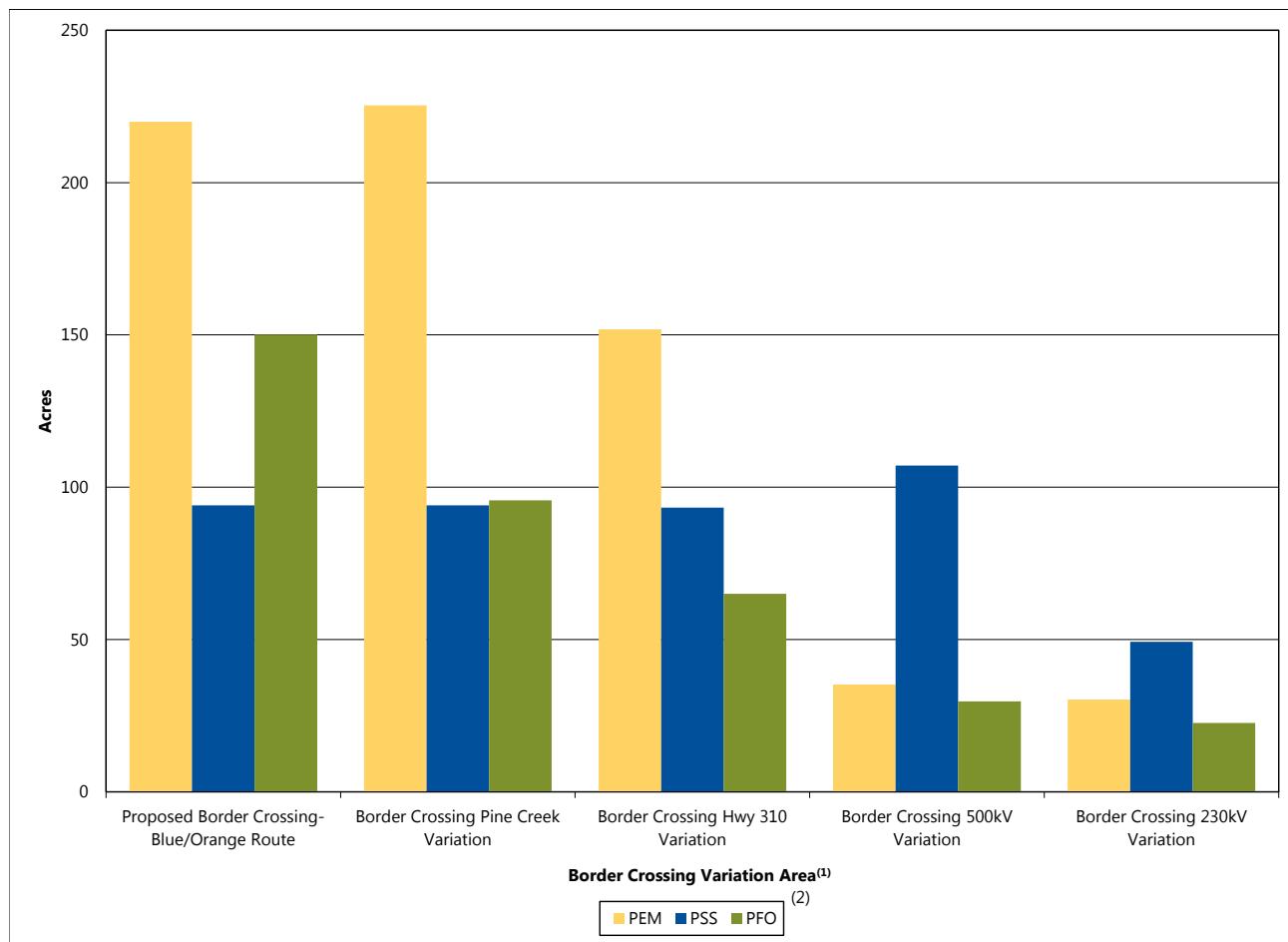
The Proposed Border Crossing-Blue/Orange Route, as well as the Border Crossing Pine Creek and Border Crossing Hwy 310 variations, would require construction and placement of transmission structures within the Zone A (100-year) floodplain of the Roseau River. Placement of transmission structures in the floodplain could not be avoided by spanning as floodplain crossing distances exceed average spanning length of 1,250 feet. As shown in Figure 6-7, structures would primarily be located within Zone A of the floodplain, although the Proposed Border Crossing-Blue/Orange Route may also require placement of one or more structures in Zone B (500-year). Impacts to floodplains are expected to be minimal and are summarized in Section 5.3.4.1.

Based on the NWI, the Proposed Border Crossing-Blue/Orange Route and all of the Border Crossing

variations would result in conversion of forested and shrub wetland areas to herbaceous wetland type through removal of woody vegetation in ROW. As shown in Figure 6-8, the Proposed Border Crossing-Blue/Orange Route contains the most combined forested and shrub wetlands, and therefore would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. The Proposed Border Crossing-Blue/Orange Route and all of the Border Crossing variations would require placement of permanent fill in wetlands for construction of transmission structures. This

Figure 6-8 Acres of Wetland by Type within the Anticipated ROW in the Border Crossing Variation Area



Source(s): USFWS 1997, reference (157)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the figure represents both the proposed international border crossings and each associated transmission line route.
- (2) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO).

impact cannot be avoided by spanning as wetland crossings in the West Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill would be expected to be minimal because of the localized extent of the impact (1,936 square feet per structure). Impacts to wetlands will be quantified during Project design once more exact spanning distances are determined and the type of structure needed at each location is known. Due to the large wetland complexes in the area, it would be expected that the Proposed Border Crossing-Blue/Orange Route and all Border Crossing variations would require temporary construction access through wetlands, whose impact would be expected to be minimal due to its short-term, localized nature, and the Applicant's intended use of minimization measures.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-

term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the border crossings and associated transmission line alternatives in the Border Crossing Variation Area are summarized in Table 6-7 and shown on Maps 5-5 and 6-3. Table 6-7 is all inclusive in that data related to the international border crossings are combined with their associated transmission line routes or variations; refer to Maps 5-5 and 6-3 for additional information. Additional vegetation data beyond the

Table 6-7 Vegetation Resources within the Anticipated ROW in the Border Crossing Variation Area

| Resource | Evaluation Parameter | Border Crossing Variation Area ⁽¹⁾ | | | | |
|--|--|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| Associated Transmission Line | Length (mi) | 25.0 | 25.7 | 18.6 | 10.1 | 8.2 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 7 | 7 | 10 | 100 | 100 |
| State Forest | Acres within ROW | 394 | 339 | 294 | 120 | 96 |
| Total Forested GAP Land Cover | Acres within ROW | 411 | 369 | 288 | 184 | 125 |
| GAP Land Cover - Dominant Types⁽⁴⁾ | | | | | | |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 341 | 300 | 226 | 131 | 88 |
| North American Boreal Forest | Acres within ROW | 56 | 56 | 50 | 40 | 26 |
| Herbaceous Agricultural Vegetation | Acres within ROW | 162 | 227 | 126 | 52 | 70 |

Source(s): USGS 2001, reference (151); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (4) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

dominant land cover types present in the ROI in this variation area are provided in Appendix E.

International Border Crossings

Vegetation resources within the 200-foot ROW of the border crossings for the Proposed Border Crossing-Blue/Orange Route and all Border Crossing variations are depicted on Maps 5-5 and 6-3.

The vegetation at the border crossings for the Proposed Border Crossing-Blue/Orange Route, Border Crossing Hwy 310 Variation and Border Crossing 230 kV Variation is North American Boreal Flooded & Swamp Forest, located within the Lost River State Forest. Similarly, the vegetation for the Border Crossing 500 kV Variation is a combination of North American Boreal Flooded & Swamp Forest and herbaceous agricultural vegetation, also within the Lost River State Forest. The vegetation at the Border Crossing Pine Creek Variation border crossing is herbaceous agricultural vegetation.

The impacts on vegetation would be the same for the border crossings for the Proposed Border Crossing-Blue/Orange Route, Border Crossing Hwy 310 Variation, Border Crossing 230 kV Variation, and Border Crossing 500 kV Variation and would include the loss or fragmentation of forest. Only the border crossing for the Border Crossing Pine Creek Variation would be different, as it is not forested nor located on State Forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-5).

Transmission Line Routes and Variations

The primary impact on vegetation that would differ across the Proposed Border Crossing-Blue/Orange Route and the Border Crossing variations is the loss or fragmentation of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce

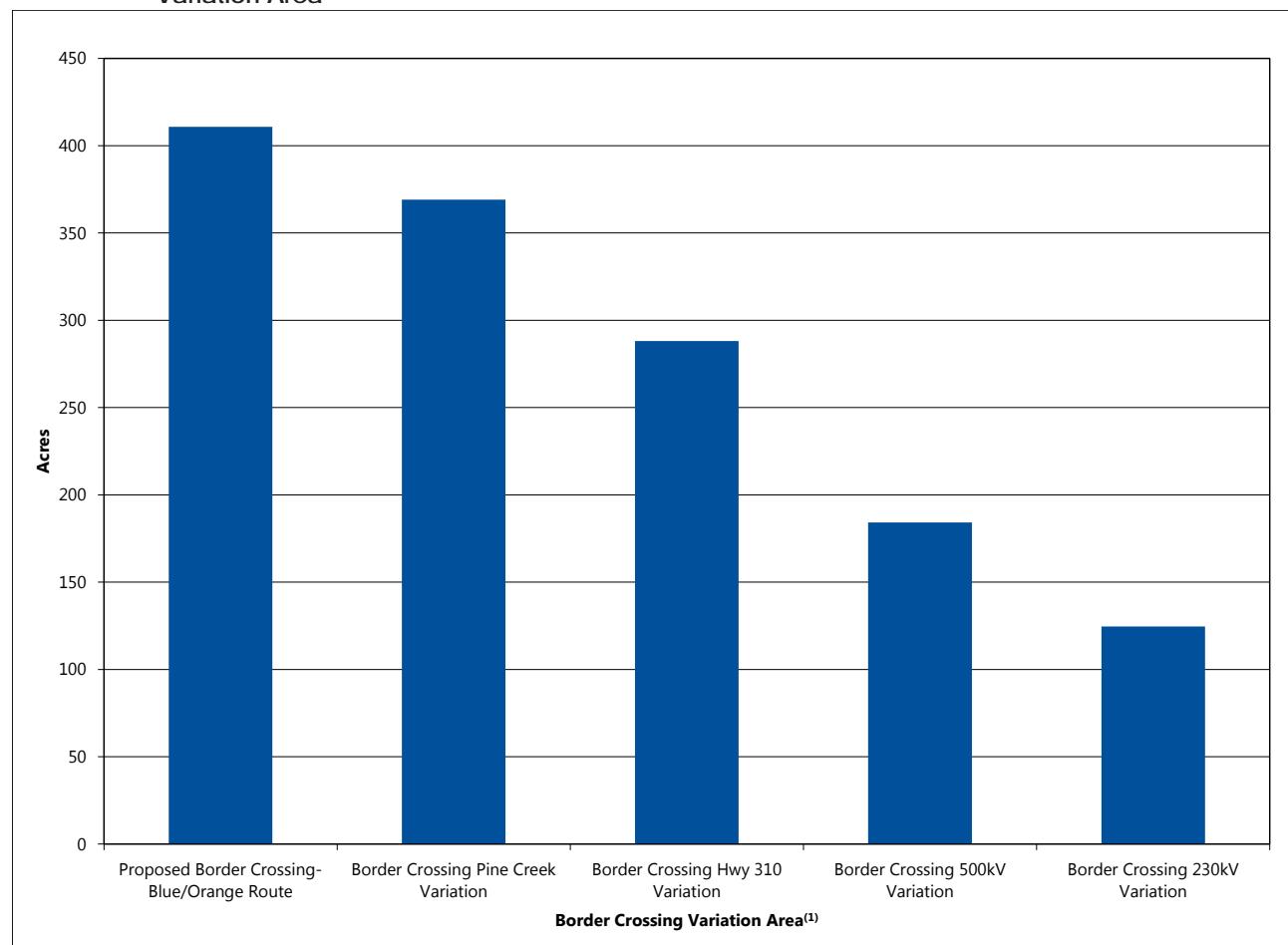
interference with the maintenance and function of the transmission line.

As indicated in Table 6-7 and Figure 6-9, the Proposed Border Crossing-Blue/Orange Route and the Border Crossing Pine Creek and Border Crossing Hwy 310 variations would pass through more forested land, including state forest land (Map 6-3), therefore resulting in more permanent removal of forested vegetation. In addition to being much shorter in length, the Border Crossing 500 kV and Border Crossing 230 kV variations would parallel existing transmission line corridor for their entire length, which would avoid forest fragmentation impacts, while the Proposed Border Crossing-Blue/Orange Route and the Border Crossing Pine Creek and Border Crossing Hwy 310 variations would parallel existing transmission line corridor for no more than 10 percent of their length (Table 6-7), therefore more impacts from forest fragmentation are expected. The Border Crossing Hwy 310

Variation would parallel existing road corridor for much of its length (Map 6-5). The Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation would likely result in the most impact on intact forested areas, in terms of habitat fragmentation, due to the longer lengths of their transmission lines and the fact that they would not parallel existing transmission line corridor for most of their lengths. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region in which the proposed Project would be located (Map 5-5).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Figure 6-9 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Border Crossing Variation Area



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

(1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the figure represents both the proposed international border crossings and each associated transmission line route.

Source(s): USGS 2001, reference (151)

Table 6-8 Wildlife Resources within the Vicinity of the Border Crossing Variation Area

| Resource | Evaluation Parameter ⁽²⁾ | Border Crossing Variation Area ⁽¹⁾ | | | | |
|---|--|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| Associated Transmission Line | Length (mi) | 25.0 | 25.7 | 18.6 | 10.1 | 8.2 |
| Existing Transmission Line ⁽³⁾ | Percent of Total Length ⁽⁴⁾ | 7 | 7 | 10 | 100 | 100 |
| Wildlife Management Areas | Acres within ROW | 25 | 25 | 0 | 0 | 0 |
| Grassland Bird Conservation Area | Acres within ROW | 81 | 81 | 81 | 0 | 0 |
| Gray Owl Management Area | Acres within 0-1,500 ft | 0 | 0 | 123 | 0 | 0 |

Source(s): USFWS/Partner's *In Flight* 2004, reference (164); Minnesota Power 2014, reference (144); MNDOC 2014, reference (145); MnDNR 2006, reference (165); MnDNR 2014 reference (166)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-50 ft includes 500 ft on each side of the anticipated alignment.
- (3) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (4) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the border crossings and associated transmission line alternatives in the Border Crossing Variation Area are summarized in Table 6-8 and shown on Map 6-3. Table 6-8 is all inclusive in that data related to the international border crossings are combined with their associated transmission line routes or variations; refer to Map 6-3 for additional information. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

International Border Crossings

Wildlife impacts within the anticipated 200-foot ROW of the border crossings for the Proposed Border Crossing-Blue/Orange Route and all Border Crossing variations include loss and fragmentation of natural and managed wildlife habitat. As shown in Map 6-3, the border crossings for the Proposed Border Crossing-Blue/Orange Route and all Border Crossing variations do not cross any Wildlife Management Areas (WMA), Grassland Bird Conservation Area core areas, or come within 1,500 feet of the Minnesota Department of Natural Resources (MnDNR) Gray Owl Management Area. As

such, potential impacts to wildlife are expected to be minimal from any of the border crossings.

Transmission Line Routes and Variations

The primary impacts on wildlife resources that would differ across the Proposed Border Crossing-Blue/Orange Route and Border Crossing variations include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Border Crossing-Blue/Orange Route and Border Crossing variations to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing ROW or create new ROW; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.2.1.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Border Crossing-Blue/Orange Route and Border Crossing variations. A detailed description of fragmentation is found in Section 5.3.4.3, but, in general, an increase in habitat fragmentation would result in the reduction in habitat connectivity. This reduction would have a greater impact on smaller species, such as turtles, and would have less of an impact on larger animals, such as deer. While these indirect, long-term adverse impacts would be greater for the Proposed Border Crossing-Blue/Orange Route,

Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation, they are expected to be minimal because of the overall amount of available contiguous habitat in the region.

The Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation would traverse the northern boundary of the Roseau Lake WMA (Table 6-8, Map 6-3). Forested portions of the WMA in the ROW would be cleared, resulting in permanent habitat fragmentation and displacement of wildlife species associated with those forest communities.

The Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek and Border Crossing Hwy 310 variations would pass through Grassland Bird Conservation Area core areas, potentially resulting in greater impacts on grassland bird species simply because a higher concentration of these birds would be expected in the Grassland Bird Conservation Areas located in the vicinity of these ROWs (Table 6-8, Map 6-3).

The ROW for the Border Crossing Hwy 310 Variation is adjacent to the MnDNR's gray owl reserve; construction and operation of this variation could result in impacts on nearby gray owls, similar to those impacts described for other wildlife in Section 5.3.4.3 (Table 6-8; Map 6-3). Impacts are expected to be minimal due to their short-term nature.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

The Applicant's proposed measures to avoid, minimize, or mitigate impacts on wildlife resources are summarized in Section 2.13 and in the Applicant's Route Permit Application. These measures, are primarily focused on birds (Minnesota Power 2014, reference (1)). Additional measures should include development of an Avian Protection Plan (APP), which would include an avian impact risk mitigation strategy, as suggested by the MnDNR (MnDNR 2014, reference (110)). The MN PUC Route Permit could require that an APP be developed and implemented as a permit condition. The Applicant should also work with the USFWS and MnDNR to include broader measures to avoid, minimize, or mitigate potential impacts to all wildlife species and associated habitats.

6.2.1.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as Scientific and Natural Areas (SNA), Minnesota Biological Survey (MBS) Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species for the border crossings and associated transmission line alternatives in the Border Crossing Variation Area are summarized in Table 6-9; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the Natural Heritage Information System (NHIS) database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of federally listed or state endangered, threatened, or special concern species differs across the border crossings and associated transmission line alternatives in the Border Crossing Variation Area. As discussed in Section 5.3.5, potential long-term adverse impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

International Border Crossings

There are no documented rare species occurrences within the one mile of the border crossings for the Border Crossing 230 kV Variation or Border Crossing 500 kV Variation. The border crossings for the Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation are all within one mile of rare species occurrences, with the most rare species occurrences occurring within one mile of the border crossing for the Proposed Border Crossing-Blue/Orange Route (Table 6-9). Any indirect impacts to rare species at the border crossings are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed

Table 6-9 Rare Species Documented within One Mile of the Anticipated ROW in the Border Crossing Variation Area

| Scientific Name ⁽²⁾ | Common Name | Federal Status | State Status | Type | Border Crossing Variation Area ⁽¹⁾ | | | | |
|--|---------------------------|----------------|-----------------|----------------|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | | | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| <i>Anthus spragueii</i> | Sprague's Pipit | Candidate | Endangered | Bird | X | X | X | | |
| <i>Carex sterilis</i> | Sterile Sedge | None | Threatened | Vascular Plant | X ⁽³⁾ | | | | |
| <i>Cypripedium arietinum</i> | Ram's-head Lady's-slipper | None | Threatened | Vascular Plant | X ⁽³⁾ | X | X | | |
| <i>Accipiter gentilis</i> | Northern Goshawk | None | Special Concern | Bird | X | X | X | X | X |
| <i>Ammodramus nelsoni</i> | Nelson's Sparrow | None | Special Concern | Bird | X | X | | X | |
| <i>Cladium mariscoides</i> | Twig-rush | None | Special Concern | Vascular Plant | X ⁽³⁾ | X ⁽³⁾ | | | |
| <i>Coturnicops noveboracensis</i> | Yellow Rail | None | Special Concern | Bird | X | X | | X | |
| <i>Drosera anglica</i> | English Sundew | None | Special Concern | Vascular Plant | X ⁽³⁾ | | | | |
| <i>Drosera linearis</i> | Linear-leaved Sundew | None | Special Concern | Vascular Plant | X ⁽³⁾ | | | | |
| <i>Limosa fedoa</i> | Marbled Godwit | None | Special Concern | Bird | X | X | X | | |
| <i>Malaxis monophyllos var. brachypoda</i> | White Adder's-mouth | None | Special Concern | Vascular Plant | | | | X ⁽³⁾ | |
| <i>Ranunculus lapponicus</i> | Lapland Buttercup | None | Special Concern | Vascular Plant | X | X | | | |

Source(s): MnDNR 2015, reference (132)

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) Canada lynx and gray wolf records are not documented in the NHIS database.
- (3) Denotes species identified within one mile of the border crossings locations for each associated transmission line alternative.

avoidance and minimization measures, direct impacts to rare species are not expected. However, the full extent of potential impacts from the border crossings cannot be determined without pre-construction field surveys, as discussed below.

Transmission Line Routes and Variations

As indicated in Table 6-9, the Proposed Border Crossing-Blue/Orange Route and the Border Crossing Pine Creek Variation have the most documented rare species within one mile of their respective ROWs, including the federal candidate and state-endangered Sprague's pipit and the state-threatened sterile sedge and ram's head lady's slipper. Many rare species documented within one mile of the Proposed Border Crossing-Blue/Orange Route are associated with calcareous fen habitats. Due to the higher concentration of rare species documented within one mile of the Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation, more indirect impacts on rare species could potentially result from construction and operation of these routes. However, the full extent of impacts from the Proposed Border Crossing-Blue/Orange Route or Border Crossing variations cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

The Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation would require establishment of new ROW, while the Border Crossing Hwy 310 Variation would parallel an existing road corridor and the Border Crossing 500 kV and Border Crossing 230 kV variations would parallel existing transmission line corridors and only require an expansion of existing ROW. Clearing of forested areas to create new ROW could have indirect, long-term adverse impacts on rare species associated with forest or shrub communities, such as the northern goshawk and the vascular plants, ram's head lady's slipper and white adder's mouth. 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. DOE's informal consultation under Section 7 of the Endangered Species Act (ESA) with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the border crossings and associated transmission line alternatives within the Border Crossing Variation Area are summarized in Table 6-10 and shown on Map 6-4. Table 6-10 is all inclusive in that data related to the international border crossings are combined with their associated transmission line routes or variations; refer to Map 6-4 for additional information. Additional, more detailed data on rare communities and resources is provided in Appendix E and Appendix G.

The primary impact on rare communities and resources that would differ across the border crossings and associated transmission line alternatives in the Border Crossing Variation Area is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

International Border Crossings

No SNAs are located within 1,500 feet of the border crossings in the Border Crossing Variation Area.

There are no MBS Sites of Biodiversity Significance, High Conservation Value Forest, or MBS native plant communities within the ROW of the border crossing for the Border Crossing Pine Creek Variation. There are MBS Sites of Biodiversity Significance ranked as moderate within 200 feet of the border crossings for the Border Crossing 230 kV Variation and the Border Crossing 500 kV Variation; however, no MnDNR High Conservation Value Forest or MBS native plant communities are present within 200 feet of these border crossings. MBS Sites of Biodiversity Significance ranked outstanding, MBS native plant communities, and MnDNR High Conservation Value Forest are present within 200 feet of the border crossings for the Proposed Border Crossing-Blue/Orange Route and Border Crossing Hwy 310 Variation. MBS native plant communities within 200 feet of the border crossing for the Proposed Border

6.0 Comparative Environmental Consequences

Table 6-10 Rare Communities and Resources within the Vicinity of the Border Crossing Variation Area

| Resource | Type | Evaluation Parameter ⁽²⁾ | Border Crossing Variation Area ⁽¹⁾ | | | | |
|---|-------------------------------|--|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| Associated Transmission Line | -- | Length (mi) | 25.0 | 25.7 | 18.6 | 10.1 | 8.2 |
| Existing Transmission Line ⁽³⁾ | -- | Percent of Total Length ⁽⁵⁾ | 7 | 7 | 10 | 100 | 100 |
| Scientific and Natural Areas | -- | Acres within 0–1,500 ft | 17 | 0 | 0 | 0 | 0 |
| MBS Sites of Biodiversity Significance ⁽⁴⁾ | Outstanding and High Rank | Acres within ROW | 124 | 69 | 73 | 62 | 42 |
| | Total | Acres within ROW | 381 | 326 | 265 | 162 | 91 |
| High Conservation Value Forest | -- | Acres within ROW | 82 | 27 | 29 | 0 | 0 |
| MBS Native Plant Communities | Conservation Status S2 and S3 | Acres within ROW | 22 | 16 | 20 | 29 | 0 |
| | Total | Acres within ROW | 124 | 68 | 69 | 60 | 34 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003 Reference 58, MBS 2015, reference (167), MnDNR 2014, reference (168), MBS 2014, reference (169)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (3) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (4) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

Crossing-Blue/Orange Route include Rich Tamarack (Sundew – Pitcher Plant) Swamp (S4 conservation status, defined below), and Rich Black Spruce Swamp (Water Track) (S3 conservation status, defined below). MBS native plant communities within 200 feet of the border crossing for the Border Crossing Hwy 310 Variation include Lowland White Cedar Forest (Northern) (S3 conservation status, defined below), and Alder – (Red Currant – Meadow-Rue) Swamp (S3 conservation status, defined below).

The rare communities and resources listed in Table 6-10 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance

and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities, particularly in the border crossings for Proposed Border Crossing-Blue/Orange Route and Border Crossing Hwy 310 Variation.

Transmission Line Routes and Variations

As indicated on Map 6-4 and in Table 6-10, the Proposed Border Crossing-Blue/Orange Route, which is located adjacent to the Pine Creek SNA, would pass through more rare communities and resources than any of the Border Crossing variations.

The Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation would impact the most MBS Sites of Biodiversity Significance, with the Proposed Border Crossing-Blue/Orange Route also impacting the most Sites of Biodiversity Significance ranked outstanding and/or high (Table 6-10). The Proposed Border Crossing-Blue/Orange Route would also impact the most areas designated as High Conservation Value Forest; these areas are generally associated with MBS Sites of Biodiversity Significance ranked outstanding and high.

The Proposed Border Crossing-Blue/Orange Route would impact the most acres of MBS native plant communities, with the Border Crossing 500 kV Variation impacting more acres of native plant communities with a conservation status of S2 (imperiled) and S3 (vulnerable to extirpation). However, the Border Crossing 500 kV Variation would require expanding existing corridor and not creating new ROW, which would result in less fragmentation of intact native plant communities. As indicated on Map 6-4, the Proposed Border Crossing-Blue/Orange Route and all Border Crossing variations would require crossing large areas (greater than the average span length of 1,250 feet) of clustered native plant communities, which would likely require placement of transmission line structures within them. The Proposed Border Crossing-Blue/Orange Route would require crossing three large areas of clustered native plant communities; two of these areas would also be crossed by the Border Crossing Pine Creek and Border Crossing Hwy 310 variations (Map 6-4). The Border Crossing 500 kV and Border Crossing 230 kV variations would require crossing one area of clustered native plant communities; however, because these two variations parallel existing transmission line corridor, they would cross native plant communities in areas previously disturbed. Native plant community types mapped by MBS in the Border Crossing Variation Area are summarized in Appendix G and include various types of rich fens and swamps.

The calcareous fens documented in the Border Creek Variation Area are located within the Pine Creek Peatland SNA and Sprague Creek Peatland SNA (Map 6-4). According to the MBS native plant community data, the calcareous fens appear to be more than 1,500 feet from the Proposed Border Crossing-Blue/Orange Route or the Border Crossing Hwy 310 Variation. However, both the Proposed Border Crossing-Blue/Orange Route and the Border Crossing Hwy 310 Variation would cross SNA Watershed Protection Areas (WPA), which were established by the MnDNR to minimize impacts that could affect groundwater sources for calcareous fens and peatland areas. Section 6.2.1 (Water Resources)

discusses potential impacts to SNA WPAs and associated impacts on calcareous fen hydrology.

The rare communities and resources listed in Table 6-10 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities, particularly for the Proposed Border Crossing-Blue/Orange Route. 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.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.1.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the border crossings and associated transmission line alternatives in the Border Crossing Variation Area, as described in Section 5.3.6. Map 6-5 shows areas where the border crossings and associated transmission line alternatives would parallel corridors with existing transportation, transmission lines, or other linear features in the Border Crossing Variation Area.

Table 6-11 identifies the percentage of total transmission line length that the Proposed Border Crossing-Blue/Orange Route or Border Crossing variations parallel with an existing corridor or linear feature in the Border Crossing Variation Area.

International Border Crossings

The Proposed Border Crossing 230 kV Variation and Proposed Border Crossing 500 kV Variation both parallel existing transmission lines at the international border crossings associated with them. The Proposed Border Crossing Hwy 310 Variation parallels a section line at the international border crossing. Neither the Proposed Border Crossing-Blue/Orange Route nor the Border Crossing Pine

Table 6-11 Corridor Sharing in the Border Crossing Variation Area

| Feature Sharing Corridor ⁽²⁾ | Evaluation Parameter | Border Crossing Variation Area ⁽¹⁾ | | | | |
|--|--|---|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| | | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS) | Percent of Total Length ⁽³⁾ | 7 | 7 | 10 | 100 | 100 |
| Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line) | Percent of Total Length ⁽³⁾ | 23 | 25 | 24 | 0 | 0 |
| Field Line (other linear features, but not transmission lines or road/trails, may be present within the field line corridor; i.e., PLSS) | Percent of Total Length ⁽³⁾ | 0 | 2 | 0 | 0 | 0 |
| PLSS Only | Percent of Total Length ⁽³⁾ | 11 | 11 | 2 | 0 | 0 |
| None | Percent of Total Length ⁽³⁾ | 59 | 55 | 64 | 0 | 0 |

Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009, reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the table represents both the proposed international border crossings and each associated transmission line route.
- (2) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Creek Variation parallel an existing corridor at their associated border crossings.

Transmission Line Routes and Alternatives

The Border Crossing 500 kV Variation and Border Crossing 230 kV Variation would parallel existing transmission line corridors for their entire length (Figure 6-10). The Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation would parallel roadways for 25 percent or less of their length and parallel existing transmission line corridors for 10 percent or less of their length.

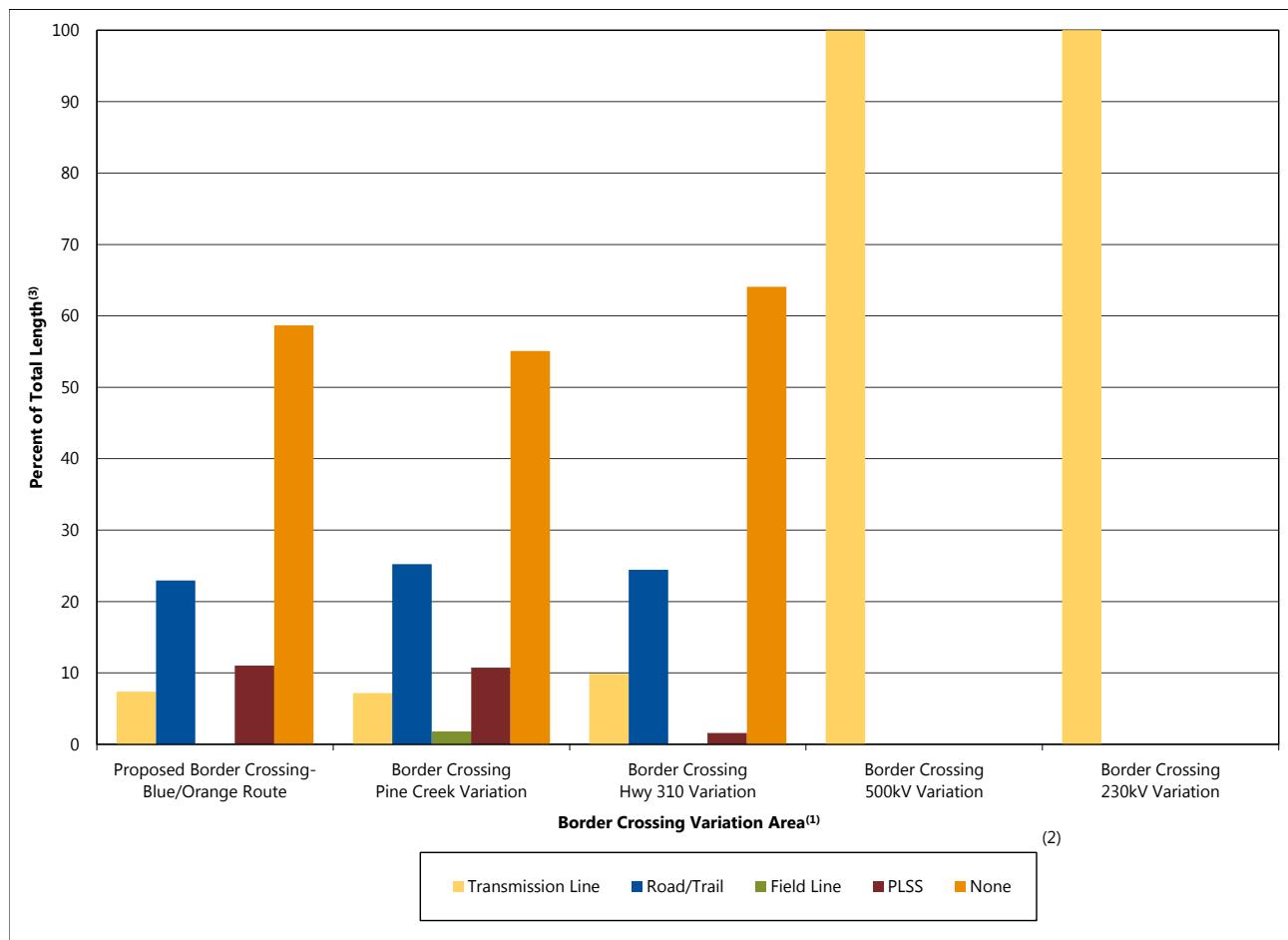
Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.2.1.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-12 summarizes the costs associated with constructing the Proposed Border Crossing-Blue/Orange Route and variations in the Border Crossing Variation Area. As indicated in Table 6-12, the Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation would be the most expensive to construct, while the Border Crossing 230 kV Variation would cost the least.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013, reference (135)). Using the \$1,600 per mile for operation and

Figure 6-10 Corridor Sharing in the Border Crossing Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009, reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) There are five proposed international border crossings associated with the alternatives in the Border Crossing Variation Area. Data in the figure represents both the proposed international border crossings and each associated transmission line route.
- (2) Transmission Line (other linear features may be present within the transmission line corridor—i.e., road, trail, field line, PLSS); Road Trail (other linear features, not transmission lines, may be present within the road/trail corridor—i.e., PLSS, field line); Field Line (other linear features, but not transmission lines or road/trails, may be present within the field line corridor—i.e., PLSS).
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-12 Construction Costs in the Border Crossing Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|-----------------|--|--------------|-------------------------|-------------|
| Border Crossing | Proposed Border Crossing-Blue/Orange Route | \$29,012,219 | \$1,160,489 | 25 |
| | Border Crossing Pine Creek Variation | \$29,292,118 | \$1,139,771 | 25.7 |
| | Border Crossing Hwy 310 Variation | \$21,144,610 | \$1,136,807 | 18.6 |
| | Border Crossing 500 kV Variation | \$11,512,144 | \$1,151,214 | 10.1 |
| | Border Crossing 230 kV Variation | \$9,862,110 | \$1,202,696 | 8.2 |

Source(s): Minnesota Power 2015, reference (9)

maintenance, the estimated cost would range from \$14,000 to \$40,000 annually for these alternatives in the Border Crossing Variation Area.

6.2.2 Roseau Lake WMA Variation Area

The Roseau Lake WMA Variation Area encompasses three route alternatives: the Proposed Blue/Orange Route, Roseau Lake WMA Variation 1, and Roseau Lake WMA Variation 2. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Roseau Lake WMA Variation Area, depending on the route or variation considered.

6.2.2.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Roseau Lake WMA Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Border Crossing Variation (Section 6.2.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources

within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Roseau Lake WMA Variation Area are summarized in Table 6-13 and shown on Maps 6-6, 6-7, 6-8, and 6-10.

As indicated in Table 6-13 for the Roseau Lake WMA Variation Area, the Proposed Blue/Orange Route and variations would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including one state forest, one state scenic byway, historic architectural sites, and one snowmobile trail (Maps 6-7, 6-8, and 6-10). In addition, each of these alternatives would be located within 1,500 feet of a number of residences, which also have high visual sensitivity (Figure 6-11).

Of the three alternatives in the Roseau Lake WMA Variation Area, Roseau Lake WMA Variation 1 would affect the most residences within 1,500 feet of the anticipated alignment (50), including 19 of those that are within 1,000 feet of the anticipated alignment and three that are within 500 feet of the alignment. The Proposed Blue/Orange Route would affect the fewest residences (13), with five residences within 1,000 feet of the anticipated alignment and two within 500 feet of the anticipated alignment. The Roseau Lake WMA Variation 2 would affect 23

Table 6-13 Aesthetic Resources within the ROI in the Roseau Lake WMA Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Roseau Lake WMA Variation Area | | |
|---|--|--------------------------------|-----------------------------|-----------------------------|
| | | Proposed Blue/Orange Route | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 |
| Transmission Line | Length (mi) | 30.7 | 44.1 | 37.5 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 33 | 7 | 27 |
| Residences | Count within 0–500 ft | 2 | 3 | 0 |
| | Count within 0–1,000 ft | 5 | 19 | 8 |
| | Count within 0–1,500 ft | 13 | 50 | 23 |
| Historic Architectural Sites | Count within 0–1,500 ft | 0 | 1 | 1 |
| | Count within 0–5,280 ft | 0 | 1 | 2 |
| State Forests | Acres within ROW | 334 | 6 | 52 |
| | Count within 0–1,500 ft | 1 | 1 | 1 |
| State Scenic Byways | Count within 0–1,500 ft | 1 | 1 | 1 |
| Snowmobile Trails | Count within 0–1,500 ft | 1 | 1 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2003, reference (148); MnDOT 2013, reference (149); MnDNR 2010, reference (150)

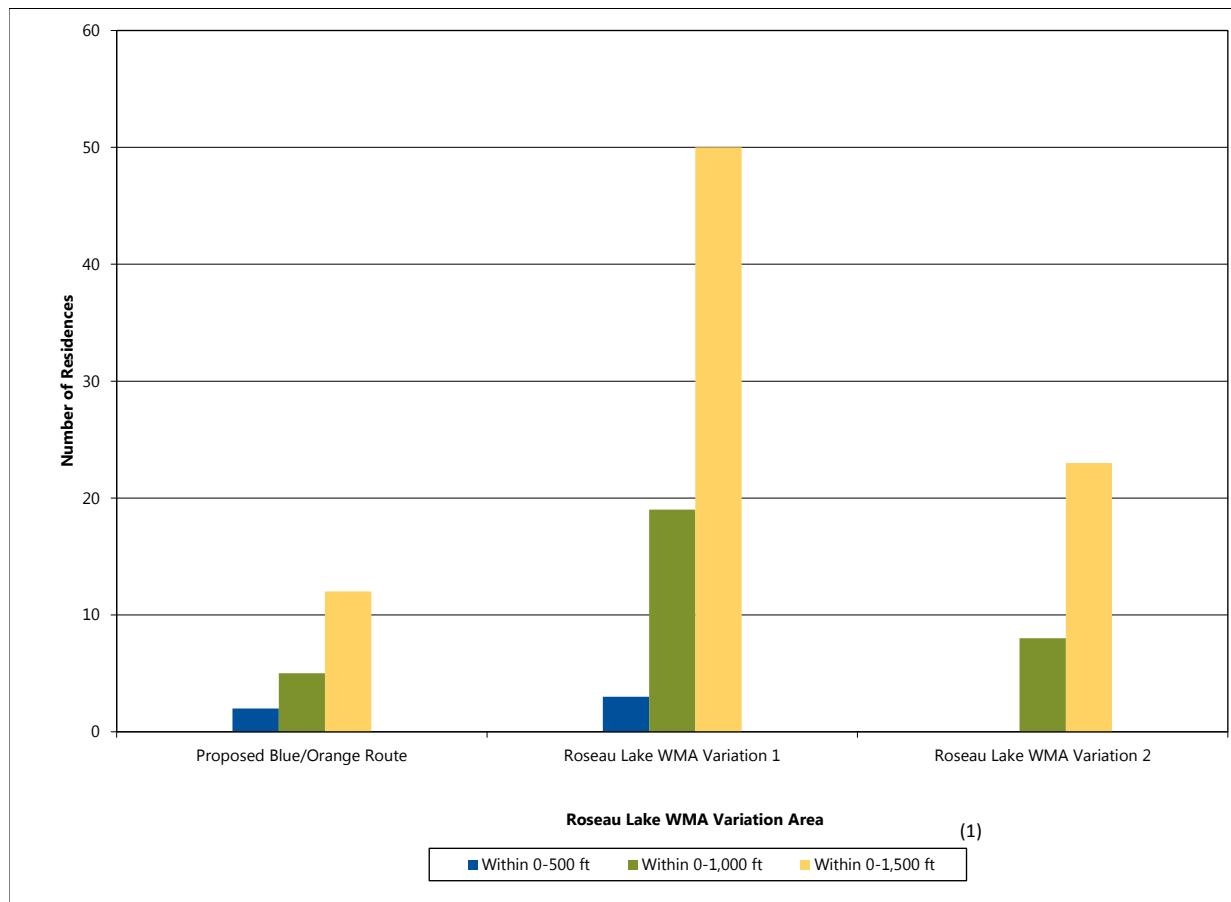
Note(s): Totals may not sum due to rounding

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

(2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-11 Residences within the ROI in the Roseau Lake WMA Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

residences, eight of which are within 1,000 feet of the anticipated alignment and none within 500 feet.

In addition, the Proposed Blue/Orange Route is the shortest of the three alternatives (30.7 miles) and parallels existing large transmission lines (i.e., 230 kV and 500 kV lines) for a greater percentage of its length (33 percent; Table 6-13). Therefore, the Proposed Blue/Orange Route is likely to produce less contrast than the variations.

The Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would cross the Waters of the Dancing Sky Scenic Byway (State Route 11) just north of a large substation (Map 6-10). Viewpoint 04a in Appendix N shows the existing view looking southeast in the direction of the substation and along the anticipated alignment of the Proposed Blue/Orange Route and Roseau Lake WMA Variation 2. Viewpoint 04a in Appendix N shows a photosimulation of the same view with the transmission line for the proposed Project. In this view, the transmission line would be almost directly overhead. Viewpoint 04b in Appendix N

shows the existing view looking west-southwest along the scenic byway toward the location where the Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would cross the scenic byway. The existing substation is south of the scenic highway and to the left in the photograph. Viewpoint 04b shows a photosimulation of the same view with the proposed transmission line. In this view the transmission line would cross the scenic byway approximately 0.25 mile to the west. As indicated in the photographs showing the existing views and the photosimulations for Viewpoint 04a and Viewpoint 04b, the existing transmission structures and structures in and near the substation produce strong contrast. The addition of the proposed transmission line would increase the contrast somewhat by adding to the number of structures in the views. However, because the new structures would be similar in scale, form, line, color, and texture to the existing adjacent structures, the increase in contrast would not be substantial in either view. From these viewpoints, the Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would not

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substantially diminish the visual character or quality of views in this area of the scenic byway.

Because the Proposed Blue/Orange Route is shorter in length (30.7 miles), parallels existing large transmission lines for a greater percentage of its length, and affects fewer residences (13) than either Roseau Lake WMA Variation 1 (50) or Roseau Lake WMA Variation 2 (23), the Proposed Blue/Orange Route in the Roseau Lake WMA Variation Area would result in less aesthetic impact than the Roseau Lake WMA Variation 1 or Roseau Lake WMA Variation 2.

Aesthetic impacts of the Proposed Blue/Orange Route are expected to be limited because it is shorter in length, parallels an existing transmission line of similar size and design for 33 percent of its length, and affects relatively few residences (13) and other sensitive visual resources (one state forest, one state scenic byway, and one snowmobile trail).

The Roseau Lake WMA Variation 2 is longer in length than the Proposed Blue/Orange Route (37.5 miles), it affects a moderate number of residences (23) and other sensitive visual resources (two historic architectural sites, one state forest, one state scenic byway, and one snowmobile trail), and parallels an existing large transmission line of similar size and design for a 27 percent of its length.

The Roseau Lake WMA Variation 1 is longer in length than the Proposed Blue/Orange Route (44.1 miles), affects a relatively large number of residences (50), including three within 500 feet of the anticipated alignment, and parallels an existing large transmission line for only 7 percent of its length. For

these reasons, aesthetic impacts of the Roseau Lake WMA Variation 1 are potentially significant.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.2, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

Land Uses

Table 6-14 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue/Orange Route, Roseau Lake WMA Variation 1, and Roseau Lake WMA Variation 2 in the Roseau Lake WMA Variation Area and Figure 6-12 shows the percentage of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue/Orange Route, Roseau Lake WMA Variation 1, and Roseau Lake WMA Variation 2 in the Roseau Lake WMA Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in this variation area are shown in Map 5-5 and residences, churches, cemeteries, and airports near the Proposed Blue/Orange Route and variations are shown on Map 6-6.

The Proposed Blue/Orange Route and both variations would have some long-term direct impacts from

Table 6-14 Land Uses within the ROI in the Roseau Lake WMA Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Roseau Lake WMA Variation Area | | |
|--|------------------------|-------------------------------------|--------------------------------|-----------------------------|-----------------------------|
| | | | Proposed Blue/Orange Route | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 11,333 | 16,123 | 13,768 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 330 | 838 | 651 |
| | Agricultural | Acres within 0–1,500 ft | 3,364 | 12,616 | 8,783 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 7,350 | 2,615 | 4,269 |
| | Other | Acres within 0–1,500 ft | 289 | 54 | 65 |

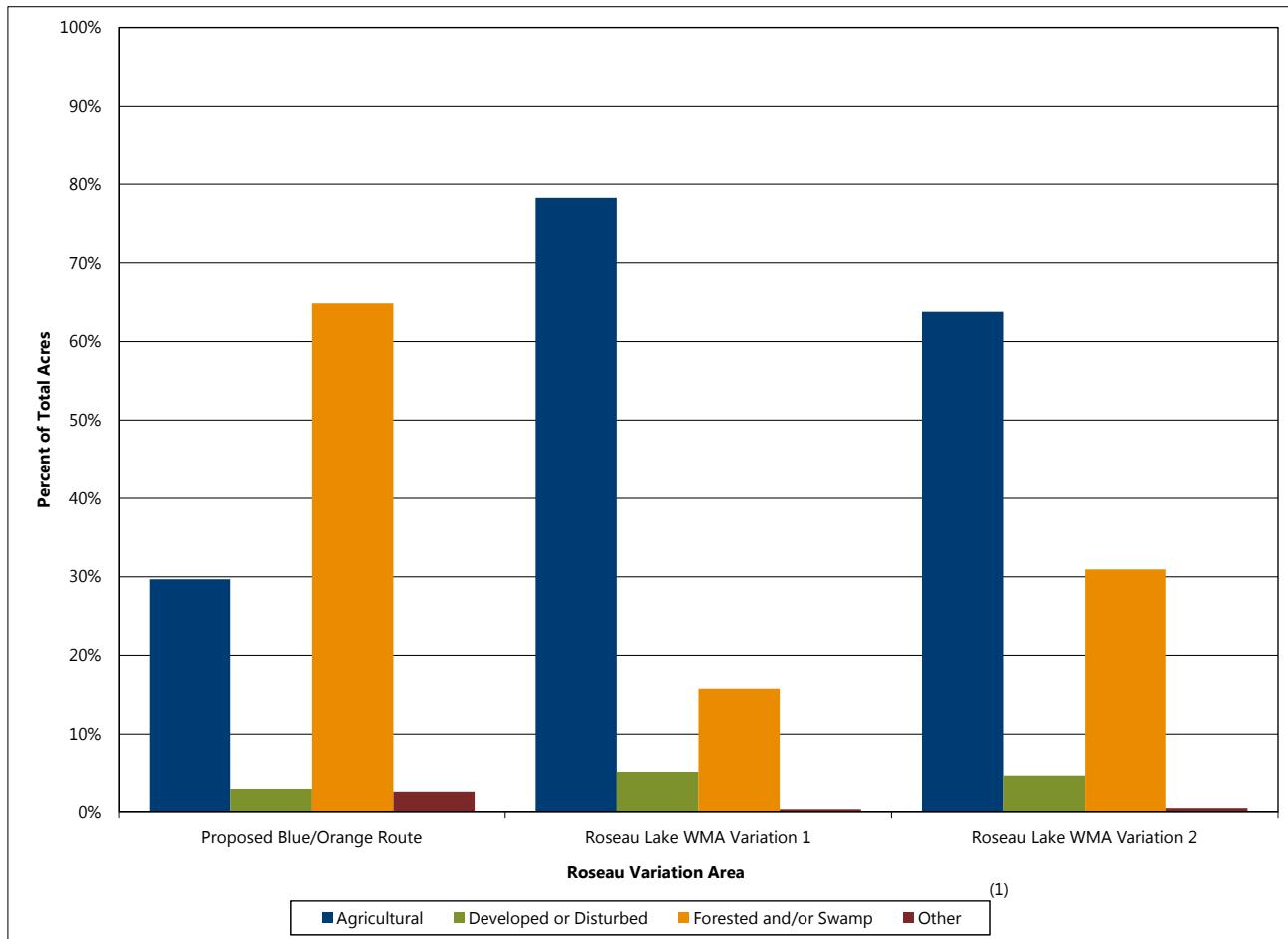
Source: USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.

(2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Figure 6-12 Land Uses within the ROI in the Roseau Lake WMA Variation Area



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

(1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.

Source(s): USGS 2001, reference (151)

long-term removal of forested and/or swamp land. Forested and/or swamp land is the predominant land cover type within the ROI of the Proposed Blue/Orange Route, while agricultural is the most common land cover type within the ROI of Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 (Figure 6-12). The Proposed Blue/Orange Route would impact a greater amount of forested and/or swamp land compared to the variations. Roseau Lake WMA Variation 1 would impact the least amount of forested and/or swamp land.

Interest Lands would occur for the Proposed Blue/Orange Route or either variation.

Approximately one-third of the Proposed Blue/Orange Route would parallel an existing corridor. A slightly lower percentage of Roseau Lake WMA Variation 2 would parallel an existing corridor compared to the Proposed Blue/Orange Route, while a small percent of Roseau Lake WMA Variation 1 would parallel an existing corridor (see Section 6.2.2.6).

Impacts to land use from the proposed Project in the Roseau Lake WMA Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue/Orange Route and variations would all 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. The length

Land Ownership and Management

Table 6-15 and Figure 6-13 identify the amount of land by ownership or management category. The Proposed Blue/Orange Route would also impact a greater amount of state forest and state fee lands compared to the variations, and Roseau Lake WMA Variation 2 would impact a greater amount than Roseau Lake WMA Variation 1. No impacts to county lands, state conservation easements or USFWS

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

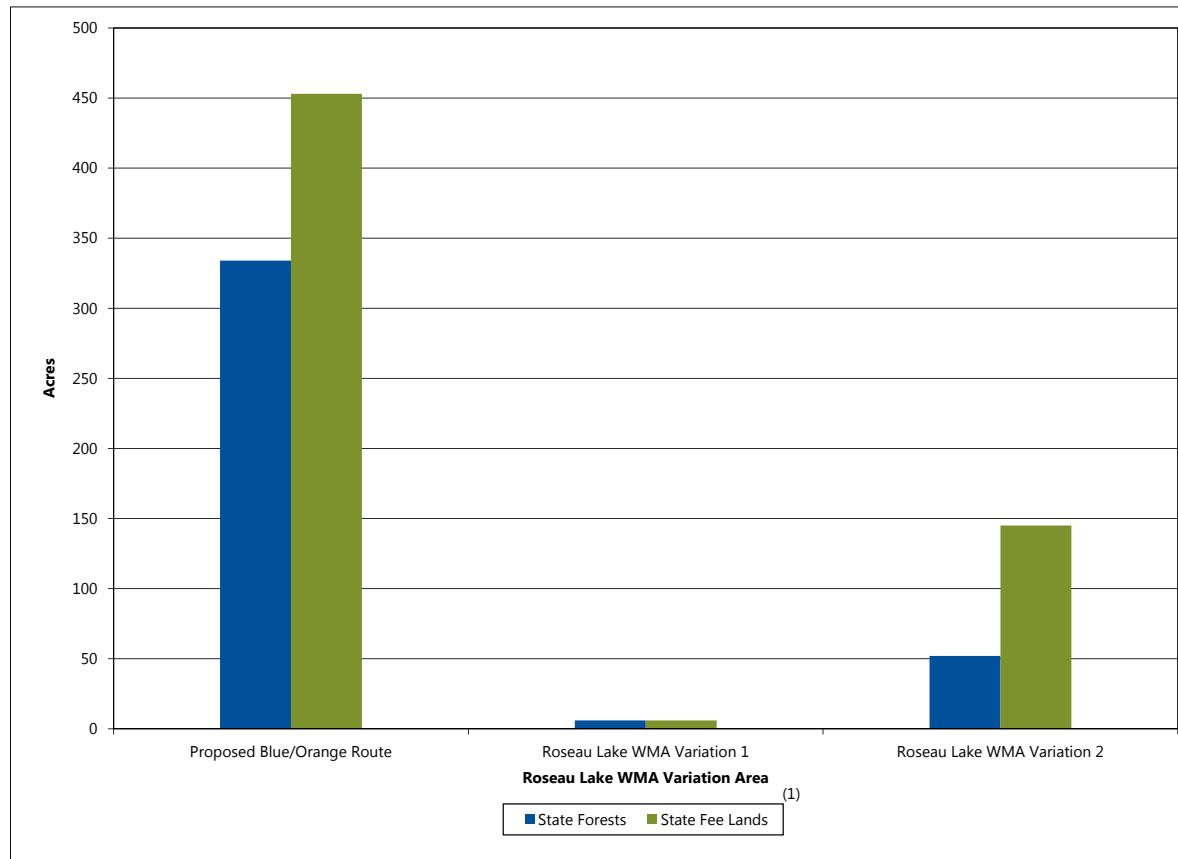
| Resource | Type | Evaluation Parameter | Roseau Lake WMA Variation Area | | |
|--|---------------------------------------|----------------------|--------------------------------|-----------------------------|-----------------------------|
| | | | Proposed Blue/Orange Route | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 |
| Total Lands | | Acres within ROW | 746 | 1,070 | 910 |
| State Forests | -- | Acres within ROW | 334 | 6 | 52 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 453 | 6 | 145 |
| State Fee Lands ⁽¹⁾ 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 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 293 | 1,064 | 765 |

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.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-13 Public Land Ownership/Management within the ROI in the Roseau Lake WMA Variation Area⁽¹⁾



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.

of the proposed route or variation that would parallel an existing corridor is also important, and in this case the Proposed Blue/Orange Route would parallel an existing corridor for more of its length than Roseau Lake WMA Variation 1 or Roseau Lake WMA Variation 2. Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 would avoid a greater amount of state forest and state fee lands than the Proposed Blue/Orange Route thereby avoiding long-term changes to land use.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.2.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Roseau Lake WMA Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Roseau Lake WMA Variation Area are summarized in Table 6-16.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-16 and Figure 6-14

show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the proposed route and variations in the ROI.

The Roseau Lake WMA Variation 1 has the longest length and would pass through the most acres of farmland, including the most acres of prime farmland if drained (Table 6-16, Figure 6-14). The proposed route and variations would each impact less than 25 acres of farmland of statewide importance. The Proposed Blue/Orange Route, which parallels existing corridors for 33 percent of its length and has the shortest transmission line route, would likely result in the least amount of impact to farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term

Table 6-16 Land-Based Economy Resources 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 |
| Transmission Line | -- | Length (mi) | 30.7 | 44.1 | 37.5 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 33 | 7 | 27 |
| Farmland | Not Farmland | Acres within ROW | 561 | 578 | 498 |
| | Prime Farmland If Drained | Acres within ROW | 143 | 388 | 356 |
| | Farmland Of Statewide Importance | Acres within ROW | 23 | 21 | 23 |
| | All Areas Are Prime Farmland | Acres within ROW | 18 | 84 | 33 |
| State Forest | -- | Acres within ROW | 334 | 6 | 52 |

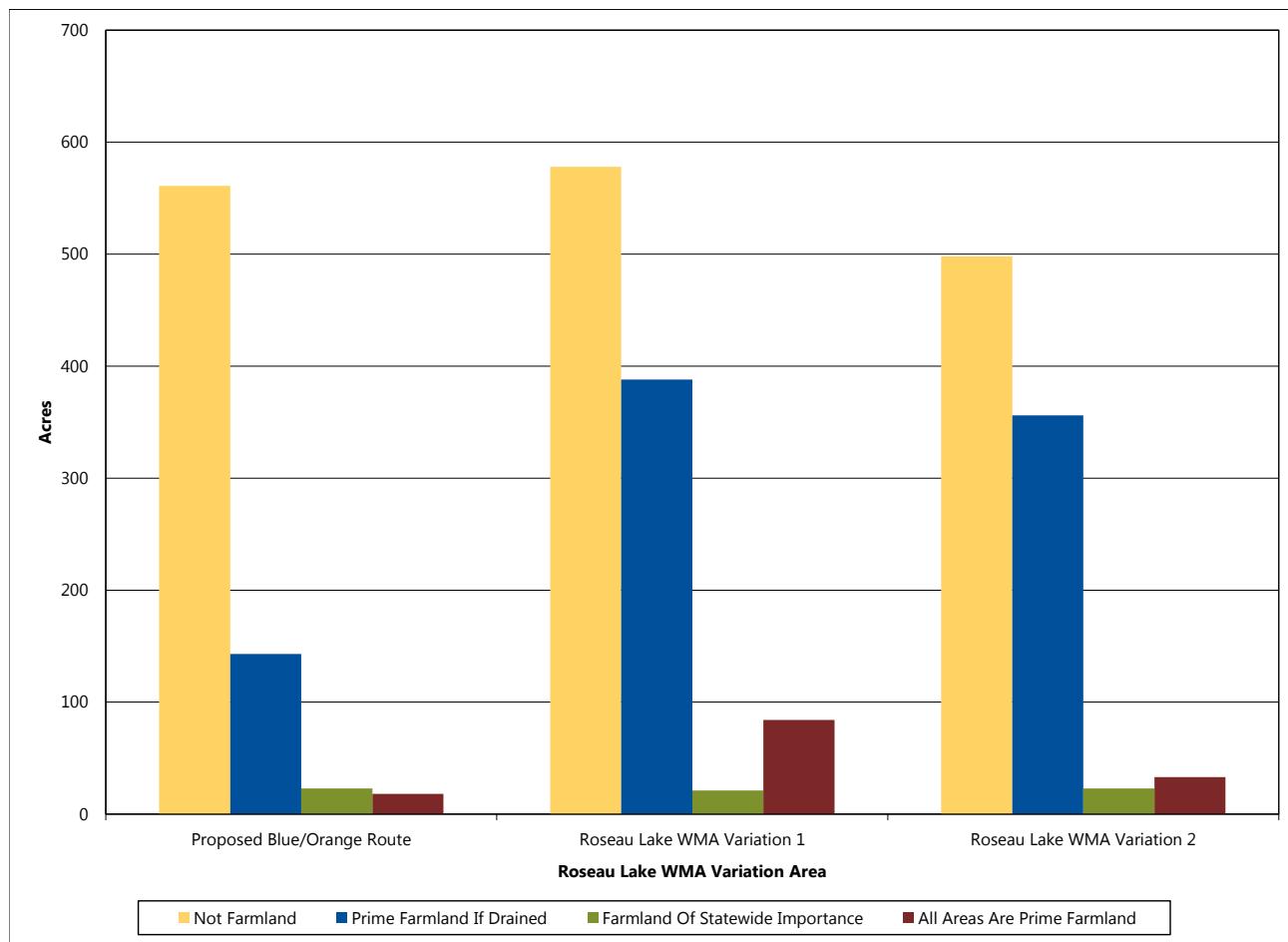
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-14 Acres of Farmland by Type within the Anticipated ROW in the Roseau Lake WMA Variation Area



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

Source(s): USDA NRCS 2014, reference (154)

impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-16 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Orange/Blue Route and variations. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue/Orange Route or the variations within the Roseau Lake WMA Variation Area.

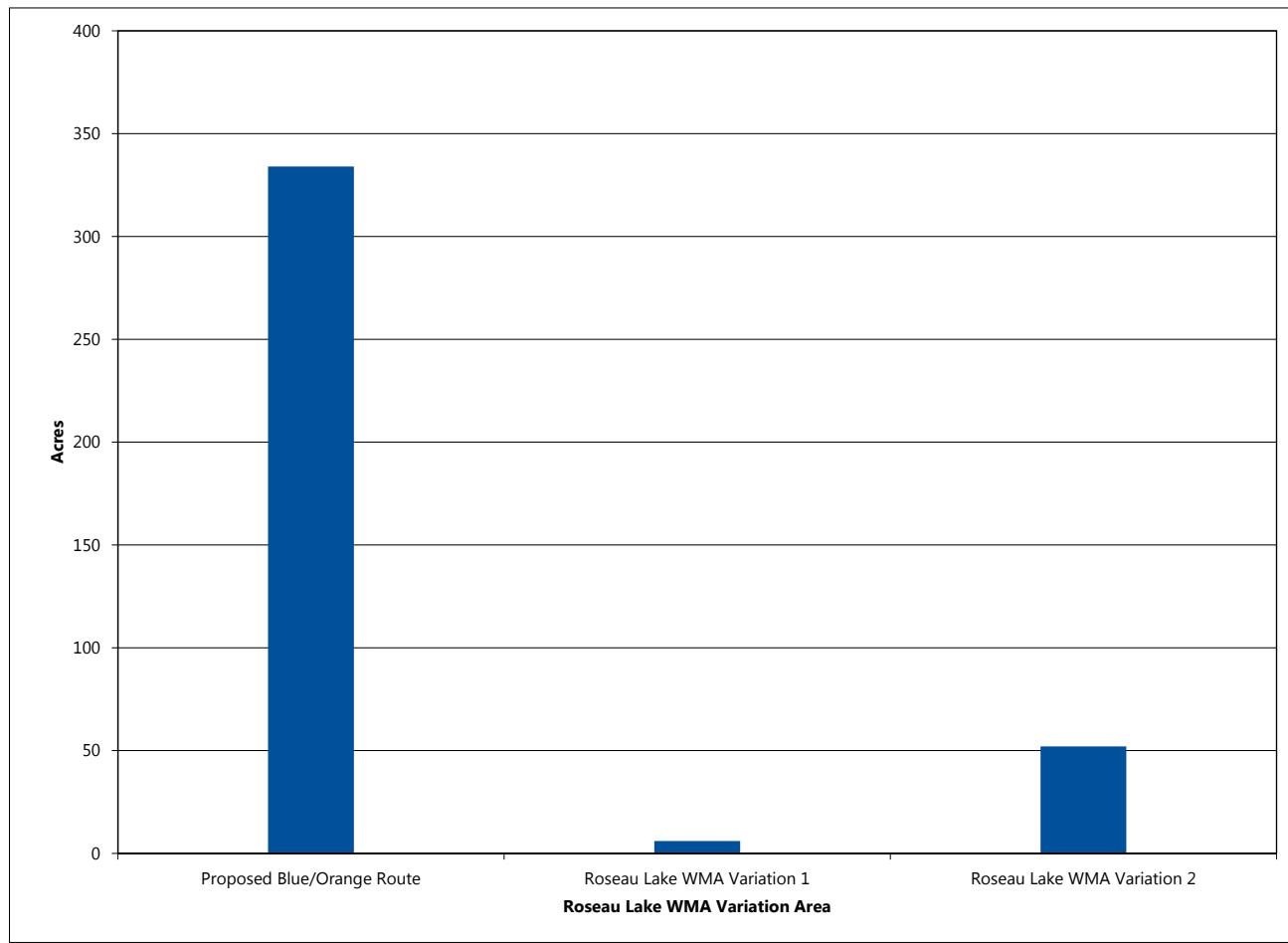
The Proposed Blue/Orange Route, which has the shortest length and parallels existing corridors for 60 percent of its length, would cross the most acres of state forest lands - the Lost River State Forest (Figure 6-15, Map 6-6). The Roseau Lake WMA Variation 1, which would parallel existing corridors for over one-half of its length, would be expected to

have the fewest impacts on timber activities in the Lost River State Forest.

As discussed in Section 5.3.2.2 construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct impacts on forest lands from the removal of vegetation, localized physical disturbance, and soil compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Figure 6-15 Acres of State Forest Land within the Anticipated ROW in the Roseau Lake WMA Variation Area



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

Source(s): MnDNR 2003, reference (148)

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. There are no active or expired/terminated state mineral leases, records of current mineral mining, or known aggregate resources that would be impacted by the proposed route and variations in within the Roseau Lake WMA Variation Area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. However, such impacts are not expected from the proposed Project because such activities do not exist nor are planned in this area.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid,

minimize, or mitigate impacts on these resources from the proposed Project.

6.2.2.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the **direct APE** for potential direct impacts to archaeological and historic resources includes the 200-foot ROW of the proposed transmission line. In addition, potential indirect impacts to historic resources and **Native American resources** are evaluated within one mile from the anticipated alignment, which is considered the **indirect APE**, since visual intrusions can change the context and setting of historic architectural properties.

Table 6-17 provides a summary of the previously recorded archaeological **sites** and historic **architectural** resources within the ROW (direct APE), within 1,500 feet of the anticipated alignment, and within one mile of the anticipated alignment (indirect APE) for the proposed route and its variations in the Roseau Lake WMA Variation Area. A more detailed description of these resources can

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Table 6-17 Archaeological and Historic Resources within the Roseau Lake WMA Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Roseau Lake WMA Variation Area | | |
|------------------------------|-------------------------------------|--------------------------------|-----------------------------|-----------------------------|
| | | Proposed Blue/Orange Route | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 |
| Historic Architectural Sites | Count within ROW | 0 | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 1 | 1 |
| | Count within 0–5,280 ft | 0 | 1 | 2 |
| Archaeological Sites | Count within ROW | 0 | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 3 | 3 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the proposed route and variations in the Roseau Lake WMA Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Roseau Lake WMA Variation Area, the Proposed Blue/Orange Route does not cross any previously recorded archaeological sites or historic architectural resources, while the Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 cross substantially more archaeological sites and historic architectural resources. None of the archaeological sites or historic architectural resources are located within the ROW for the proposed route or variations and therefore none of the proposed routes or variations are expected to result in direct adverse impacts as a result of the construction or operation of the proposed Project. The two historic architectural resources, RO-JAD-002 (Bridge No. L9057) and RO-DET-002 (Town Hall) located within the Roseau Lake WMA Variation 2 indirect APE, have not been evaluated for NRHP-eligibility status. Site RO-DET-002 is also located within the indirect APE of the Roseau Lake WMA Variation 1.

There is currently no identified potential for direct, long-term, adverse impacts on archaeological and historic architectural resources, as no sites were identified within the Roseau Lake WMA Variation Area direct APE, although cultural resource investigations have not yet occurred for the Proposed Route or variations. Indirect, long-term, adverse visual impacts on historic architectural

resources for Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 within the indirect APE, have the potential to occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. For example, people driving down Township Road 142 and crossing the bridge identified as historic architectural site RO-JAD-002 could potentially see the transmission line which would appear inconsistent with the existing setting of the resources. Because the NRHP eligibility status for the historic architectural sites has not been evaluated, the significance of these impacts or their effects under Section 106 of the NHPA are currently unknown. Since the Roseau Lake WMA Variation 1 and 2 contain historic architectural sites that have not been evaluated for NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse effect under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

The proposed route and variations have not, yet, been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for cultural resources. These cultural resources investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential

adverse effects on historic properties as a result of construction and operation of the proposed Project.

Potential short- and long-term adverse effects from construction, operation, maintenance, and emergency repair-related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.2.2.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Roseau Lake WMA Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Roseau Lake WMA Variation Area are summarized in Table 6-18 and shown on Map 6-8. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmission structures in floodplains and wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ across the Proposed Blue/Orange Route and Roseau Lake WMA variations.

The Proposed Blue/Orange Route and both Roseau Lake WMA variations would cross PWI watercourses,

though Variation 1 would cross the most (Table 6-18). The Proposed Blue/Orange Route would cross Sprague Creek and a tributary to the Roseau River, while Roseau Lake WMA Variation 2 would cross the Roseau River twice and Pine Creek once. Roseau Lake WMA Variation 1 would require ten PWI stream crossings, including Pine Creek, the South Fork of the Roseau River, Hay Creek, two Bear Creek tributaries, the Roseau River twice, and Sucker Creek three times. Neither the Proposed Blue/Orange Route, nor the variations would cross PWI waterbodies.

The Proposed Blue/Orange Route and both Roseau Lake WMA variations would also require crossing non-PWI waters. Ditches are the primary resource that would be crossed, but several smaller watercourses and waterbodies would be crossed as well (Figure 6-16). These include the Lost River, and several smaller, unnamed streams.

The Proposed Blue/Orange Route and both Roseau Lake WMA variations would require crossings of MPCA-listed impaired waters as shown in Table 5-24. The Proposed Blue/Orange Route would cross Sprague Creek, and Roseau Lake WMA Variation 1 and Variation 2 would each cross the Roseau River twice.

It is anticipated that PWI crossings, non-PWI water crossings, and impaired waters are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

The Proposed Blue/Orange Route and both Roseau Lake WMA variations would require construction and placement of transmission structures within the Zone A floodplain of the Roseau River. Roseau Lake WMA Variations 1 and 2 would also each cross small

Table 6-18 Water Resources within the Anticipated ROW in the Roseau Lake Variation Area

| Resource | Evaluation Parameter | Roseau Lake WMA Variation Area | | |
|-------------------------------|----------------------|--------------------------------|-----------------------------|-----------------------------|
| | | Proposed Blue/Orange Route | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 |
| Transmission Line | Length (mi) | 30.7 | 44.1 | 37.5 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 2 | 10 | 3 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 23 | 38 | 33 |
| Impaired Waters | Number of Crossings | 1 | 2 | 2 |
| Floodplains ⁽³⁾ | Acres within ROW | 321 | 202 | 307 |
| NWI Wetlands | Acres within ROW | 547 | 102 | 272 |

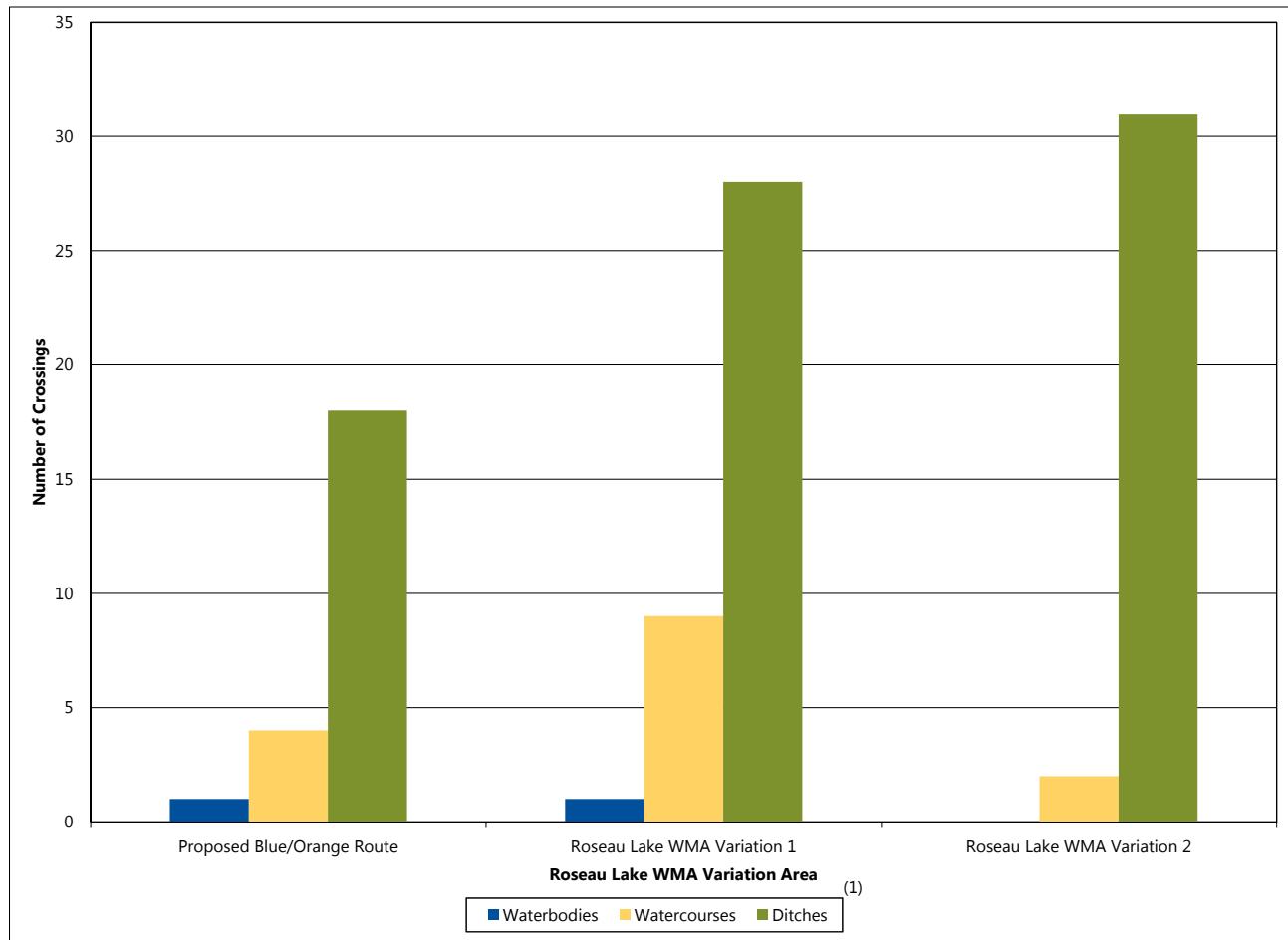
Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); MPCA 2014, reference (119); MPCA 2014, reference (118); Minnesota Power 2014, reference (163)

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

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.
- (3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

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Figure 6-16 Non-PWI Water Crossings by Type in the Roseau Lake WMA Variation Area



Source(s) : USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

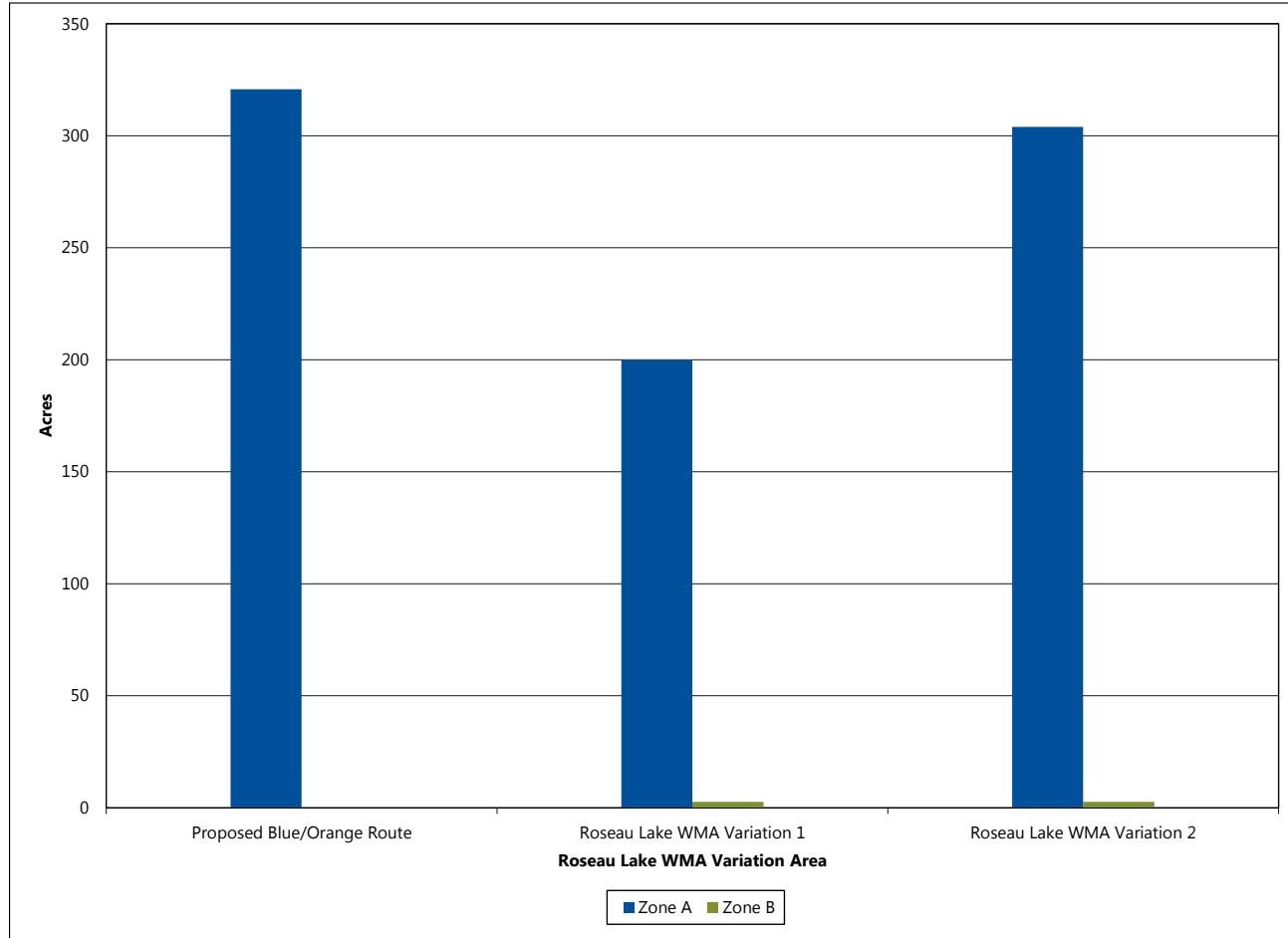
areas of the Roseau River's Zone B floodplain, as shown on Figure 6-17. Placement of transmission structures in the floodplain could not be avoided by spanning as floodplain crossing distances exceed average spanning length of 1,250 feet. Impacts to floodplains are expected to be minimal and are summarized in Section 5.3.4.1.

Based on the NWI, the Proposed Blue/Orange Route and both Roseau Lake WMA variations would require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-18, the Proposed Blue/Orange Route contains nearly double the forested and shrub wetlands compared to Roseau Lake WMA Variation 1 or Variation 2 and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in

wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. The Proposed Blue/Orange Route and both of the Roseau Lake WMA variations would require placement of permanent fill in wetlands for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the West Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill would be expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to the large wetland complexes in the area, it would be expected that the Proposed Blue/Orange Route and both Roseau Lake WMA variations would require temporary construction access through wetlands, which is also not likely to be significant due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and

Figure 6-17 Acres of Floodplain by Type within the Anticipated ROW in the Roseau Lake WMA Variation Area



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

Source(s): Minnesota Power 2014, reference (163)

long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Roseau Lake WMA Variation Area are summarized in Table 6-19 and shown on Maps 5-5 and 6-8. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

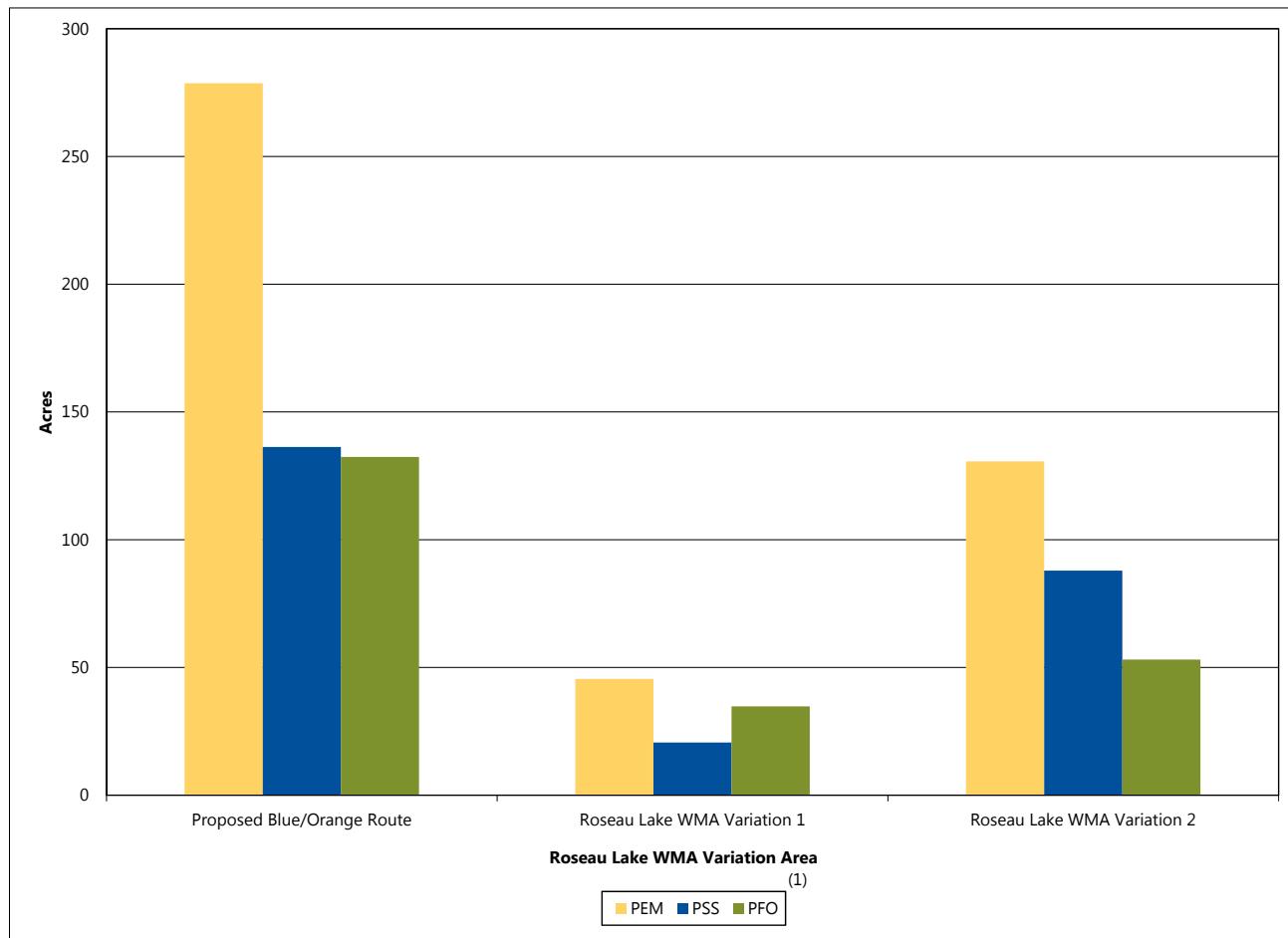
The primary impact on vegetation that would differ across the Proposed Blue/Orange Route and Roseau Lake WMA variations is the loss or fragmentation of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would

be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Figure 6-19 and Table 6-19, the Proposed Blue/Orange Route would pass through the most forested land, including state forest, resulting in more impacts on forested vegetation, therefore resulting in more permanent removal of forested vegetation. However the Proposed Blue/Orange Route would parallel existing transmission line corridor for a third of its length (Table 6-19), which would reduce fragmentation of intact forest in these areas where forest vegetation is present. Roseau Lake WMA Variation 1 and Variation 2 would pass through more herbaceous agricultural vegetation. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-5).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term

Figure 6-18 Acres of Wetland by Type within the Anticipated ROW in the Roseau Lake WMA Variation Area



Source(s): USFWS 1997 reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO).

impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

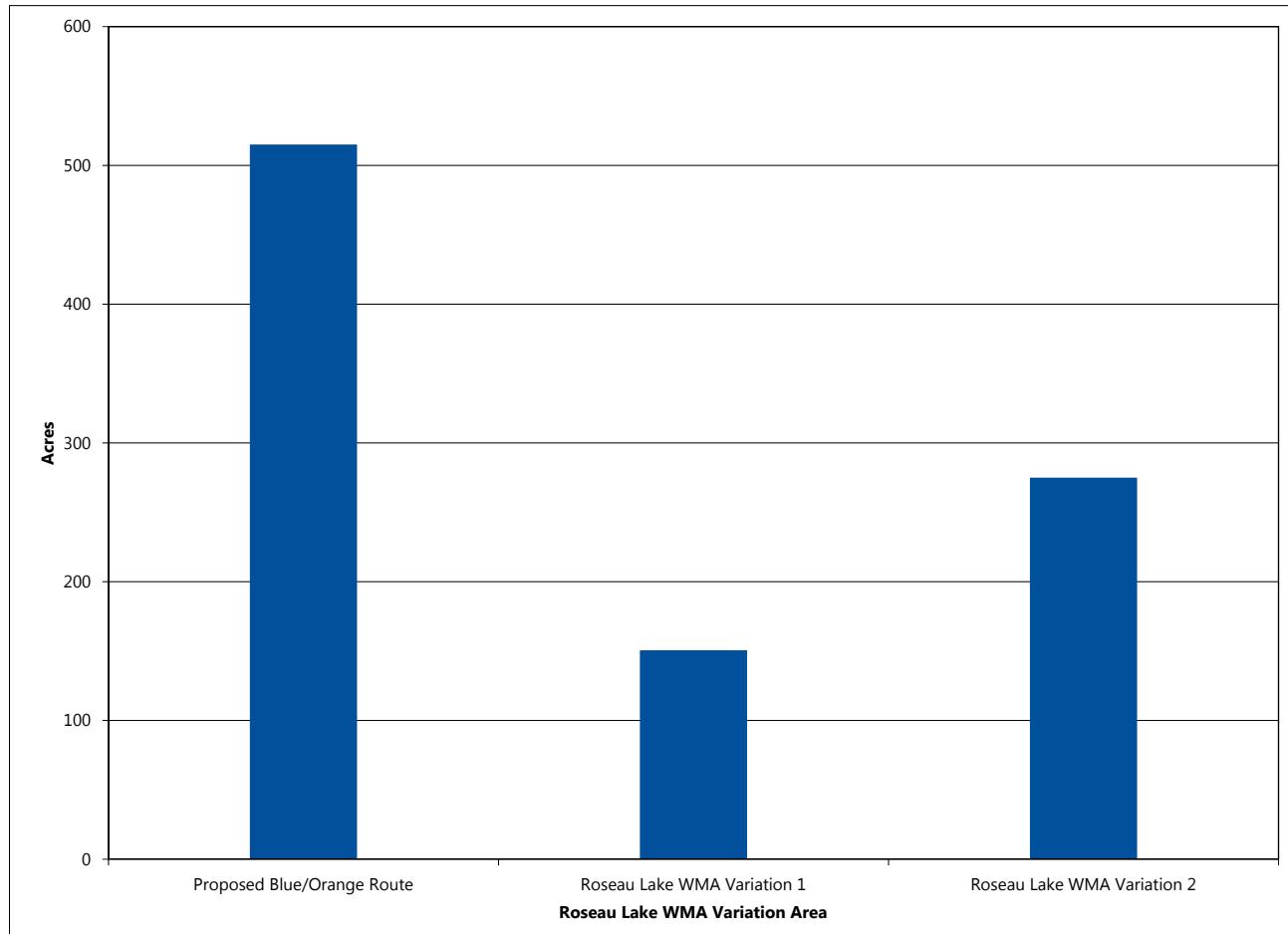
The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Roseau Lake WMA Variation Area are summarized in Table 6-20 and shown on Map 6-8. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ across the Proposed Blue/Orange Route and the Roseau Lake WMA variations include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue/Orange Route and Roseau Lake WMA variations to these

areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor and create new ROW; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.2.2.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue/Orange Route and Roseau Lake WMA variations. A detailed description of fragmentation is found in Section 5.3.4.3, but, in general, an increase in habitat fragmentation would result in the reduction in habitat connectivity. This reduction would have a greater impact on smaller species, such as turtles, and would have less of an impact on larger animals, such as deer. These indirect, long-term adverse impacts are expected to be minimal because of the overall amount of available contiguous habitat in the region.

The Proposed Blue/Orange Route would traverse the northern boundary of the Roseau Lake WMA

Figure 6-19 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Roseau Lake WMA Variation Area



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

Source(s): USGS 2001, reference (151)

and the Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would traverse the Cedar Bend WMA (Table 6-20, Map 6-8). Forested portions of the WMA in the ROW would be cleared, resulting in permanent habitat fragmentation and displacement of wildlife species associated with those forest communities.

While the Proposed Blue/Orange Route and both Roseau Lake WMA variations would all pass through Grassland Bird Conservation Area core areas, Roseau Lake WMA Variation 1 avoids many of these Grassland Bird Conservation Area areas (Map 6-8). The Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would likely result in greater impacts on grassland bird species simply because a higher concentration of these birds would be expected in the Grassland Bird Conservation Area areas located in the vicinity of their ROWs (Table 6-20). While there may be greater impacts for these alternatives, the ongoing vegetation management of the ROW in an early successional

vegetative stage, would be compatible with grassland bird species' habitat requirements.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional measures to avoid, minimize, or mitigate impacts on wildlife.

6.2.2.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS sites of biodiversity significance, MnDNR High Conservation Value Forest, MnDNR

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Table 6-19 Vegetation Resources within the Anticipated ROW in the Roseau Lake WMA Variation Area

| Resource | Evaluation Parameter | Roseau Lake WMA Variation Area | | |
|--|--|--------------------------------|--------------------------------|--------------------------------|
| | | Proposed Blue/ Orange Route | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 |
| Transmission Line | Length (mi) | 30.7 | 44.1 | 37.5 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 33 | 7 | 27 |
| State Forest | Acres within ROW | 334 | 6 | 52 |
| Total Forested GAP Land Cover | Acres within ROW | 515 | 156 | 275 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | | |
| North American Boreal Flooded & Swamp Forest | Acres within ROW | 388 | 61 | 165 |
| North American Boreal Forest | Acres within ROW | 73 | 30 | 57 |
| Herbaceous Agricultural Vegetation | Acres within ROW | 196 | 866 | 531 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)
Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Table 6-20 Wildlife Resources within the Vicinity of the Roseau Lake WMA Variation Area

| Resource | Evaluation Parameter | Roseau Lake WMA Variation Area | | |
|---|--|--------------------------------|--------------------------------|--------------------------------|
| | | Proposed Blue/ Orange Route | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 |
| Transmission Line | Length (mi) | 30.7 | 44.1 | 37.5 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 33 | 7 | 27 |
| Wildlife Management Areas | Acres within ROW | 69 | 0 | 44 |
| Grassland Bird Conservation Area | Acres within ROW | 131 | 40 | 220 |

Source(s): USFWS/Partner's In Flight 2004, reference (164); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2006, reference (165)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Roseau Lake WMA Variation Area are summarized in Table 6-21; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species differs across the Proposed Blue/Orange Route and Roseau Lake WMA variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

As indicated in Table 6-21, the Proposed Blue/Orange Route has the most documented rare species within one mile of the ROW, including the state-endangered Sprague's pipit and the state-threatened ram's head lady's slipper. The state-threatened eastern spotted skunk was documented within 1,500 feet of the anticipated alignment of the transmission line for the Roseau Lake WMA Variation 2

Table 6-21 Rare Species Documented within One Mile of the Anticipated ROW in the Roseau Lake WMA Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | Roseau Lake WMA Variation Area | | |
|-----------------------------------|---------------------------|----------------|-----------------|----------------|--------------------------------|-----------------------------|-----------------------------|
| | | | | | Proposed Blue/Orange Route | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 |
| <i>Anthus spragueii</i> | Sprague's Pipit | Candidate | Endangered | Bird | X | | |
| <i>Cypripedium arietinum</i> | Ram's-head Lady's-slipper | None | Threatened | Vascular Plant | X | | |
| <i>Spilogale putorius</i> | Eastern Spotted Skunk | None | Threatened | Mammal | | | X |
| <i>Accipiter gentilis</i> | Northern Goshawk | None | Special Concern | Bird | X | | X |
| <i>Ammodramus nelsoni</i> | Nelson's Sparrow | None | Special Concern | Bird | X | | |
| <i>Coturnicops noveboracensis</i> | Yellow Rail | None | Special Concern | Bird | X | | |
| <i>Lasmigona compressa</i> | Creek Heelsplitter | None | Special Concern | Mussel | | X | |
| <i>Ligumia recta</i> | Black Sandshell | None | Special Concern | Mussel | | X | X |
| <i>Limosa fedoa</i> | Marbled Godwit | None | Special Concern | Bird | X | X | X |
| <i>Mustela nivalis</i> | Least Weasel | None | Special Concern | Mammal | | X | |
| <i>Ranunculus lapponicus</i> | Lapland Buttercup | None | Special Concern | Vascular Plant | X | | |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

(Table 6-21; Appendix F). The Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 may result in the most impacts on state-endangered and threatened species; however, the full extent of potential impacts from the Proposed Blue/Orange Route or either Roseau Lake WMA variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

The Proposed Blue/Orange Route traverses more forested land; clearing of forested areas to create new ROW could have indirect, long-term adverse impacts on rare species associated with forest or shrub communities, such as the northern goshawk and the ram's head ladyslipper. Roseau Lake WMA Variation 1 and Variation 2 traverse more herbaceous agricultural land; these variations may have more impacts on species that inhabit more open areas, such as the marbled godwit, eastern spotted skunk, and least weasel. 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.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Roseau Lake WMA Variation Area are

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summarized in Table 6-22 and shown on Map 6-9; additional, more detailed data on rare communities and resources is provided in Appendix E and Appendix G.

The primary impact on rare communities and resources that would differ across the Proposed Blue/Orange Route and Roseau Lake WMA variations is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-9 and in Table 6-22, the Proposed Blue/Orange Route would pass through more rare communities and resources, relative to the variations in the Roseau Lake WMA Variation Area.

The Proposed Blue/Orange Route would impact the most MBS Sites of Biodiversity Significance, including sites ranked outstanding and/or high (Table 6-22). The Proposed Blue/Orange Route would also impact the most areas designated as High Conservation Value Forest; these areas are generally associated with MBS Sites of Biodiversity Significance ranked outstanding and high.

The Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would impact the most acres of MBS native plant communities, including native plant communities with a conservation status of

S2 (imperiled) and S3 (vulnerable to extirpation). As indicated on Map 6-9, the Proposed Blue/Orange Route would require crossing three large areas (greater than the average span length of 1,250 feet) of clustered native plant communities; two of these areas would also be crossed by Variation 2 (Map 6-9). These crossings would require placement of transmission line structures within MBS native plant communities. However, one of the areas of clustered native plant communities crossed by the Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 is previously disturbed by an existing transmission line corridor (Map 6-9). Native plant community types mapped by MBS in the Roseau Lake WMA Variation Area are summarized in Appendix G and include various types of rich fens and swamps.

The rare communities and resources listed in Table 6-22 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in broader regional depletion of certain rare communities, particularly for the Proposed Blue/Orange Route. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a

Table 6-22 Rare Communities and Resources within the Vicinity of 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 |
| Transmission Line | -- | Length (mi) | 30.7 | 44.1 | 37.5 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 33 | 7 | 27 |
| MBS Sites of Biodiversity Significance | Outstanding and High Rank | Acres within ROW | 107 | 7 | 77 |
| | Total | Acres within ROW | 404 | 14 | 153 |
| High Conservation Value Forest | -- | Acres within ROW | 22 | 6 | 6 |
| MBS Native Plant Communities | Conservation Status S2 and S3 | Acres within ROW | 39 | 0 | 22 |
| | Total | Acres within ROW | 107 | 5 | 75 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167); MnDNR 2014, reference (168); MBS 2014, reference (169)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

permit condition, which could include plant surveys along the permitted ROW.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.2.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-10 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Roseau Lake WMA Variation Area.

Table 6-23 identifies the percentage of total transmission line length that the Proposed Blue/Orange Route or Roseau Lake WMA variations parallel an existing corridor or linear feature in the Roseau Lake WMA Variation Area.

The Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would parallel existing transmission line corridors more than Roseau Lake WMA Variation 1 (Figure 6-20). The Roseau Lake WMA Variation 2 would parallel corridors for over 70 percent of its length while the Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would parallel existing corridors for about 55 to 60 percent of their lengths.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.2.2.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-24 summarizes the costs associated with constructing the Proposed Blue/Orange Route and variations in the Roseau Lake WMA Variation Area. As indicated in Table 6-24, the Roseau Lake WMA Variation 1 would be the most expensive to construct, while the

Table 6-23 Corridor Sharing in the Roseau Lake WMA Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Roseau Lake WMA Variation Area | | |
|---|--|--------------------------------|-----------------------------|-----------------------------|
| | | Proposed Blue/Orange Route | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, PLSS, field line) | Percent of Total Length ⁽²⁾ | 33 | 7 | 27 |
| Road/Trail (other linear features, but not transmission lines, may be present with the road/trail corridor; i.e., PLSS, field line) | Percent of Total Length ⁽²⁾ | 19 | 4 | 16 |
| Field Line (other linear features, but not transmission lines or road/trails may be present within the field line corridor; i.e., PLSS) | Percent of Total Length ⁽²⁾ | 0 | 41 | 28 |
| PLSS Only | Percent of Total Length ⁽²⁾ | 9 | 1 | 0 |
| None | Percent of Total Length ⁽²⁾ | 40 | 46 | 29 |

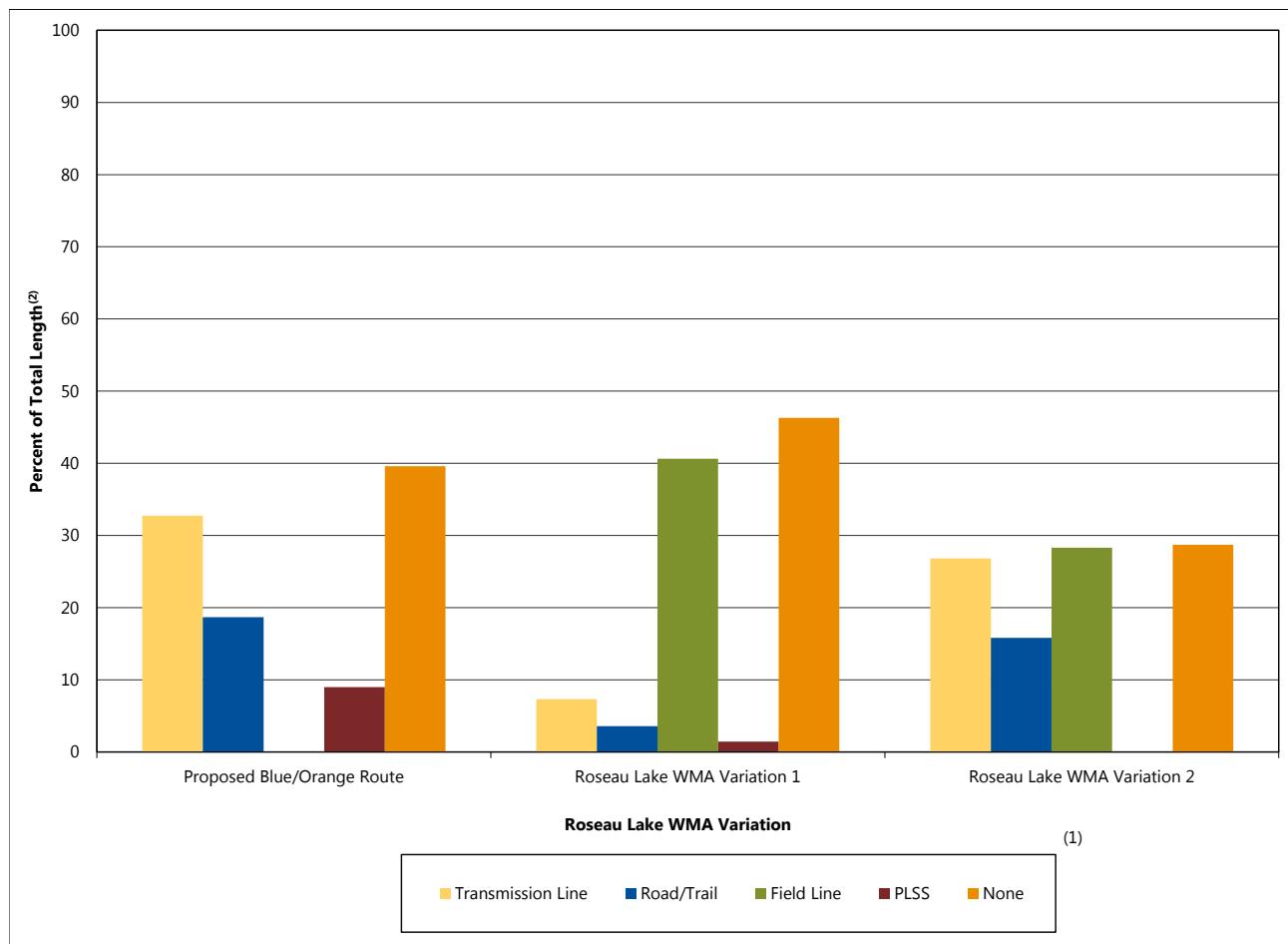
Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009, reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

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Figure 6-20 Corridor Sharing in the Roseau Lake WMA Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009, reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS); Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line); Field Line (other linear features, but not transmission lines or road/trails, may be present within the field line corridor; i.e., PLSS).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-24 Construction Costs in the Roseau Lake WMA Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|-----------------|-----------------------------|--------------|-------------------------|-------------|
| Roseau Lake WMA | Proposed Blue/Orange Route | \$33,247,089 | \$1,081,910 | 30.7 |
| | Roseau Lake WMA Variation 1 | \$57,086,075 | \$1,293,882 | 44.1 |
| | Roseau Lake WMA Variation 2 | \$46,162,144 | \$1,273,438 | 37.5 |

Source(s): Minnesota Power 2015, reference (9)

Proposed Blue/Orange Route would cost the least to construct.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013, reference (135)). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$60,000 to \$71,000 annually for these alternatives in the Roseau Lake WMA Variation Area.

6.2.3 Cedar Bend WMA Variation Area

The Cedar Bend WMA Variation Area encompasses two route alternatives: the Proposed Blue/Orange Route and the Cedar Bend WMA Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Cedar Bend WMA Variation Area, depending on the route or variation considered.

6.2.3.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Cedar Bend WMA Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Border Crossing Variation (see Section 6.2.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Cedar Bend WMA Variation Area are summarized in Table 6-25 and shown on Maps 6-11, 6-12, 6-13, and 6-15.

As indicated in Table 6-25 for the Cedar Bend WMA Variation Area, the Proposed Blue/Orange Route and Cedar Bend WMA Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including two state forests, one state scenic byway, and two snowmobile trails (Map 6-13 and Map 6-15). The Cedar Bend WMA Variation would be located within one mile of eight historic architectural sites with high visual sensitivity, whereas the Proposed Blue/Orange Route would not be located near any historic architectural sites (Map 6-12). In addition, each of these alternatives would be located within 1,500 feet of a number of residences, which could also have high visual sensitivity (Figure 6-21). Of the two alternatives

Table 6-25 Aesthetic Resources within the ROI in the Cedar Bend WMA Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Cedar Bend WMA Variation Area | |
|---|--|-------------------------------|--------------------------|
| | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| Transmission Line | Length (mi) | 24.7 | 19.6 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 100 | 100 |
| Residences | Count within 0–500 ft | 0 | 16 |
| | Count within 0–1,000 ft | 5 | 52 |
| | Count within 0–1,500 ft | 11 | 101 |
| Historic Architectural Sites | Count within 0–1,500 ft | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 8 |
| State Forests | Acres in ROW | 372 | 78 |
| | Count within 0–1,500 ft | 2 | 2 |
| State Scenic Byways | Count within 0–1,500 ft | 1 | 1 |
| Snowmobile Trails | Count within 0–1,500 ft | 2 | 2 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2003, reference (148); MnDOT 2013, reference (149); MnDNR 2010 reference (150)

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

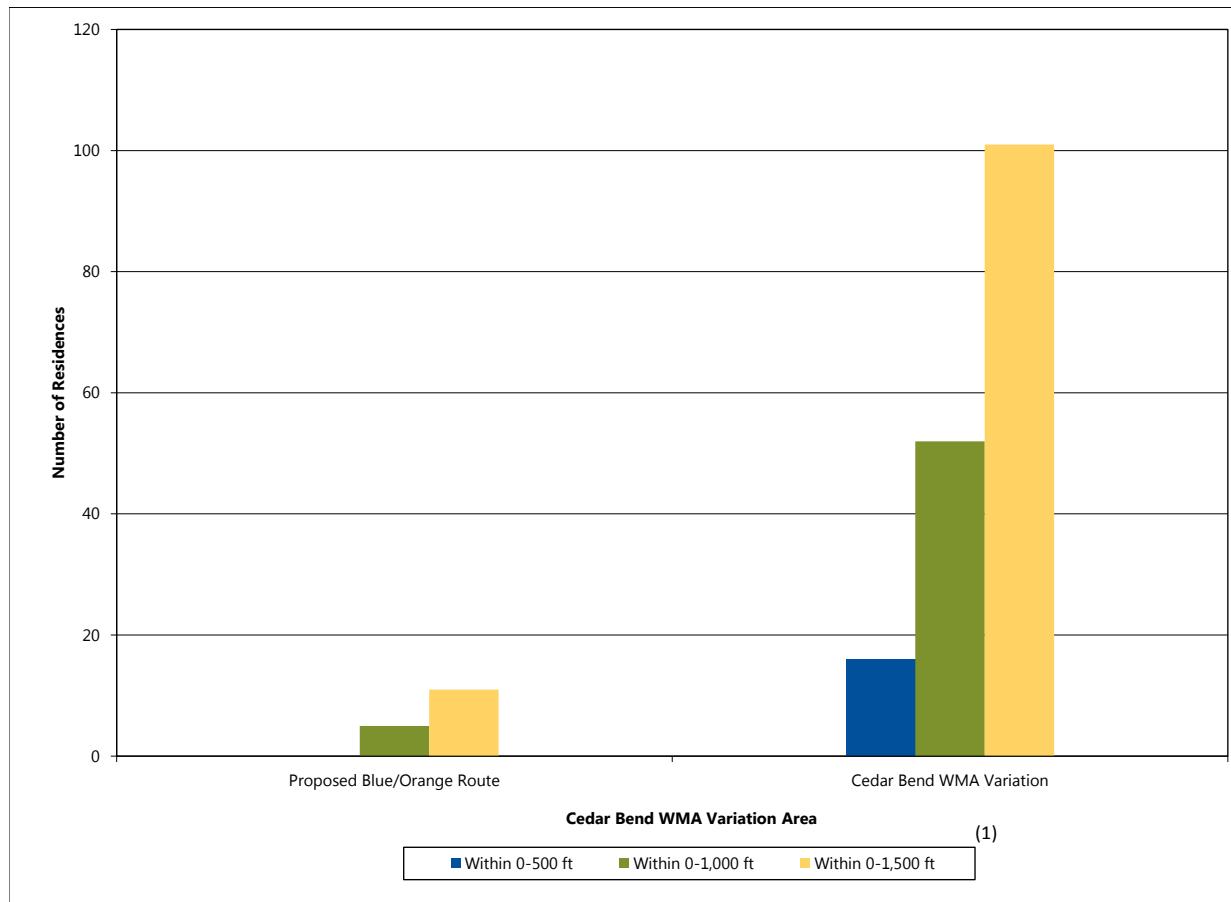
(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

(2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

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Figure 6-21 Residences within the ROI in the Cedar Bend WMA Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

in the Cedar Bend WMA Variation Area, the Cedar Bend WMA Variation would affect substantially more residences within 1,500 feet of the anticipated alignment (101) than the Proposed Blue/Orange Route (11), including 52 residences that are within 1,000 feet of the anticipated alignment and 16 within 500 feet, compared to five and zero, respectively for the Proposed Blue/Orange Route.

The Cedar Bend WMA Variation is approximately five miles shorter than the Proposed Blue/Orange Route and would affect substantially fewer acres of state forest land (78 versus 372 acres). However, within the Cedar Bend WMA Variation, the clearing of forest vegetation for the ROW would occur adjacent to an existing cleared ROW; this would expand the width of the existing ROW and increase contrast incrementally rather than substantially. Because the Cedar Bend WMA Variation crosses more open agricultural land, it is likely to be visible to more viewers at greater distances than the Proposed Blue/Orange Route which traverses more forested lands with more limited viewing distances. Both

alternatives parallel existing large transmission lines for their entire lengths; the Proposed Blue/Orange Route parallels an existing 500 kV transmission line and the Cedar Bend WMA Variation parallels a 230 kV transmission line. By paralleling an existing 500 kV transmission line with similar structure design, the Proposed Blue/Orange Route is likely to produce slightly less contrast than the Cedar Bend WMA Variation which would parallel an existing 230 kV transmission line with a slightly different structure design.

Overall, the Cedar Bend WMA Variation is likely to produce less contrast than the Proposed Blue/Orange Route due to its shorter length (19.6 miles) compared to the Proposed Blue/Orange Route (24.7 miles) and fewer forest acres removed for corridor expansion. The Proposed Blue/Orange Route is likely to produce less contrast than the Cedar Bend WMA Variation due to views of the transmission line more likely to be screened by forest vegetation and paralleling a 500 kV transmission line with a similar structure design. However, the Cedar Bend WMA

would provide greater contrast to substantially more residences (101) than the Proposed Blue/Orange Route (11), as well as several historic architectural sites (eight). For these reasons, the Proposed Blue/Orange Route would result in less aesthetic impact than the Cedar Bend WMA Variation.

Although the Proposed Blue/Orange Route is longer in length compared to the Cedar Bend WMA Variation, it parallels an existing transmission line of similar size and design for its full length, and could affect relatively few residences and other sensitive visual resources (Table 6-25). For these reasons, potential aesthetic impacts of the Proposed Blue/Orange Route are not expected to be significant.

Although the Cedar Bend WMA Variation parallels an existing transmission line of similar size and design for its full length and could affect relatively few other sensitive visual resources, it is longer in length and affects a large number of residences (101) within 1,500 feet compared to the Proposed Blue/Orange Route (11). For these reasons, potential aesthetic impacts of the Cedar Bend WMA Variation are expected to be significant.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

Land Uses

Table 6-26 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue/Orange Route and Cedar Bend WMA Variation in the Cedar Bend WMA Variation Area and Figure 6-22 shows the percentage of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue/Orange Route and Cedar Bend WMA Variation in the Cedar Bend WMA Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in this variation area are shown in Map 5-5 and residences, churches, cemeteries, and airports near the proposed route and variation are shown on Map 6-11.

The Proposed Blue/Orange Route and Cedar Bend WMA Variation would all have some long-term direct impacts from long-term removal of forested and/or swamp land. Forested and/or swamp land is the predominant land cover type within the ROI for the proposed route and variation (Figure 6-22). The Proposed Blue/Orange Route would impact a greater amount of forested and/or swamp land compared to the Cedar Bend WMA Variation, while the Cedar Bend WMA Variation would impact a greater amount of agricultural land than the Proposed Blue/Orange Route.

Land Ownership and Management

Table 6-27 identifies the amount of land by ownership **or management** category. The Proposed Blue/Orange Route would impact a greater amount of state forest land and state fee land than the Cedar Bend WMA Variation. The Proposed Blue/Orange Route would impact a small acreage (approximately 6 acres with a crossing distance of 1,379 feet) of USFWS Interest Lands while the Cedar Bend

Table 6-26 Land Uses within the ROI in the Cedar Bend WMA Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Cedar Bend WMA Variation Area | |
|---|------------------------|-------------------------------------|-------------------------------|--------------------------|
| | | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 9,131 | 7,293 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 231 | 478 |
| | Agricultural | Acres within 0–1,500 ft | 844 | 2,625 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 8,045 | 4,180 |
| | Other | Acres within 0–1,500 ft | 11 | 10 |

Source(s): USGS 2001, reference (151)

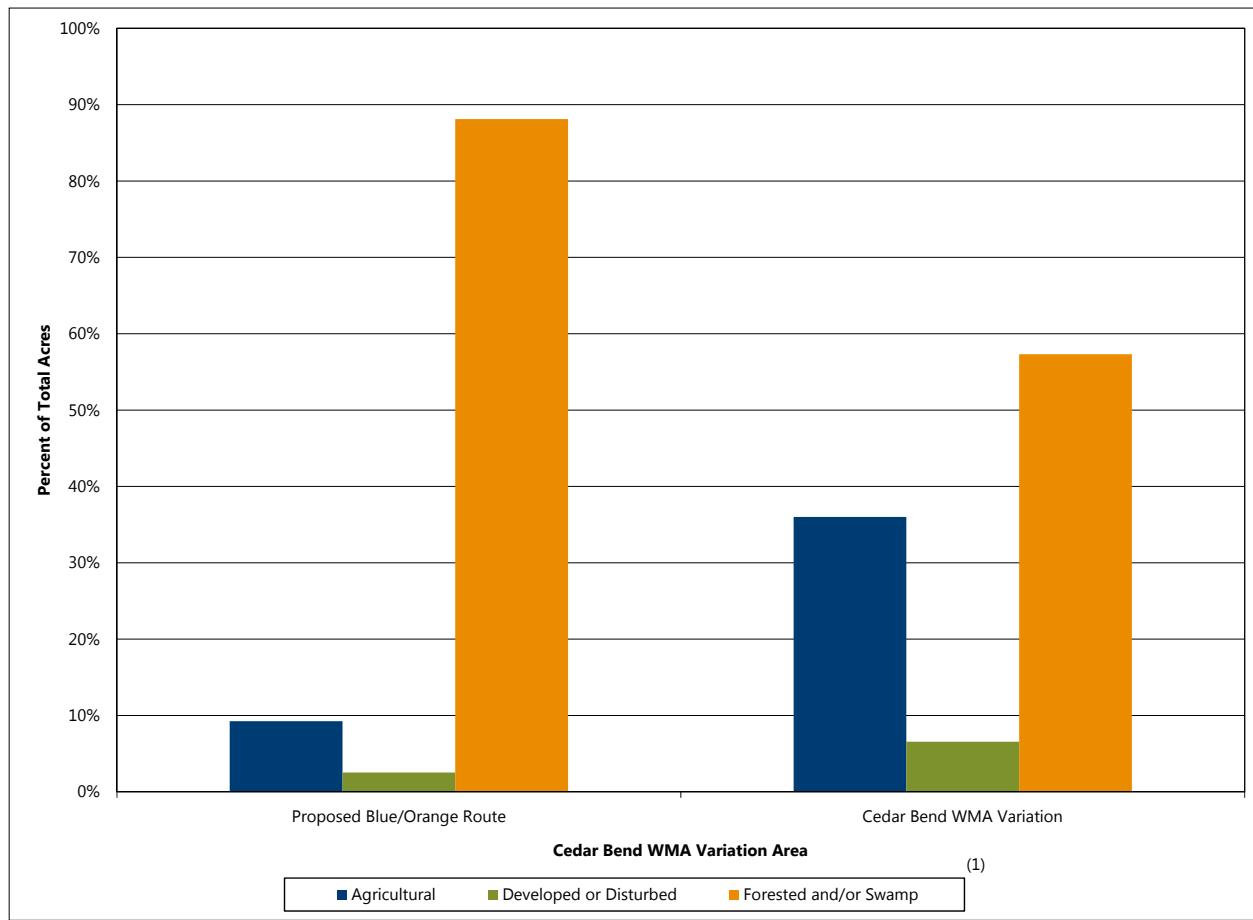
Note(s): Totals may not sum due to rounding

(1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.

(2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

6.0 Comparative Environmental Consequences

Figure 6-22 Land Uses within the ROI in the Cedar Bend WMA Variation Area



Source(s): USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.

Table 6-27 Land Ownership/Management within the Anticipated ROW in the Cedar Bend WMA Variation Area

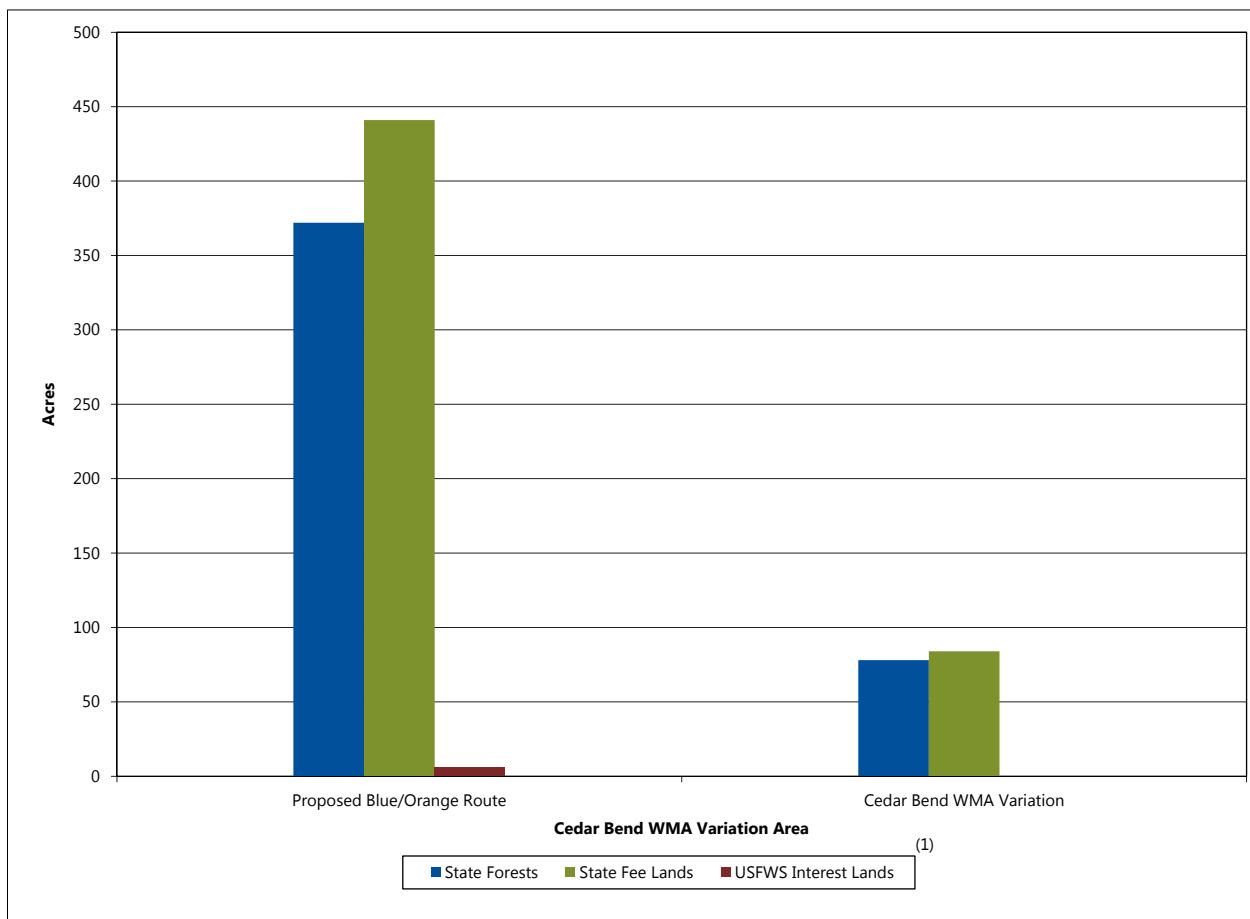
| Resource | Type | Evaluation Parameter | Cedar Bend WMA Variation Area | |
|--|---------------------------------------|----------------------|-------------------------------|--------------------------|
| | | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| Total Lands | -- | Acres within ROW | 599 | 476 |
| State Forests | -- | Acres within ROW | 372 | 78 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 441 | 84 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 397 | 78 |
| | Other—Acquired, Tax Forfeit, Volstead | Acres within ROW | 5 | 6 |
| | Trust Fund | Acres within ROW | 33 | 0 |
| | Federal - State Lease | Acres within ROW | 6 | 0 |
| USFWS Interest Lands | -- | Acres within ROW | 6 | 0 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 158 | 392 |

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); USFWS 2014, reference (178)

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.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-23 Public Land Ownership/Management within the ROI in the Cedar Bend WMA Variation Area



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.

WMA Variation would impact none (Map 6-11). No impacts to county lands or state conservation easements would occur under the Proposed Blue/Orange Route or Cedar Bend WMA Variation.

Both the Proposed Blue/Orange Route and Cedar Bend WMA Variation would parallel an existing ROW for their entire length (Figure 6-23); and therefore, incompatibility with surrounding land uses would be minimal (see Section 6.2.3.6).

Impacts to land use from the proposed Project in the Cedar Bend WMA Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Route and Variation would all 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. The length of the route that would parallel an existing corridor is

also important, and in this case both the Proposed Route and Variation would parallel an existing ROW for their entire length. The Variation avoids a greater amount of state forest and state fee lands than the Proposed Route thereby avoiding long-term changes to land use.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.3.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Cedar Bend WMA Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Cedar Bend WMA Variation Area are summarized in Table 6-28.

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Table 6-28 Land-Based Economy Resources within the Anticipated ROW in the Cedar Bend WMA Variation Area

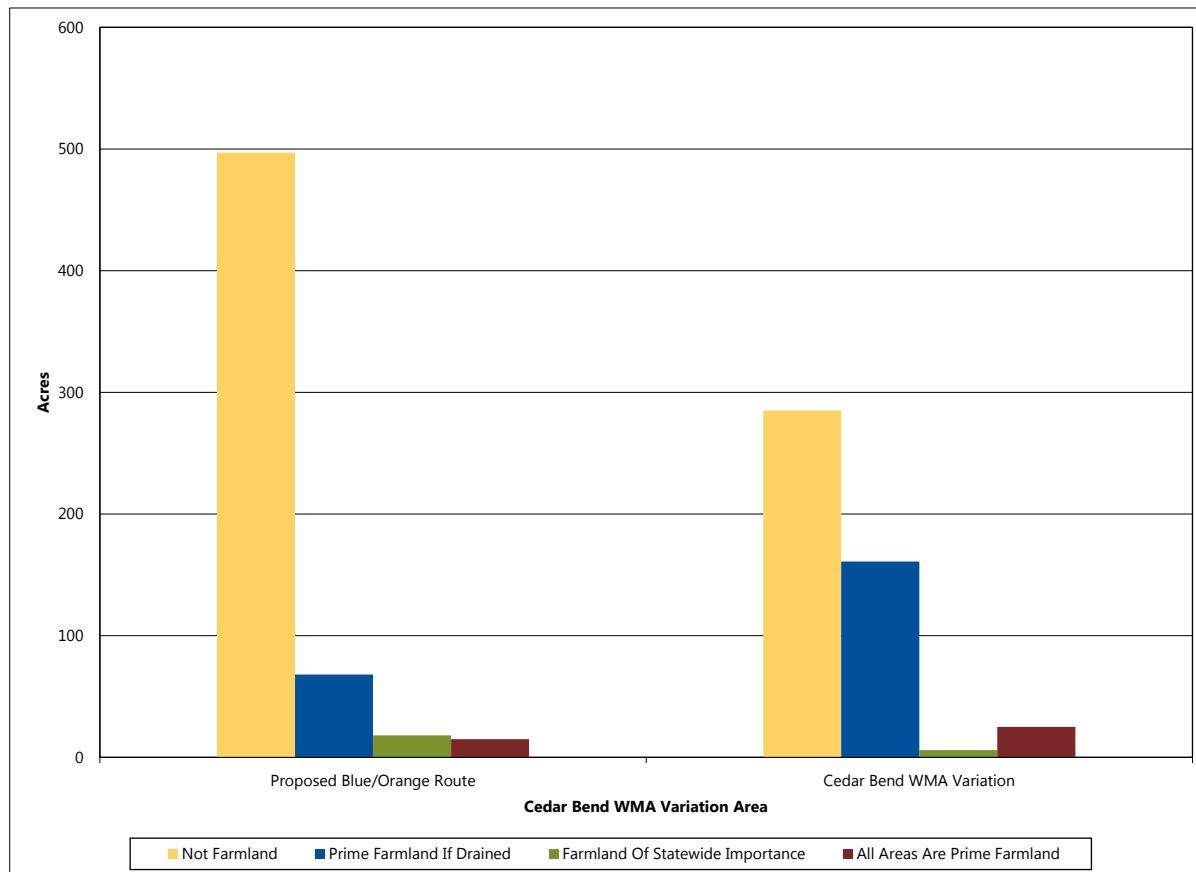
| Resource | Type | Evaluation Parameter | Cedar Bend WMA Variation Area | |
|---|----------------------------------|--|-------------------------------|--------------------------|
| | | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| Transmission Line | -- | Length (mi) | 24.7 | 19.6 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 100 | 100 |
| Farmland | Not Farmland | Acres within ROW | 497 | 285 |
| | Prime Farmland if Drained | Acres within ROW | 68 | 161 |
| | Farmland of Statewide Importance | Acres within ROW | 18 | 6 |
| | All Areas are Prime Farmland | Acres within ROW | 15 | 25 |
| State Forest | -- | Acres within ROW | 372 | 78 |
| State Mineral Leases (active and/or terminated/expired) | -- | Acres within ROW | 97 | 0 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

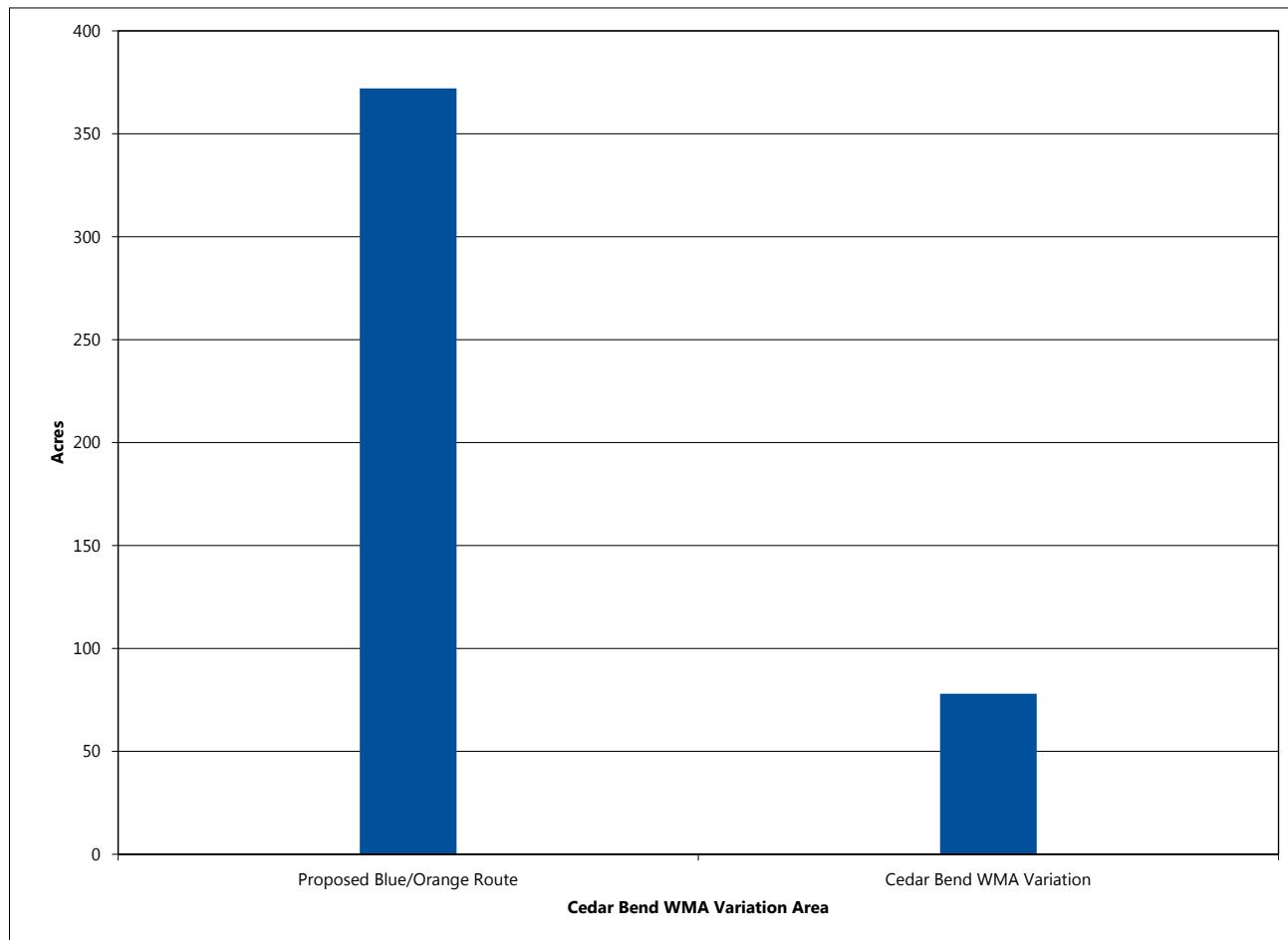
Figure 6-24 Acres of Farmland by Type within the Anticipated ROW in the Cedar Bend WMA Variation Area



Source(s): USDA NRCS 2014, reference (154)

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

Figure 6-25 Acres of State Forest Land within the Anticipated ROW in the Cedar Bend WMA Variation Area



Source(s): MnDNR 2003, reference (148)

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

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-28 and Figure 6-24 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, land not classified as prime farmland, and farmland of statewide importance that would be impacted by the Proposed Blue/Orange Route and Cedar Bend WMA Variation in the ROI.

Although the Cedar Bend WMA Variation has a shorter length, it would cross more farmland than the Proposed Blue/Orange Route, which is longer and parallels the existing 230 kV transmission line for 100 percent of its length (Table 6-28, Figure 6-24). Therefore, the Cedar Bend WMA Variation would be expected to result in a greater impact on farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust,

damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-28 and Figure 6-25 identify the acreage of

state forest land that would be impacted in the ROI by the Proposed Blue/Orange Route or Cedar Bend WMA Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue/Orange Route or Cedar Bend WMA Variation in the Cedar Bend WMA Variation Area.

The Proposed Blue/Orange Route, which has the longer length, would cross more acres of state forest lands - Beltrami Island State Forest (Figure 6-25, Map 6-11). Therefore, the Cedar Bend WMA Variation, which has the shorter length, would be expected to have the least impact on timber activities in the Beltrami Island State Forest.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from

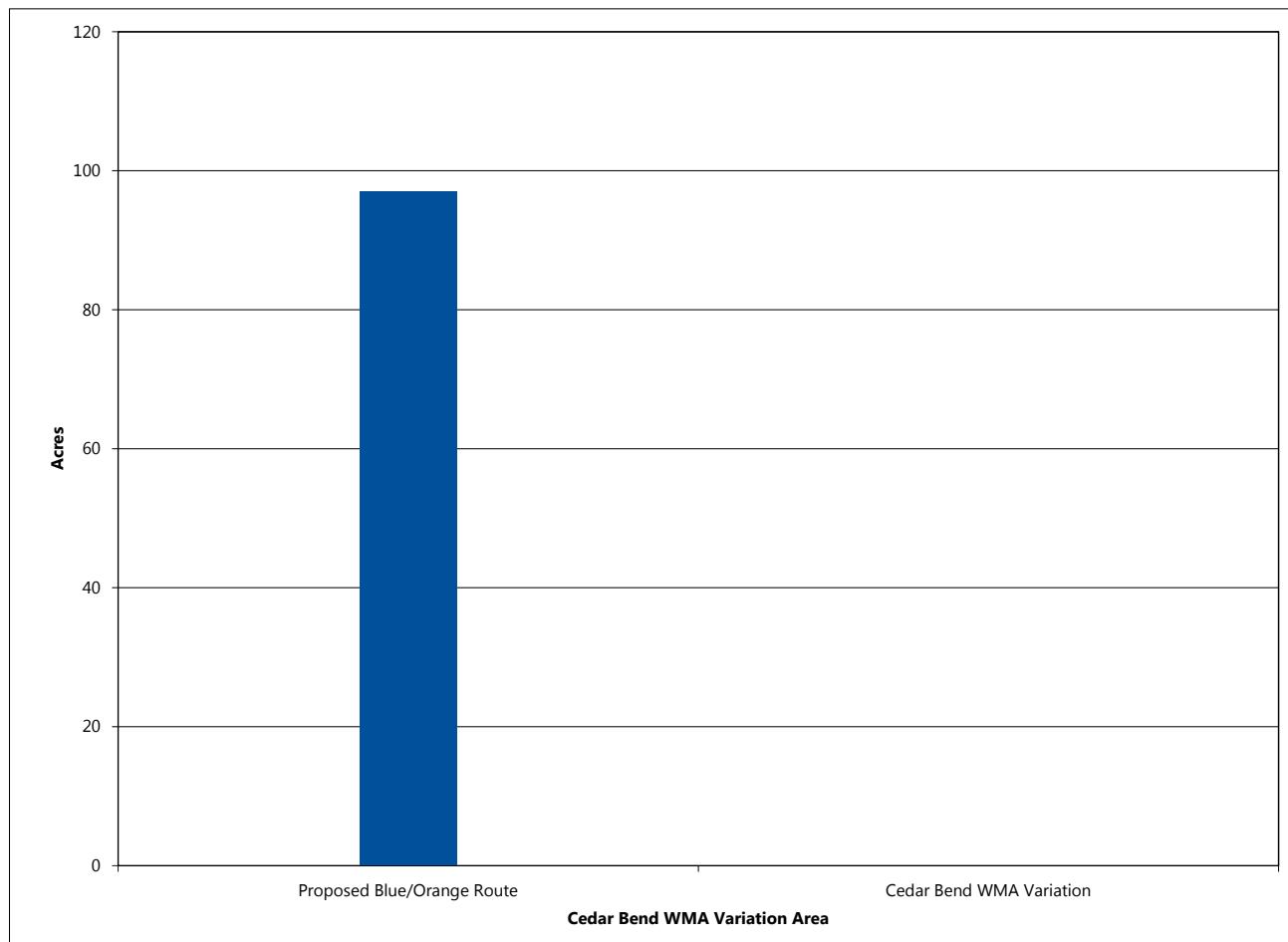
the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-28, Figure 6-26, and Map 6-11 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the Cedar Bend WMA Variation Area. There are no **active mineral leases**, known aggregate resources or records of current mineral mining in the ROW of

Figure 6-26 Acres of State Mineral Leases within the Anticipated ROW in the Cedar Bend WMA Variation Area⁽¹⁾



Source(s): MnDNR 2014, reference (179)

(1) All mineral lease lands are classified as terminated/expired.

either the Proposed Blue/Orange Route or the Cedar Bend WMA Variation.

The Proposed Blue/Orange Route would traverse several acres of mining lands with **terminated/expired** state mineral leases, while the Cedar Bend WMA Variation would not traverse any mining lands with **terminated/expired** state mineral leases (Table 6-28, Figure 6-26, and Map 6-11). The Proposed Blue/Orange Route would require crossing a terminated/expired mineral lease. The Proposed Blue/Orange Route could potentially interfere with future mining activities in this area if the structures interfere with access to mineable resources or the ability to remove these resources.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.3.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic architectural resources includes the 200-foot ROW of the proposed transmission line; however, potential indirect impacts to historic resources are evaluated within one mile of the anticipated alignment since visual intrusions can change the context and setting of historic architectural properties.

Table 6-29 provides a summary of the previously recorded archaeological **sites** and historic architectural **resources** within the ROW (direct APE), within 1,500 feet of the anticipated alignment, and within one mile of the anticipated alignment

(indirect APE) for all routes and variations in the Cedar Bend WMA Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue/Orange Route and the Cedar Bend WMA Variation in the Cedar Bend WMA Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources with the direct and indirect APEs for the proposed Project.

Within the Cedar Bend WMA Variation Area, no archaeologic sites or historic **architectural resources** are present within the ROW of the Proposed Blue/Orange Route but one archaeological site is located within the ROW of the Cedar Bend WMA Variation. Site 21ROs, located within the Cedar Bend WMA Variation ROW is a precontact site with an unknown NRHP-eligibility **status**. The Cedar Bend WMA Variation has eight historic architectural sites documented within the indirect APE, while the Proposed Blue/Orange Route does not have any historic architectural sites documented within the indirect APE. The NRHP eligibility status has not been evaluated for any of the eight historic architectural sites identified in the indirect APE of the Cedar Bend WMA Variation (RO-RSC-001, RO-CDR-001, RO-LAO-001, RO-LAO-002, RO-LAO-003, RO-LAO-005, RO-LAO-007, and RO-LAO-008).

There is currently no identified potential for direct, adverse, long-term impacts on archaeological or historic architectural sites for the Proposed Orange/Blue Route as there were no sites located within the direct APE of that route, although cultural

Table 6-29 Archaeological and Historic Resources within the Cedar Bend WMA Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Cedar Bend WMA Variation Area | |
|------------------------------|-------------------------------------|-------------------------------|--------------------------|
| | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| Historic Architectural Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 8 |
| Archaeological Sites | Count within ROW | 0 | 1 |
| | Count within 0–1,500 ft | 0 | 2 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

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resource investigations have not, yet, occurred for the **Proposed Blue/Orange Route or Cedar Bend WMA Variation**. Direct, adverse, long-term impacts for the Cedar Bend WMA Variation could occur as a result of the presence of archaeological resources being present within the ROW which could be affected by ground-disturbing activities associated with construction of the proposed Project. Because the NRHP eligibility of the archaeological resource is unknown, the proposed Project may result in direct impacts to the resource that could be considered an adverse impact under Section 106 of the NHPA if this archaeological resource is determined NRHP-eligible.

There is currently the potential for indirect, **long-term, adverse visual impacts** to the historic **architectural** resource sites wherever the proposed Project is visibly prominent in the landscape or a viewed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. This indirect **impact** could occur, for example, where people are crossing the bridges (RO-LAO-005, RO-LAO-007, and RO-LAO-008) identified as historic architectural sites, and have a view of the transmission line from the **roadway that would be inconsistent with the existing settings of the bridges**.

As the Proposed Blue/Orange Route and Cedar Bend WMA Variation contain historic architectural sites that have not been evaluated for NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse impact under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is

determined to be a character-defining feature that contributes to the significance of the resource.

The proposed route and variation have not been surveyed. As such, **archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources** will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resources investigations will be implemented as part of the DOE's **Draft PA (Appendix V)** that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse impacts on historic architectural site as a result of construction and operation of the proposed Project.

Potential adverse impacts from construction, operation, maintenance, and emergency repair-related short-term and long-term to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.2.3.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Cedar Bend WMA Variation Area and the potential impacts from the proposed Project.

Table 6-30 Water Resources within the Anticipated ROW in the Cedar Bend WMA Variation Area

| Resource | Evaluation Parameter | Cedar Bend WMA Variation Area | |
|-------------------------------|----------------------|-------------------------------|--------------------------|
| | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| Transmission Line | Length (mi) | 24.7 | 19.6 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 4 | 5 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 12 | 11 |
| Impaired Waters | Number of Crossings | 2 | 3 |
| Floodplains ⁽³⁾ | Acres within ROW | 0 | 32 |
| NWI Wetlands | Acres within ROW | 466 | 154 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); MPCA 2014, reference (119); MPCA 2014, reference (118); Minnesota Power 2014, reference (163)

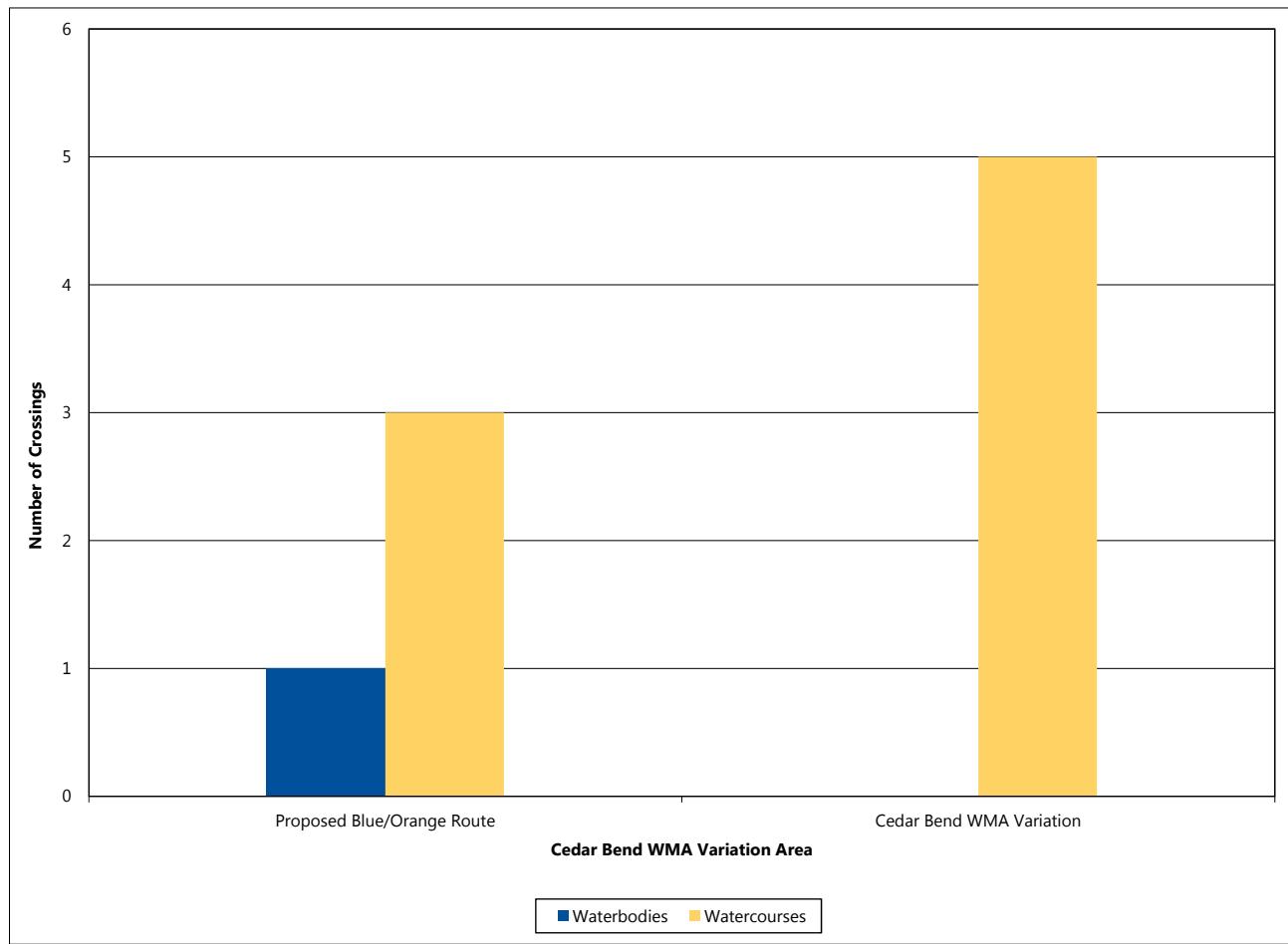
Note(s): Totals may not sum due to rounding

(1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.

(2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

(3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

Figure 6-27 PWI Water Crossings by Type in the Cedar Bend WMA Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Cedar Bend WMA Variation Area are summarized in Table 6-30 and shown on Map 6-13. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmission structures in floodplains and wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Blue/Orange Route and the Cedar Bend WMA Variation.

The Proposed Blue/Orange Route and the Cedar Bend WMA Variation would both cross the East Branch of the Warroad River and the West Branch of the Warroad River, which are PWI watercourses. The Proposed Blue/Orange Route would cross one additional unnamed PWI watercourse, while the

Cedar Bend WMA Variation would cross three more. The Proposed Blue/Orange Route would cross one small, unnamed PWI waterbody. The Proposed Blue/Orange Route and the Cedar Bend WMA Variation would not cross PWI wetlands (Figure 6-27).

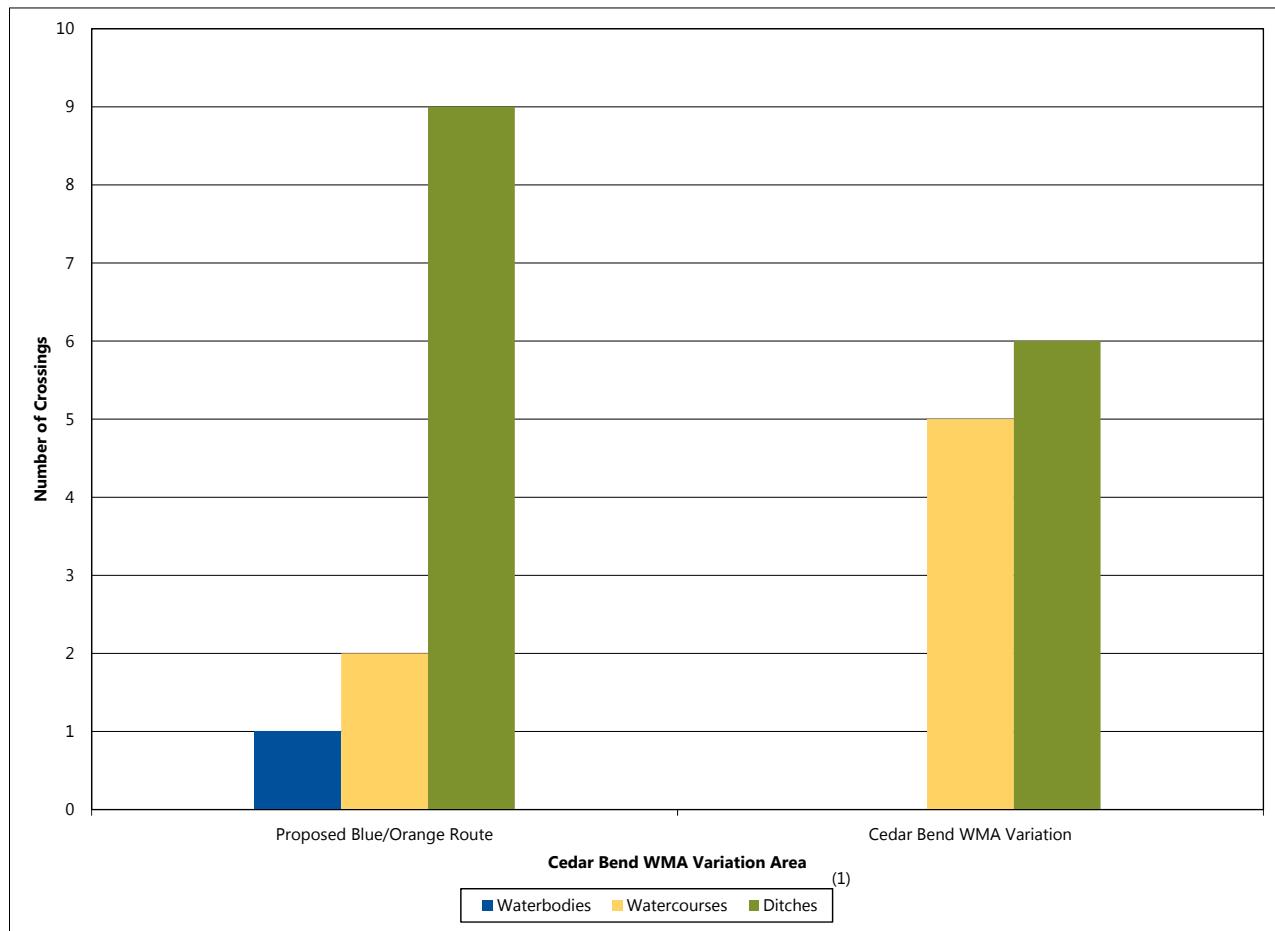
The Proposed Blue/Orange Route and the Cedar Bend WMA Variation would both require crossing non-PWI waters. The Proposed Blue/Orange Route would primarily cross ditches, while the Variation would cross ditches and watercourses almost equally (Figure 6-28). The Proposed Blue/Orange Route would also cross one small PWI waterbody.

The Proposed Blue/Orange Route and the Cedar Bend WMA Variation would each require crossing the East Branch of the Warroad River and the West Branch of the Warroad River once. In addition, the Cedar Bend WMA Variation would cross Willow Creek. Each of these is a MPCA-listed impaired water, as shown on Table 5-24.

It is anticipated that PWI crossings, non-PWI water crossings, and impaired waters are spannable

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Figure 6-28 Non-PWI Water Crossings by Type in the Cedar Bend WMA Variation Area



Source(s): : USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

(crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

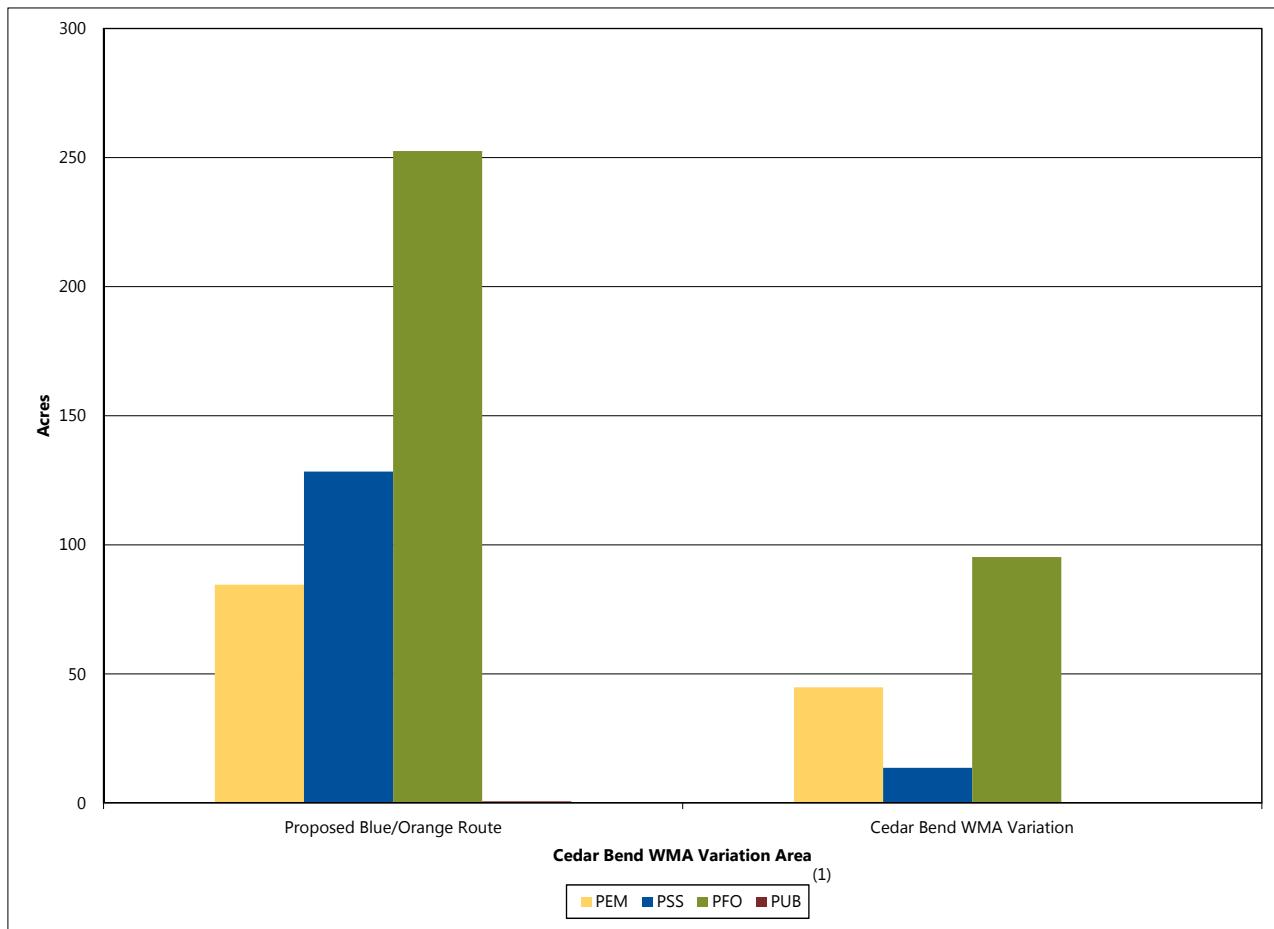
The Proposed Blue/Orange Route would not traverse a floodplain; however, the Cedar Bend WMA Variation would require construction and placement of transmission structures within floodplain Zone A of both the East Branch of the Warroad River and the West Branch of the Warroad River. Placement of transmission structures in the floodplain could not be avoided by spanning as floodplain crossing distances exceed average spanning length of 1,250 feet. Impacts to floodplains are expected to be minimal and are summarized in Section 5.3.4.1.

Based on the NWI, the Proposed Blue/Orange Route and the Cedar Bend WMA Variation would both require conversion of forested and shrub wetland areas to wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-29, the Proposed Blue/Orange Route contains more

than double the forested and shrub wetlands compared to the Cedar Bend WMA Variation and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1.

Both the Proposed Blue/Orange Route and the Cedar Bend WMA Variation would require placement of permanent fill in wetlands for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the West Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are

Figure 6-29 Acres of Wetland by Type within the Anticipated ROW in the Cedar Bend WMA Variation Area



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

Source(s): USFWS 1997, reference (157)

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to the large wetland complexes in the area, it would be expected that the Proposed Blue/Orange Route and the Cedar Bend WMA Variation would require temporary construction access through wetlands which would be expected to be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the

proposed transmission line. Data related to the ROI for vegetation in the Cedar Bend WMA Variation Area are summarized in Table 6-31 and shown on Maps 5-5 and 6-13. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ between the Proposed Blue/Orange Route and the Cedar Bend WMA Variation is the loss of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-31 and Figure 6-30, the Proposed Blue/Orange Route would pass through more forested land, including state forest, therefore resulting in more permanent removal of forested vegetation relative to the Cedar Bend WMA

Table 6-31 Vegetation Resources within the Anticipated ROW in the Cedar Bend WMA Variation Area

| Resource | Evaluation Parameter | Cedar Bend WMA Variation Area | |
|--|--|-------------------------------|--------------------------|
| | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| Transmission Line | Length (mi) | 24.7 | 19.6 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 100 |
| State Forest | Acres within ROW | 372 | 78 |
| Total Forested GAP Land Cover | Acres within ROW | 543 | 266 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 338 | 117 |
| North American Boreal Forest | Acres within ROW | 110 | 57 |
| Eastern North American Cool Temperate Forest | Acres within ROW | 37 | 28 |
| Eastern North American Flooded and Swamp Forest | Acres within ROW | 58 | 64 |
| Herbaceous Agricultural Vegetation | Acres within ROW | 41 | 186 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Variation. However, both the Proposed Blue/Orange Route and the Cedar Bend WMA Variation would parallel existing transmission line corridor for their entire length, which would require expanding existing corridor, rather than creating a new ROW. The Cedar Bend WMA Variation would pass through more herbaceous agricultural vegetation relative to the Proposed Blue/Orange Route (Table 6-31). While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-5).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

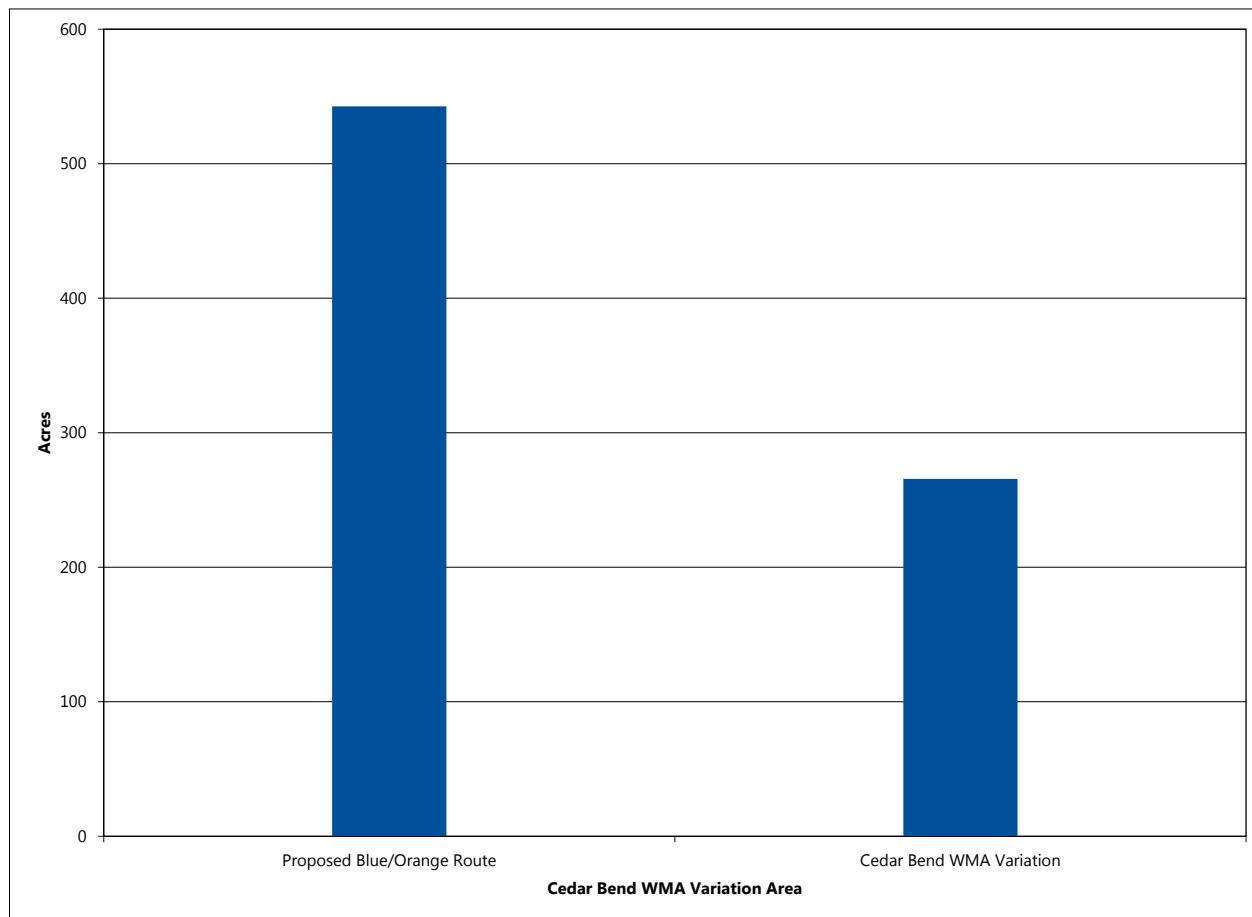
Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Cedar Bend WMA Variation Area are summarized in Table 6-32 and shown on Map 6-13. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ across the Proposed Blue/Orange Route and the Cedar Bend WMA Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue/Orange Route and the Cedar Bend WMA Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.2.3.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue/Orange Route and the Cedar Bend WMA Variation.

The Proposed Blue/Orange Route would traverse the Cedar Bend WMA, while the Cedar Bend WMA Variation would avoid this wildlife resource (Map 6-13). Forested portions of the WMA in the ROW would be cleared, resulting in permanent habitat fragmentation and displacement of wildlife species associated with those forest communities. However, both the Proposed Blue/Orange Route and the Cedar Bend WMA Variation parallel an existing transmission line corridor, where habitat fragmentation has already occurred; so this direct, long-term adverse impact would be expected to be minimal (Map 6-13).

Figure 6-30 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Cedar Bend WMA Variation Area



Source(s): USGS 2001, reference (151)

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

Table 6-32 Wildlife Resources within the Vicinity of the Cedar Bend WMA Variation Area

| Resource | Evaluation Parameter | Cedar Bend WMA Variation Area | |
|---|--|-------------------------------|--------------------------|
| | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| Transmission Line | Length (mi) | 24.7 | 19.6 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 100 |
| Wildlife Management Areas | Acres within ROW | 44 | 0 |
| Shallow Lakes | Count within ROW | 1 | 0 |
| Grassland Bird Conservation Area | Acres within ROW | 50 | 10 |

Source(s): USFWS/Partner's In Flight 2004, reference (164); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2006, reference (165); MnDNR 2010, reference (180)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-33 Rare Species Documented within One Mile of the Anticipated ROW in the Cedar Bend Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | Cedar Bend WMA Variation Area | |
|-----------------------------------|---------------------------|----------------|-----------------|----------------|-------------------------------|--------------------------|
| | | | | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| <i>Cypripedium arietinum</i> | Ram's-head Lady's-slipper | None | Threatened | Vascular Plant | X | |
| <i>Botrychium pallidum</i> | Pale Moonwort | None | Special Concern | Vascular Plant | X | |
| <i>Botrychium simplex</i> | Least Moonwort | None | Special Concern | Vascular Plant | X | |
| <i>Ichthyomyzon fossor</i> | Northern Brook Lamprey | None | Special Concern | Fish | | X |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

The Proposed Blue/Orange Route would pass through more Grassland Bird Conservation Area core areas than the Cedar Bend WMA Variation (Table 6-32 and Map 6-13); as a result, the Proposed Blue/Orange Route may have greater impacts on grassland bird species due to the potentially higher concentration of these birds in the vicinity of its ROW. While these impacts may be short-term in nature during construction, the ongoing vegetation management of the ROW in an early successional vegetative stage, would be compatible with grassland bird species' habitat requirements.

The Proposed Blue/Orange Route would require crossing an unnamed MnDNR-designated shallow lake in the southwest part of the variation area, which could result in greater impacts on wildlife that utilize this lake (Table 6-32; Map 6-13). However, the crossing of this shallow lake by the Proposed Blue/Orange Route would require expanding an existing corridor, rather than creating a new one, as this shallow lake is currently crossed by an existing transmission line (Map 6-13).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.2.3.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species

encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Cedar Bend WMA Variation Area are summarized in Table 6-33; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species differs between the Proposed Blue/Orange Route and the Cedar Bend WMA Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

As indicated in Table 6-33, three rare species have been documented within one mile of the ROW for the Proposed Blue/Orange Route, including the state-threatened ram's head lady's slipper and state special concern pale moonwort and least moonwort. The state special concern northern brook lamprey has been documented within one mile of the Cedar Bend WMA Variation; however, as mentioned in Section 5.3.5, all streams would be

Table 6-34 Rare Communities and Resources within the Vicinity of the Cedar Bend WMA Variation Area

| Resource | Type | Evaluation Parameter | Cedar Bend WMA Variation Area | |
|---|-------------------------------|--|-------------------------------|--------------------------|
| | | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| Transmission Line | -- | Length (mi) | 24.7 | 19.6 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 100 | 100 |
| MBS Sites of Biodiversity Significance | Outstanding and High Rank | Acres within ROW | 43 | 0 |
| | Total | Acres within ROW | 454 | 112 |
| High Conservation Value Forest | -- | Acres within ROW | 8 | 0 |
| MBS Native Plant Communities | Conservation Status S2 and S3 | Acres within ROW | 22 | 0 |
| | Total | Acres within ROW | 43 | 0 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167); MnDNR 2014, reference (168); MBS 2014, reference (169)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

crossed, so impacts to the northern brook lamprey are not anticipated from the proposed Project. The Proposed Blue/Orange Route may result in more impacts on rare species; however, the full extent of potential impacts from the Proposed Blue/Orange Route or the Cedar Bend WMA Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could also include plant surveys along 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. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Cedar Bend WMA Variation Area are summarized in Table 6-34 and shown on Map 6-14; additional, more detailed data on rare communities and resources is provided in Appendix E and Appendix G.

The primary impact on rare communities and resources that would differ between the Proposed Blue/Orange Route and the Cedar Bend WMA Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest. As indicated on Map 6-14 and in Table 6-34, the Proposed Blue/Orange Route would pass through more rare communities and resources relative to the Cedar Bend WMA Variation. However, both the Proposed Blue/Orange Route and the Cedar Bend WMA Variation would parallel an existing transmission line corridor for their entire length (Map 6-14).

The Proposed Blue/Orange Route would impact more MBS Sites of Biodiversity Significance, including sites ranked outstanding and/or high, which are not present in the ROW of the Cedar Bend WMA Variation (Table 6-34; Map 6-14). The Proposed Blue/Orange Route would also impact

areas designated as High Conservation Value Forest; these areas, which are absent in the Cedar Bend WMA Variation ROW, are generally associated with MBS Sites of Biodiversity Significance ranked outstanding and high.

The Proposed Blue/Orange Route would impact MBS native plant communities, including native plant communities with a conservation status of S2 (imperiled) and S3 (vulnerable to extirpation), while no MBS native plant communities have been mapped in the Variation ROW (Table 6-34; Map 6-14). As indicated on Map 6-14, the Proposed Blue/Orange Route would require crossing one large area (greater than the average span length of 1,250 feet) of clustered native plant communities; this crossing would require placement of transmission line structures within MBS native plant communities. However, this area is previously disturbed by an existing transmission line corridor (Map 6-14). Native plant community types mapped by MBS in the Cedar Bend WMA are summarized in Appendix G and include rich fens and swamps.

The rare communities and resources listed in Table 6-34 and detailed above show that the Proposed Blue/Orange Route may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in broader regional depletion of certain rare communities. 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.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.3.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-15 shows areas where the proposed route and variations would parallel corridors with existing

transportation, transmission line, or other linear features in the Cedar Bend WMA Variation Area.

Table 6-35 identifies the percentage of total transmission line length that the Proposed Blue/Orange Route or Cedar Bend WMA Variation parallels an existing corridor or linear feature in the Cedar Bend WMA Variation Area.

The Proposed Blue/Orange Route and Cedar Bend WMA Variation would parallel existing transmission line corridors for their entire length (Table 6-35).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.2.3.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-36 summarizes the costs associated with constructing the Proposed Blue/Orange Route and Cedar Bend WMA Variation in the Cedar Bend WMA Variation Area. As indicated in Table 6-36, the Proposed Blue/Orange Route would be the most expensive to construct, while the Cedar Bend WMA Variation would cost the least to construct.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$31,000 to \$60,000 annually for these alternatives in the Cedar Bend WMA Variation Area.

6.2.4 Beltrami North Variation Area

The Beltrami North Variation Area encompasses three route alternatives: the Proposed Blue/Orange Route, Beltrami North Variation 1, and Beltrami North Variation 2. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Beltrami North Variation Area, depending on the route or variation considered.

Table 6-35 Corridor Sharing in the Cedar Bend WMA Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Cedar Bend WMA Variation Area | |
|--|--|-------------------------------|--------------------------|
| | | Proposed Blue/Orange Route | Cedar Bend WMA Variation |
| Transmission Line (other linear features may be present within the transmission corridor; i.e., road, trail, PLSS, field line) | Percent of Total Length ⁽²⁾ | 100 | 100 |

Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

(1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-36 Construction Costs in the Cedar Bend WMA Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|----------------|----------------------------|--------------|-------------------------|-------------|
| Cedar Bend WMA | Proposed Blue/Orange Route | \$27,197,650 | \$1,101,119 | 24.7 |
| | Cedar Bend WMA Variation | \$23,172,312 | \$1,182,261 | 19.6 |

Source(s): Minnesota Power 2015, reference (9)

6.2.4.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Beltrami North Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Border Crossing Variation (Section 6.2.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Beltrami North Variation Area are summarized in Table 6-37 and shown on Maps 6-16, 6-17, 6-18, and 6-20.

As indicated in Table 6-37 for the Beltrami North Variation Area, the Proposed Blue/Orange Route, Beltrami North Variation 1, and Beltrami North Variation 2 would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including two state forests and two snowmobile trails (Map 6-18 and Map 6-20). The Beltrami North Variation 2 would be located within one mile of two historic architectural sites with

high visual sensitivity, whereas the Proposed Blue/Orange Route and Beltrami North Variation 1 would not be located near any historic architectural sites (Map 6-17). In addition, each of these alternatives would be located within 1,500 feet of one or more residences, which also have the potential for high visual sensitivity (Figure 6-31). Of the three alternatives in the Beltrami North Variation Area, Beltrami North Variation 1 would affect the most residences within 1,500 feet (6), none of which are located within 1,000 or 500 feet of the anticipated alignment. The Beltrami North Variation 2 would affect the fewest residences (1), none of which are located within 1,000 or 500 feet of the anticipated alignment. The Proposed Blue/Orange Route would affect three residences, two of which are located within 1,000 feet of the anticipated alignment but none within 500 feet.

Beltrami North Variation 1 is slightly shorter in length (15.8 miles) than the Proposed Blue/Orange Route (16.5 miles) and Beltrami North Variation 2 (19.7 miles; Table 6-37). However, the Proposed Blue/Orange Route parallels an existing large 500 kV transmission line for its entire length, whereas Beltrami North Variation 1 and Beltrami North Variation 2 parallel an existing 500 kV transmission line for 72 and 53 percent of their length, respectively. Beltrami North Variation 1 would affect fewer acres of state forest land (291 acres)

6.0 Comparative Environmental Consequences

Table 6-37 Aesthetic Resources within the ROI in the Beltrami North Variation Area

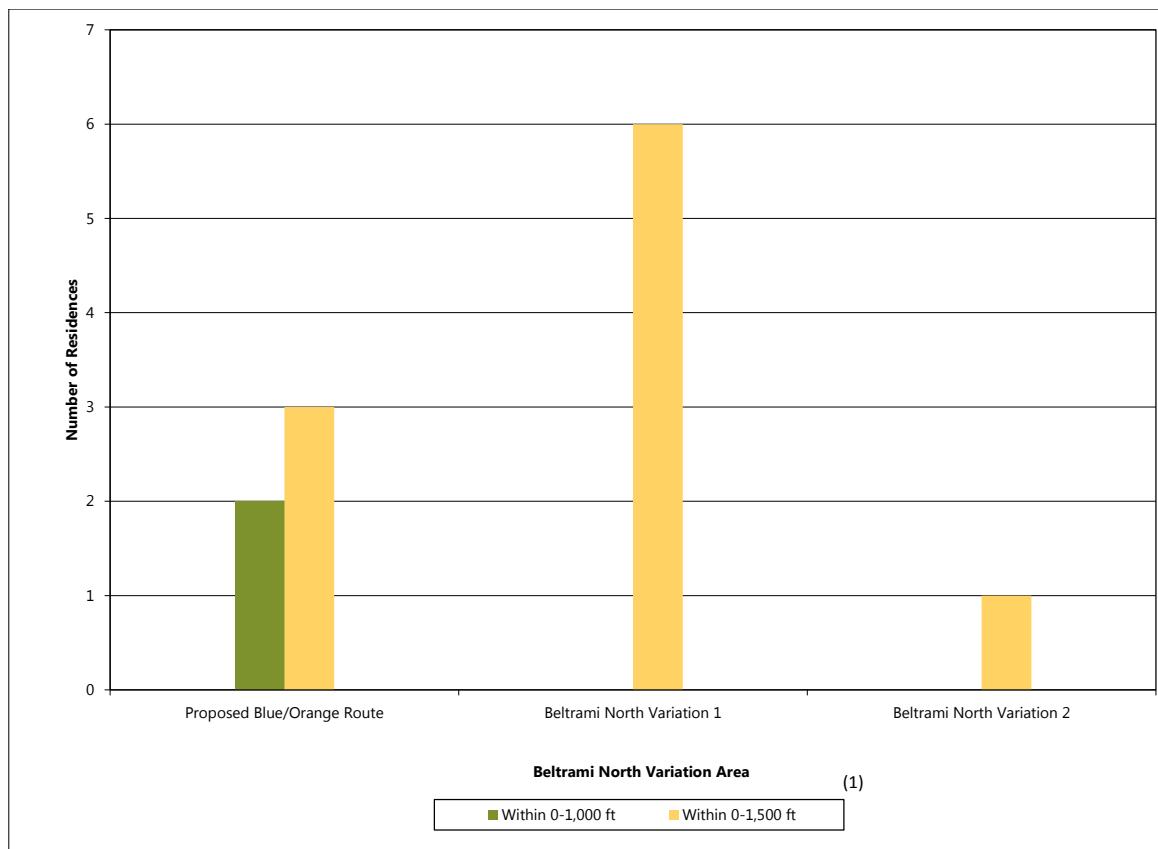
| Resource | Evaluation Parameter ⁽¹⁾ | Beltrami North Variation Area | | |
|---|--|-------------------------------|----------------------------|----------------------------|
| | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| Transmission Line | Length (mi) | 16.5 | 15.8 | 19.7 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 100 | 72 | 53 |
| Residences | Count within 0–500 ft | 0 | 0 | 0 |
| | Count within 0–1,000 ft | 2 | 0 | 0 |
| | Count within 0–1,500 ft | 3 | 6 | 1 |
| Historic Architectural Sites | Count within 0–1,500 ft | 0 | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 0 | 2 |
| State Forests | Acres within ROW | 372 | 291 | 462 |
| | Count within 0–1,500 ft | 2 | 2 | 2 |
| Snowmobile Trails | Count within 0–1,500 ft | 2 | 2 | 2 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2003, reference (148), MnDNR 2010, reference (150)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-31 Residences within the ROI in the Beltrami North Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

- (1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

than either the Proposed Blue/Orange Route (372 acres) or Beltrami North Variation 2 (462 acres). However, clearing of forest vegetation for both of these alternatives would mostly occur adjacent to an existing cleared corridor, which would expand the width of the corridor and increase contrast incrementally rather than substantially. A large portion of Beltrami North Variation 2 does not parallel an existing corridor, and therefore would require a new corridor to be cleared through the forest. Because Beltrami North Variation 1 crosses more open agricultural land than the Proposed Blue/Orange Route or Beltrami North Variation 2, it is likely to be slightly more visible to more viewers at greater distances than these two alternatives which traverse more forested lands with more limited viewing distances.

Overall, Beltrami North Variation 2 is likely to produce the greatest contrast of the three alternatives due to its longer length, greater number of acres cleared in the state forest (462 acres), and greater length of new corridor where it does not parallel an existing large transmission line (Table 6-37). The Beltrami North Variation 1 is likely to produce less contrast due to its slightly shorter length and smaller number of acres cleared in the state forest (291 acres). However, the Proposed Blue/Orange Route is likely to produce less contrast than Beltrami North Variation 1 due to following an existing large transmission line for its entire length and being slightly less visible within forested lands with more limited viewing distances. Therefore, the Proposed Blue/Orange Route is likely to produce less contrast than Beltrami North Variation 1 and substantially less contrast than Beltrami North Variation 2.

Because the Proposed Blue/Orange Route in the Beltrami North Variation Area would produce less contrast than Beltrami North Variation 1, produce substantially less contrast than Beltrami North Variation 2, and would affect slightly fewer residences (three) than Beltrami North Variation 1 (six), the Proposed Blue/Orange Route would result in less aesthetic impact than Beltrami North Variation 1 and substantially less aesthetic impact than Beltrami North Variation 2.

Because the Proposed Blue/Orange Route is short in length, parallels an existing transmission line of similar size and design for its full length, and affects very few residences (three) and other sensitive visual resources (two state forests, two snowmobile trails), aesthetic impacts of the Proposed Blue/Orange Route are expected to be minimal. Because Beltrami North Variation 1 and Beltrami North Variation 2 are short in length, parallel existing large transmission lines for relatively long or moderate portions of

their lengths, and affect few residences (six and one, respectively) and other sensitive visual resources (two state forests, two snowmobile trails, zero to two historic architectural sites), potential aesthetic impacts of Beltrami North Variation 1 and Beltrami North Variation 2 are expected to be minimal.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

Land Uses

Table 6-38 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue/Orange Route, Beltrami North Variation 1, and Beltrami North Variation 2 in the Beltrami North Variation Area. The various land uses present in the variation area are shown in Map 5-5 and residences, churches, cemeteries, and airports near the Proposed Blue/Orange Route and Beltrami North variations are shown on Map 6-16.

The Proposed Blue/Orange Route and both variations would all have some long-term direct impacts from removal of forested and/or swamp land. Forested and/or swamp land is the predominant land cover type within the ROI for the Proposed Blue/Orange Route and Beltrami North Variation 1 (Table 6-39). Beltrami North Variation 2 would impact the greatest amount of forested and/or swamp land compared to the Proposed Route and Beltrami North Variation 1. The Proposed Blue/Orange Route would impact a slightly greater amount of forested and/or swamp land than Beltrami North Variation 1. Beltrami North Variation 1 would impact a greater amount of agricultural land than either the Proposed Blue/Orange Route or Beltrami North Variation 2; however, the amount of agricultural land is comparatively small amount compared to forested and/or swamp land.

Land Ownership and Management

As identified in Table 6-39, the ROW of Beltrami North Variation 2 would impact the greatest amount of state forest land and state fee land, compared to the Proposed Route and Beltrami North Variation 1.

6.0 Comparative Environmental Consequences

Table 6-38 Land Uses within the ROI in the Beltrami North Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Beltrami North Variation Area | | |
|--|------------------------|-------------------------------------|-------------------------------|----------------------------|----------------------------|
| | | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 6,142 | 5,896 | 7,297 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 92 | 143 | 79 |
| | Agricultural | Acres within 0–1,500 ft | 84 | 358 | 22 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 5,961 | 5,391 | 7,190 |
| | Other | Acres within 0–1,500 ft | 5 | 4 | 6 |

Source(s): USGS 2001, reference (151)

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

- (1) Other category includes: Open water, Great Plains Grassland & Shrubland and Introduced & Semi Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-39 Land Ownership/Management within the Anticipated ROW in the Beltrami North Variation Area

| Resource | Type | Evaluation Parameter | Beltrami North Variation Area | | |
|--|---------------------------------------|----------------------|-------------------------------|----------------------------|----------------------------|
| | | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| Total Lands | -- | Acres within ROW | 400 | 383 | 477 |
| State Forests | -- | Acres within ROW | 372 | 291 | 462 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 364 | 297 | 450 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 353 | 294 | 445 |
| | Other—Acquired, Tax Forfeit, Volstead | Acres within ROW | 5 | 3 | 5 |
| | Trust Fund | Acres within ROW | 0 | 0 | 0 |
| | Federal - State Lease | Acres within ROW | 6 | 0 | 0 |
| USFWS Interest Lands | -- | Acres within ROW | 6 | 0 | 0 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 36 | 86 | 27 |

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152), USFWS 2014, reference (178)

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.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

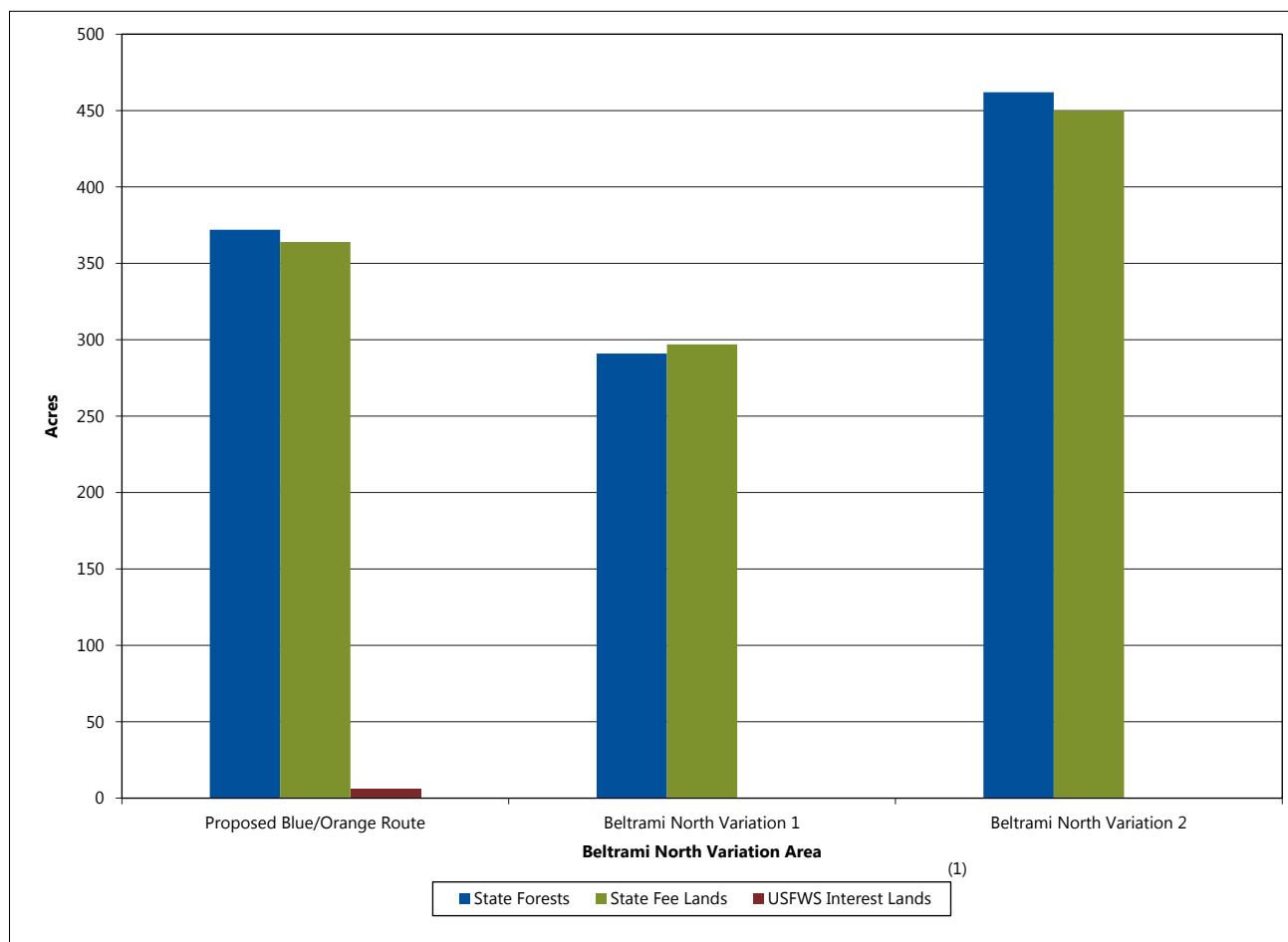
No impacts to county lands or state conservation easements would occur under the Proposed Blue/Orange Route or Beltrami North variations. The Proposed Blue/Orange Route would impact six acres of USFWS Interest Lands (crossing distance of 1,379 feet) while neither variation would impact this land ownership category (Map 6-16).

The Proposed Blue/Orange Route would parallel an existing corridor for its entire length while over 70 percent of Beltrami North Variation 1 would parallel an existing corridor and over half of Beltrami North Variation 2 would parallel an existing corridor

(see Section 6.2.4.6); and therefore, incompatibility with surrounding land uses would be minimal (Figure 6-32).

Impacts to land use from the proposed Project in the Beltrami North Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue/Orange Route and both variations would all 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

Figure 6-32 Public Land Ownership/Management within the ROI in the Beltrami North Variation Area



Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); USFWS 2014, reference (178)

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.

to have a minimal impact on land use. The length of the alternative that would parallel an existing corridor is also important, and in this case the Proposed Orange/Blue Route would parallel an existing corridor more of its length than Beltrami North Variation 1 or Beltrami North Variation 2. Beltrami North Variation 1 also affects less state forest and state fee lands than the Proposed Blue/Orange Route or Beltrami North Variation 2, thereby avoiding long-term changes to land use.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.4.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Beltrami North Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Beltrami North Variation Area are summarized in Table 6-40.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-40 and Figure 6-33 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue/Orange Route and Beltrami North variations in the ROI.

6.0 Comparative Environmental Consequences

Table 6-40 Land-Based Economy Resources within the Anticipated ROW in the Beltrami North Variation Area

| Resource | Type | Evaluation Parameter | Beltrami North Variation Area | | |
|---|-----------------------------------|--|-------------------------------|----------------------------|----------------------------|
| | | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| Transmission Line | -- | Length (mi) | 16.5 | 15.8 | 19.7 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 100 | 72 | 53 |
| Farmland | Not Farmland | Acres within ROW | 373 | 356 | 450 |
| | Prime Farmland if Drained | Acres within ROW | 27 | 19 | 27 |
| | Farmland of State-wide Importance | Acres within ROW | 0 | 0 | 0 |
| | All Areas are Prime Farmland | Acres within ROW | 0 | 8 | <0.5 |
| State Forest | -- | Acres within ROW | 372 | 291 | 462 |
| State Mineral Leases (active and/or terminated/expired) | -- | Acres within ROW | 97 | 97 | 152 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

The Proposed Blue/Orange Route, which parallels an existing transmission line corridor for its entire length, and Beltrami North Variations 1 and 2 all pass through the same acreage of farmland (Figure 6-33). The Proposed Blue/Orange Route and variations would not impact farmland, and less than 25 acres of prime farmland if drained.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

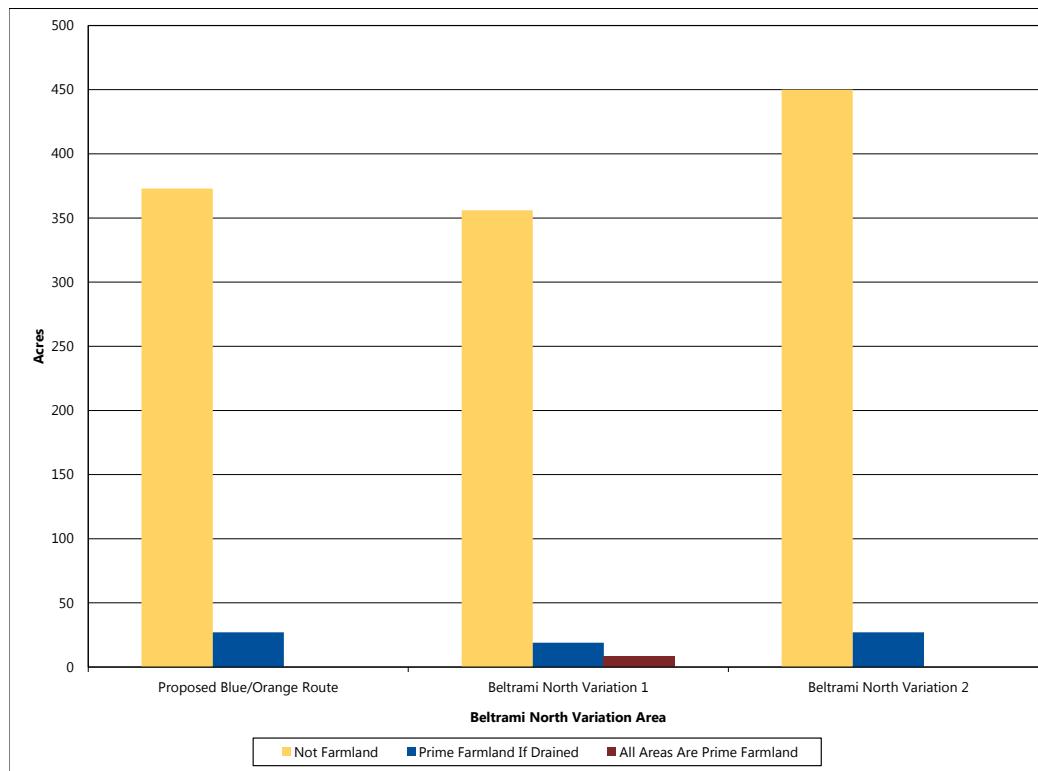
Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-40 and Figure 6-34 identify the acreage of state forest land that would be impacted in the ROI by the Proposed Blue/Orange Route and variations. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue/Orange Route or the variations in the Beltrami North Variation Area.

Beltrami North Variation 2, which has the longest transmission line route associated with it, would cross the most acres of state forest lands in the Beltrami Island State Forest (Figure 6-34, Map 6-18). Beltrami North Variation 1, which has the shortest length, would be expected to result in the least impact on timber activities in the Beltrami Island State Forest as it would cross the fewest acres of forest lands.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct impacts on forest lands from the removal of vegetation, localized physical disturbance, and soil compaction caused by equipment. Woody vegetation would routinely

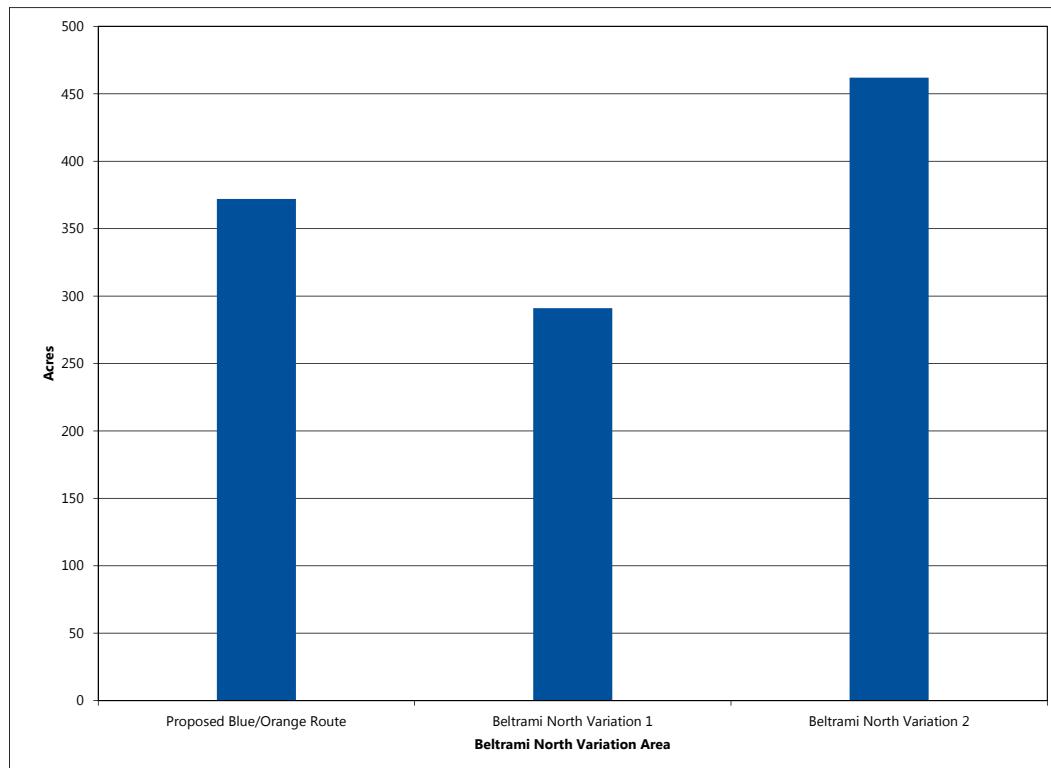
Figure 6-33 Acres of Farmland by Type within the Anticipated ROW in the Beltrami North Variation Area



Source(s): USDA NRCS 2014, reference (154)

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

Figure 6-34 Acres of State Forest Land within the Anticipated ROW in the Beltrami North Variation Area



Source(s): MnDNR 2003, reference (148)

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

need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-40, Figure 6-35, and Map 6-16 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted by the proposed route and variations in the Beltrami North Variation Area. **There are no active mineral leases**, known aggregate resources, or records of current mineral mining in the ROW of either the Proposed Blue/Orange Route or the Beltrami North variations.

The Proposed Blue/Orange Route and both Beltrami North variations would traverse mining lands with **terminated/expired** state mineral leases. Beltrami North Variation 2 would require traversing the most acres of terminated/expired state mineral lease lands (Table 6-40, Figure 6-35, and Map 6-16). While the Proposed Blue/Orange Route and both Beltrami North variations could all potentially interfere with future mining activities in this area, the Beltrami North Variation 2 could have the greatest potential impacts on future mining activity because it crosses through the most acres of **terminated/expired** state mineral lease lands.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.4.3 Archaeology and Historic Architectural Resources

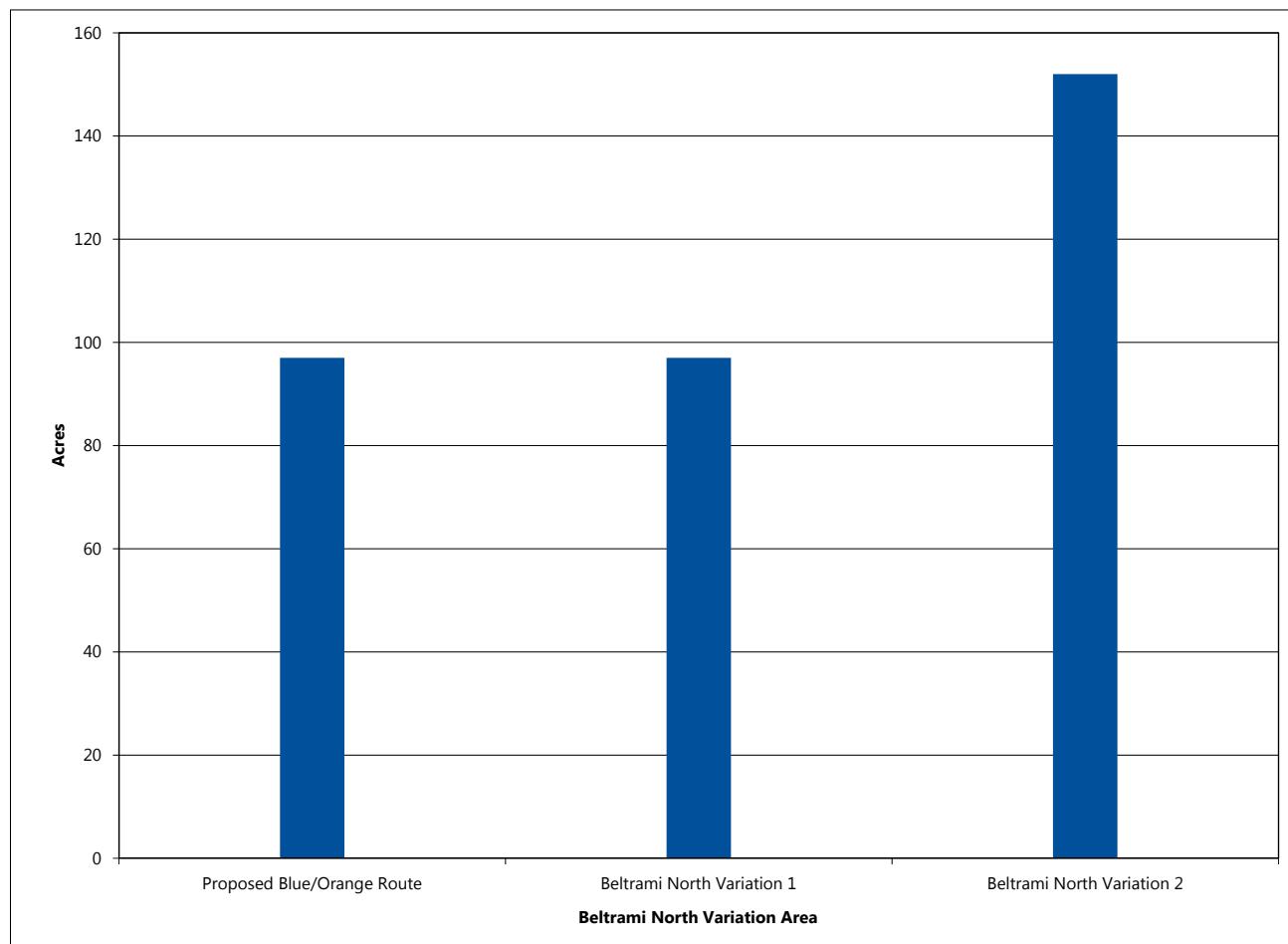
As described in Section 6.2.1.3, the APE for potential direct **impacts** to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential indirect impacts to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural site.

Table 6-41 provides a summary the previously recorded archaeological **sites** and historic **architectural** resources within the ROW (direct APE), within 1,500 feet of the anticipated alignment, and within one mile of the anticipated alignment (indirect APE) for the Proposed Blue/Orange Route and Beltrami North Variations 1 and 2 in the Beltrami North Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue/Orange Route or variations in the Beltrami North Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Beltrami North Variation Area, there are no archaeological or historic architectural sites located within the ROW of the Proposed Blue/Orange Route and Beltrami North Variation 1 that could be subject to direct adverse impacts from the proposed Project. The Beltrami North Variation 2 has an archaeological resource (Site 21ROao) within the ROW that could be directly affected by the proposed Project. The NRHP-eligibility status is unknown for this resource. **The proposed Blue/Orange Route and the Beltrami North Variation 1 do not have any previously recorded historic architectural resources documented within their indirect APEs.** The Beltrami North Variation 2 is the only proposed route or variation in the Beltrami North Variation Area that contains historic architectural sites within the indirect APE (**RO-UOG-002 and RO-UOG-004**). Site RO-UOG-002 (Clear River ghost town), has not been evaluated for NRHP eligibility, while RO-UOG-004 (Clear River Forestry Office) has been recommended not NRHP-eligible.

Figure 6-35 Acres of State Mineral Leases within the Anticipated ROW in the Beltrami North Variation Area



Source(s): MnDNR 2014, reference (179)

Table 6-41 Archaeological and Historic Resources within the Beltrami North Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Beltrami North Variation Area | | |
|------------------------------|-------------------------------------|-------------------------------|----------------------------|----------------------------|
| | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| Historic Architectural Sites | Count within ROW | 0 | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 0 | 2 |
| Archaeological Sites | Count within ROW | 0 | 0 | 1 |
| | Count within 0–1,500 ft | 0 | 0 | 2 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

There is currently no identified potential for direct, long-term, adverse impacts on archaeological or historic architectural sites within the Proposed Blue/Orange Route and Beltrami North Variation 1, although cultural resource investigations have not yet occurred for the Proposed Route or variations. Direct, adverse, long-term impacts for the Beltrami North Variation 2 could occur as a result of the presence of an archaeological resource being present within the ROW which could be affected by ground disturbing activities associated with construction of the proposed Project. Because the NRHP eligibility of the archaeological resource is unknown, the proposed Project may result in direct impacts to the resource that could be considered an adverse impact under Section 106 of the NHPA if this archaeological resource is determined NRHP-eligible. For Beltrami North Variation 2, indirect, long-term, adverse visual impacts on architectural resources within the indirect APE could potentially occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of Site RO-UOG-002 (Clear River ghost town) or within views to and from the architectural resource. Since the indirect APE for the Beltrami North Variation 2 contains historic architectural sites that have not been evaluated for NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse impact under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a character-defining feature that contributes to the significance of the resource.

The Proposed Blue/Orange Route and Beltrami North Variations 1 and 2 have not been surveyed for cultural resources. As such, archaeological surveys, architectural site surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for cultural resources. These cultural resources investigations will be implemented as part of the DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate adverse impacts on cultural resource during Project construction and operation.

Potential short- and long-term adverse effects from construction, operation, maintenance, and emergency-repair related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed

measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.2.4.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Beltrami North Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Beltrami North Variation Area are summarized in Table 6-42 and shown on Map 6-18. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmission structures in wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ across the Proposed Blue/Orange Route and Beltrami North variations. The Proposed Blue/Orange Route and Beltrami North variation ROWs contain floodplains.

The Proposed Blue/Orange Route and Beltrami North Variation 2 would each require crossing the Warroad River and the West Branch of the Warroad River once. The Proposed Blue/Orange Route would also cross one unnamed PWI watercourse and a PWI waterbody. Beltrami North Variation 1 would require the most PWI crossings, including crossing an unnamed watercourse once, the East Branch of the Warroad River in three locations, and the West Branch of the Warroad River in five locations (Figure 6-36). The Proposed Blue/Orange Route and both Beltrami North variations would not cross PWI wetlands.

The Proposed Blue/Orange Route and both Beltrami North variations would require crossing multiple non-PWI waters, as shown in Figure 6-37. Crossings would primarily be ditches and smaller watercourses, including Clausner Creek and several smaller, unnamed streams. The Proposed Blue/Orange Route would also cross a small waterbody.

The Proposed Blue/Orange Route and Beltrami North Variation 2 would each cross the East Branch of the Warroad River and the West Branch of the Warroad River once, both of which are MPCA-listed impaired waters, as shown in Table 6-24. Beltrami North Variation 1 would require eight impaired water crossings, including three crossings of the East

Table 6-42 Water Resources within the Anticipated ROW in the Beltrami North Variation Area

| Resource | Evaluation Parameter | Beltrami North Variation Area | | |
|-------------------------------|----------------------|-------------------------------|----------------------------|----------------------------|
| | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| Transmission Line | Length (mi) | 16.5 | 15.8 | 19.7 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 4 | 9 | 3 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 7 | 4 | 12 |
| Impaired Waters | Number of Crossings | 2 | 8 | 2 |
| Floodplains ⁽³⁾ | Acres within ROW | 0 | 0 | 0 |
| NWI Wetlands | Acres within ROW | 323 | 294 | 391 |

Sources: : USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); MPCA 2014, reference (119); MPCA 2014, reference (118); Minnesota Power 2014, reference (163)

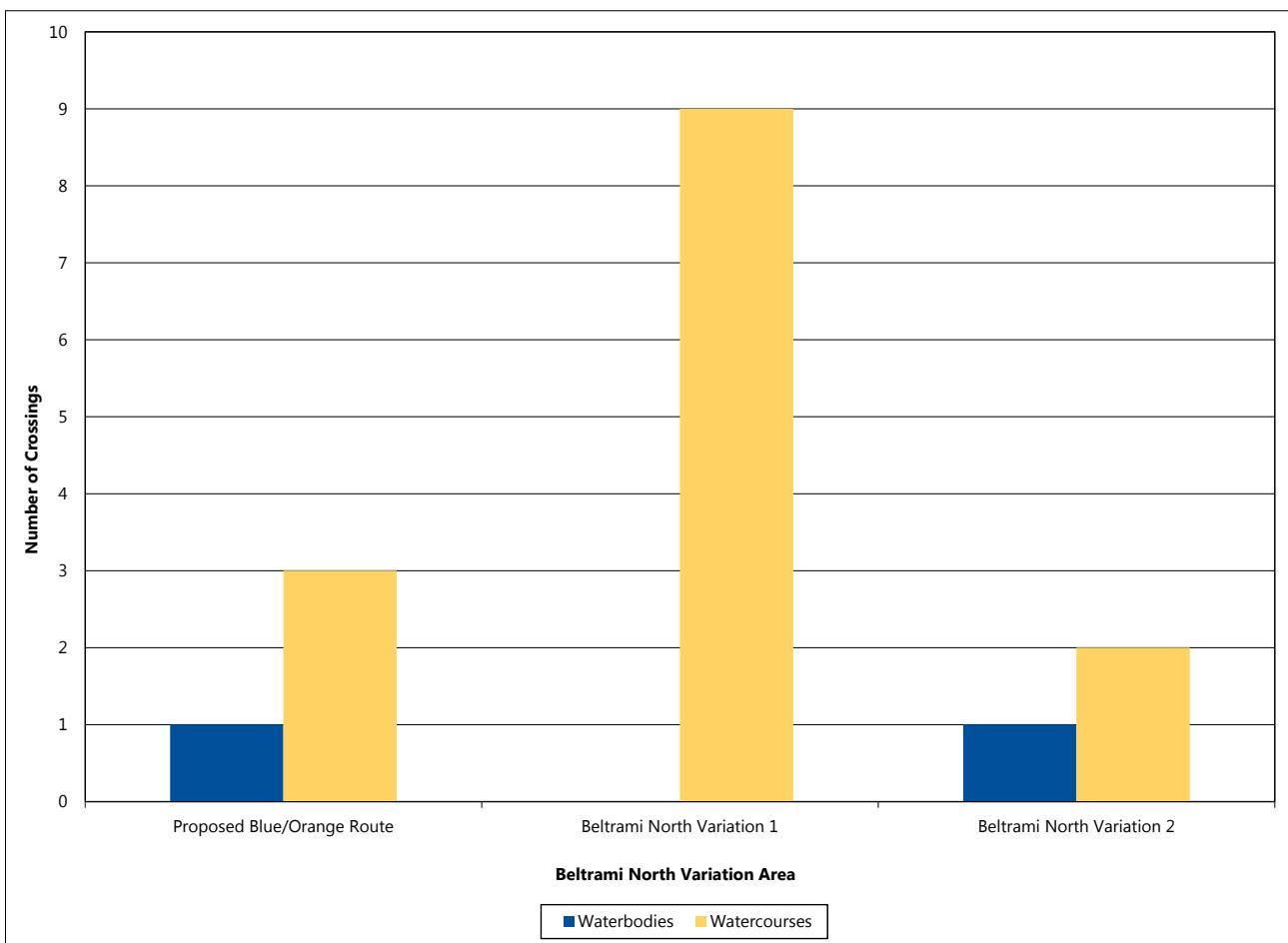
Note(s): Totals may not sum due to rounding

(1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.

(2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

(3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

Figure 6-36 PWI Water Crossings by Type in the Beltrami North Variation Area

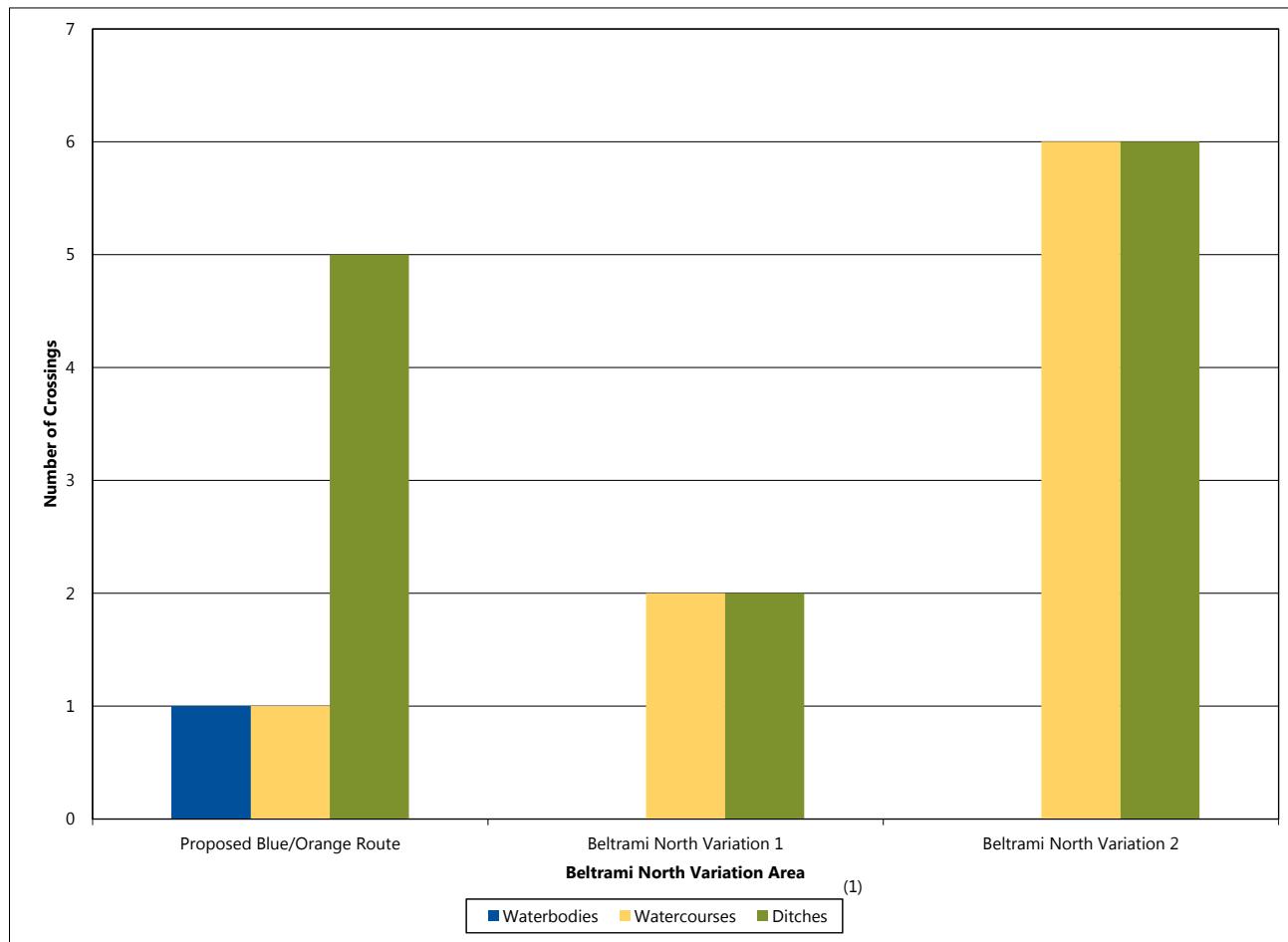


Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

6.0 Comparative Environmental Consequences

Figure 6-37 Non-PWI Water crossings by Type in the Beltrami North Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

Branch of the Warroad River and five crossings on the West Branch of the Warroad River.

It is anticipated that PWI crossings, non-PWI water crossings, and impaired waters are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Based on the NWI, the Proposed Blue/Orange Route and both Beltrami North variations would require conversion of forested and shrub wetland areas to herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-38, Beltrami North Variation 2 contains the most forested and shrub wetlands, and therefore would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount

of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. The Proposed Blue/Orange Route and both Beltrami North variations would require placement of permanent fill in wetlands for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the West Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to the large wetland complexes in the area, it would be expected that the Proposed Blue/Orange Route and both Beltrami North variations would require temporary construction access through wetlands, which is also likely to be minimal due to the short-term, localized nature of the impact, and the

Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

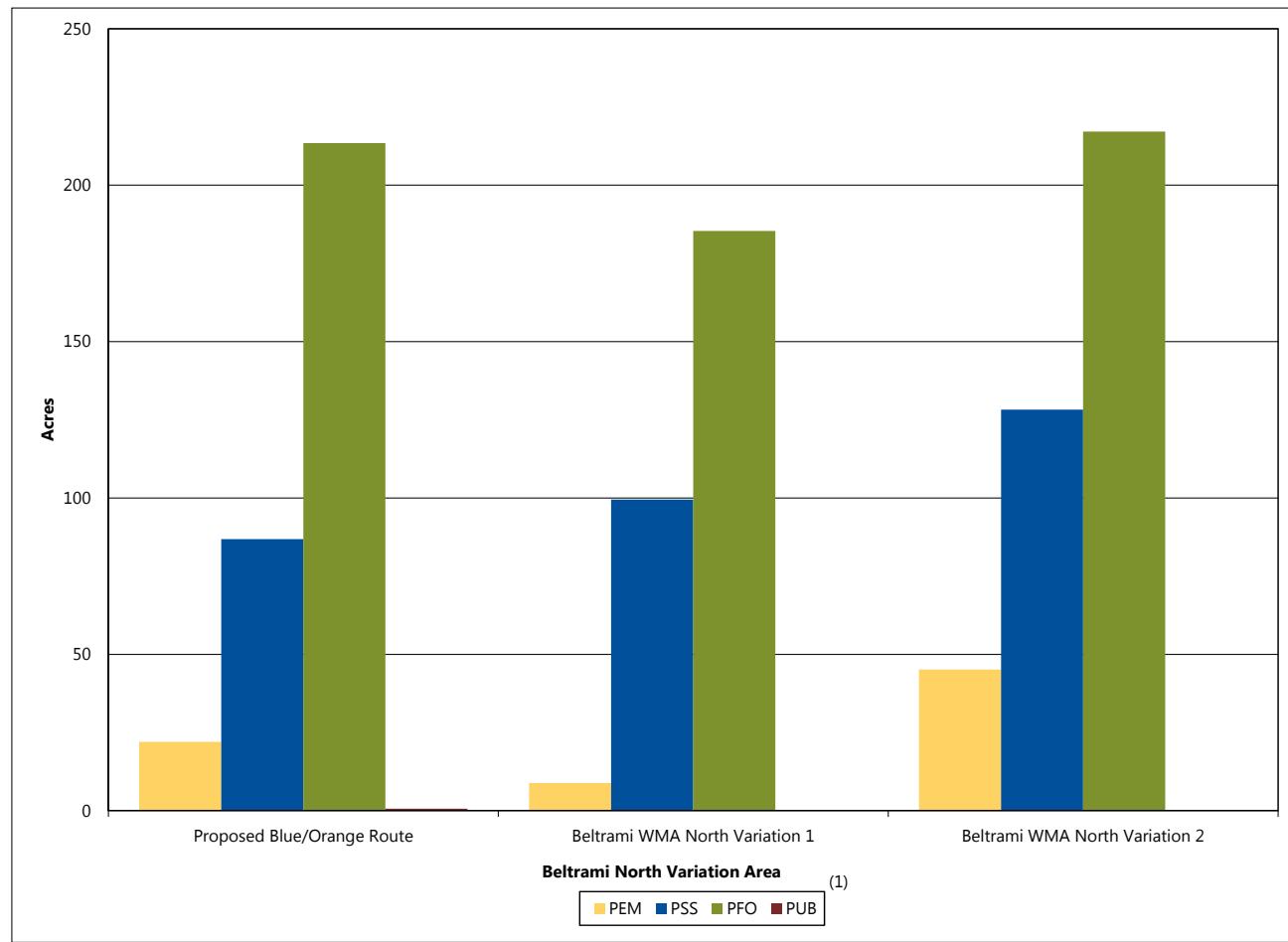
Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Beltrami North Variation Area are summarized in Table 6-43 and shown on Maps 5-5 and 6-18. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ across the Proposed Blue/Orange Route and the Beltrami North variations is the loss or fragmentation of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Figure 6-39 and Table 6-43, Beltrami North Variation 2 would pass through more forested land, including State Forest; therefore resulting in more permanent removal of forested vegetation relative to the Proposed Blue/Orange Route and Beltrami North Variation 1. In addition, Beltrami North Variation 2 follows the least amount of existing transmission line corridor and traverses further into State Forest, which would result in more fragmentation of intact forest (Map 6-18). While direct, adverse impacts to forested areas

Figure 6-38 Acres of Wetland by Type within the ROW in the Beltrami North Variation Area

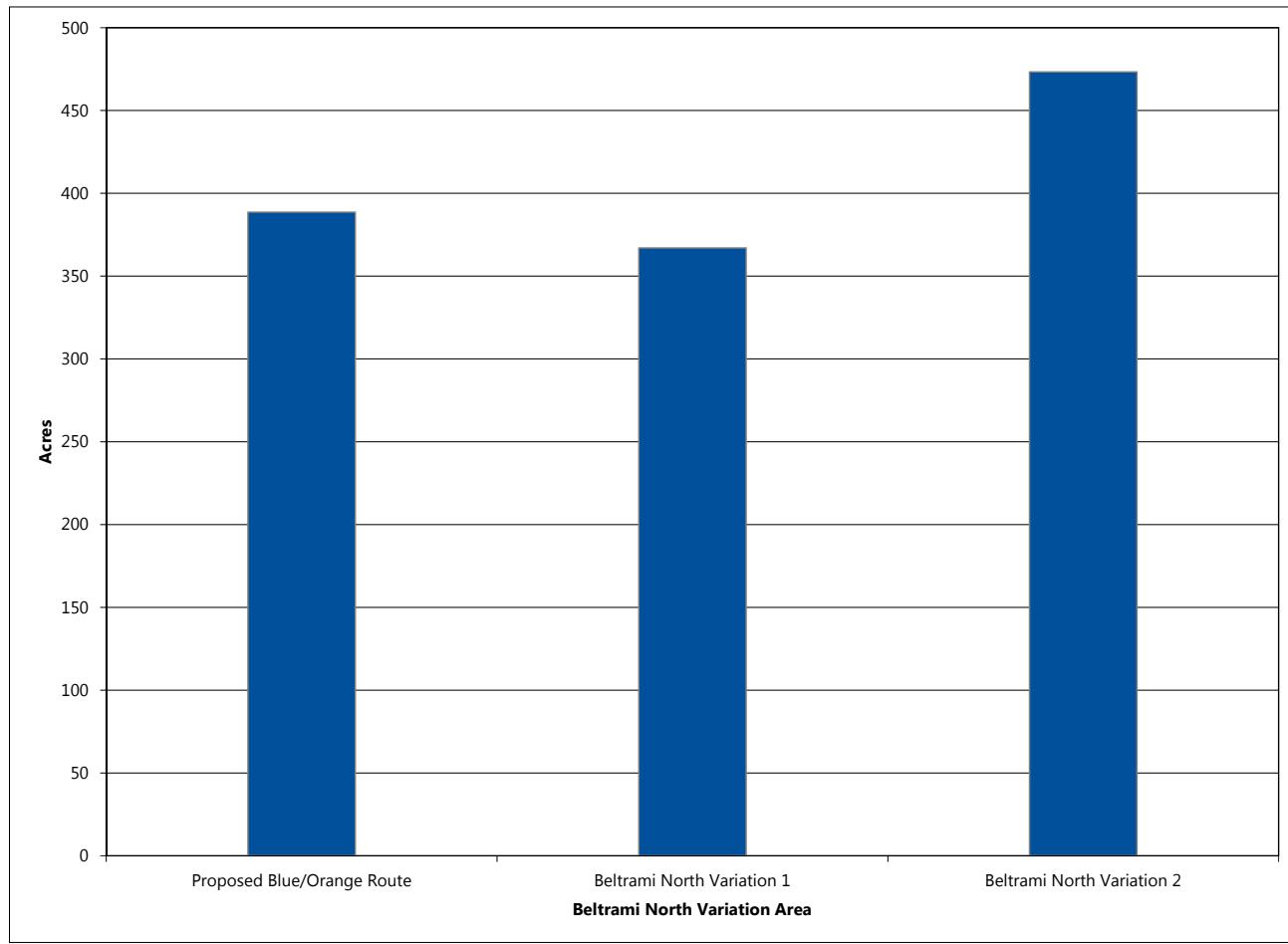


Source(s): USFWS 1997, reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

Figure 6-39 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Beltrami North Variation Area



Source(s): USGS 2001, reference (151)

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

would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-5). The Proposed Blue/Orange Route parallels an existing transmission line corridor for its entire length (Table 6-43), which would avoid forest fragmentation impacts.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Beltrami North Variation Area are summarized in Table 6-44 and shown on Map 6-18. Additional, more detailed

data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ across the Proposed Blue/Orange Route and the Beltrami North variations include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue/Orange Route and the Beltrami North variations to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.2.4.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue/Orange Route and variations.

Beltrami North Variation 2 would pass through the Big Bog Important Bird Area; which could result in more impacts on birds relative to the Proposed Blue/Orange Route and the Beltrami North Variation 1,

Table 6-43 Vegetation Resources within the Anticipated ROW in the Beltrami North Variation Area

| Resource | Evaluation Parameter | Beltrami North Variation Area | | |
|--|--|-------------------------------|----------------------------|----------------------------|
| | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| Transmission Line | Length (mi) | 16.5 | 15.8 | 19.7 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 72 | 53 |
| State Forest | Acres within ROW | 372 | 291 | 462 |
| Total Forested GAP Land Cover | Acres within ROW | 389 | 367 | 473 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | | |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 242 | 221 | 300 |
| North American Boreal Forest | Acres within ROW | 94 | 84 | 117 |
| Eastern North American Cool Temperate Forest | Acres within ROW | 27 | 24 | 21 |
| Eastern North American Flooded and Swamp Forest | Acres within ROW | 26 | 38 | 35 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Table 6-44 Wildlife Resources within the Vicinity of the Beltrami North Variation Area

| Resource | Evaluation Parameter | Beltrami North Variation Area | | |
|---|--|-------------------------------|----------------------------|----------------------------|
| | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| Transmission Line | Length (mi) | 16.5 | 15.8 | 19.7 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 72 | 53 |
| Shallow Lakes | Count within ROW | 1 | 0 | 1 |
| Important Bird Areas | Acres within ROW | 0 | 0 | 23 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2010, reference (180); Audubon Society 2014, reference (181)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

which avoid this resource (Table 6-44). The Proposed Blue/Orange Route would parallel an existing transmission line corridor for its entire length and the Beltrami North Variation 1 would parallel an existing transmission line for approximately three-quarters of its length (Map 6-18). In contrast, the Beltrami North Variation 2 would require the creation of a new corridor for approximately half of its length, including the portion that traverses into the Big Bog Important Bird Area (Map 6-18). Creation of a new corridor in the Big Bog Important Bird Area would likely result in both short-term and long-term

direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be minimal because of the overall amount of similar habitat in the surrounding region, and the long-term direct impacts would be minimized through

use of Applicant-proposed minimization measures (Section 2.13).

The Proposed Blue/Orange Route and the Beltrami North Variation 2 would require crossing the same unnamed MnDNR-designated shallow lake in the western part of the variation area, which could result in greater impacts on wildlife that utilize this lake (Table 6-44). However, the crossing of this shallow lake by the Proposed Blue/Orange Route and the Beltrami North Variation 2 would require expanding an existing corridor, rather than creating a new one, as this shallow lake is currently crossed by an existing transmission line (Map 6-18).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.2.4.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered,

threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Beltrami North Variation Area are summarized in Table 6-45; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species differs across the Proposed Blue/Orange Route and the Beltrami North variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

Table 6-45 Rare Species Documented within One Mile of the Anticipated ROW in the Beltrami North Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | Beltrami North Variation Area | | |
|----------------------------------|---------------------------|----------------|-----------------|----------------|-------------------------------|----------------------------|----------------------------|
| | | | | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| <i>Botrychium ascendens</i> | Upward-lobed Moonwort | None | Endangered | Vascular Plant | | | X |
| <i>Botrychium lunaria</i> | Common Moonwort | None | Threatened | Vascular Plant | | | X |
| <i>Cypripedium arietinum</i> | Ram's-head Lady's-slipper | None | Threatened | Vascular Plant | X | | X |
| <i>Androsace septentrionalis</i> | Northern androsace | None | Special Concern | Vascular Plant | | | X |
| <i>Botrychium minganense</i> | Mingan Moonwort | None | Special Concern | Vascular Plant | | | X |
| <i>Botrychium pallidum</i> | Pale Moonwort | None | Special Concern | Vascular Plant | | | X |
| <i>Botrychium rugulosum</i> | St. Lawrence Grapefern | None | Special Concern | Vascular Plant | | | X |
| <i>Botrychium simplex</i> | Least Moonwort | None | Special Concern | Vascular Plant | X | X | X |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

As indicated in Table 6-45, Beltrami North Variation 2 has the most documented rare species within one mile of the ROW, including the state-endangered upward-lobed moonwort and the state-threatened common moonwort and ram's head lady's slipper. The ram's head lady's slipper has also been documented within one mile of the Proposed Blue/Orange Route (Table 6-45). The Proposed Blue/Orange Route parallels an existing transmission line corridor for its entire length, while Beltrami North Variation 2 would require creation of new corridor for approximately half of its length (Map 6-19). Because of this and the higher concentration of state-endangered, threatened, and special concern species documented within one mile of the ROW, Beltrami North Variation 2 would likely result in more impacts on rare species. However, the full extent of potential impacts from the Proposed Blue/Orange Route and the Beltrami North variations cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could also include plant surveys along 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. DOE's informal consultation under Section 7 of the ESA with USFWS is currently

on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Beltrami North Variation Area are summarized in Table 6-46 and shown on Map 6-19; additional, more detailed data on rare communities and resources is provided in Appendix E and Appendix G.

The primary impact on rare communities and resources that would differ across the Proposed Blue/Orange Route and the Beltrami North variations is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-19 and in Table 6-46, Beltrami North Variation 2 would pass through more rare communities and resources, relative to the Proposed Blue/Orange Route and the Beltrami North Variation 1.

Table 6-46 Rare Communities and Resources within the Vicinity of the Beltrami North Variation Area

| Resource | Type | Evaluation Parameter | Beltrami North Variation Area | | |
|---|-------------------------------|--|-------------------------------|----------------------------|----------------------------|
| | | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| Transmission Line | -- | Length (mi) | 16.5 | 15.8 | 19.7 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 100 | 72 | 53 |
| MBS Sites of Biodiversity Significance | Outstanding and High Rank | Acres within ROW | 0 | 6 | 30 |
| | Total | Acres within ROW | 369 | 276 | 460 |
| High Conservation Value Forest | -- | Acres within ROW | 8 | 0 | 8 |
| MBS Native Plant Communities | Conservation Status S2 and S3 | Acres within ROW | 0 | 0 | 8 |
| | Total | Acres within ROW | 0 | 0 | 30 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167); MnDNR 2014, reference (168); MBS 2014, reference (169)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Beltrami North Variation 2 would impact the most MBS Sites of Biodiversity Significance, including sites ranked outstanding and/or high (Table 6-46; Map 6-19). Variation 2 and the Proposed Blue/Orange Route would impact the edge of an area designated as High Conservation Value Forest; however, this area is already crossed by an existing transmission line corridor (Map 6-19).

Beltrami North Variation 2 would impact MBS native plant communities, including native plant communities with a conservation status of S2 (imperiled) and S3 (vulnerable to extirpation) and would require the creation of a new corridor in this area. No MBS native plant communities have been mapped in the ROWs of the Proposed Blue/Orange Route and the Beltrami North Variation 1 (Table 6-46; Map 6-19). As indicated on Map 6-19, Beltrami North Variation 2 would require crossing two to three large areas (greater than the average span length of 1,250 feet) of clustered native plant communities; these crossings would require placement of transmission line structures within MBS native plant communities. Native plant community types mapped by MBS along Beltrami North Variation 2 are summarized in Appendix G and include rich fens, swamps, and upland forest.

The rare communities and resources listed in Table 6-46 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse

impacts would result in broader regional depletion of certain rare communities. 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.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.4.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-20 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Beltrami North Variation Area.

Table 6-47 identifies the percentage of total transmission line length that the Proposed Blue/Orange Route or Beltrami North variations parallel an existing corridor or linear feature in the Beltrami North Variation Area.

The Proposed Blue/Orange Route would parallel existing transmission line corridors for the entire length (Figure 6-40). The Beltrami North Variations 1 and 2 would parallel existing infrastructure corridors for less than two thirds of their lengths, with over

Table 6-47 Corridor Sharing in the Beltrami North Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Beltrami North Variation Area | | |
|---|--|-------------------------------|----------------------------|----------------------------|
| | | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, PLSS, field line) | Percent of Total Length ⁽²⁾ | 100 | 72 | 53 |
| Field Line (other linear features, but not transmission lines or roads/trails, may be present within the field line corridor; i.e., PLSS) | Percent of Total Length ⁽²⁾ | 0 | 2 | 0 |
| None | Percent of Total Length ⁽²⁾ | 0 | 26 | 47 |

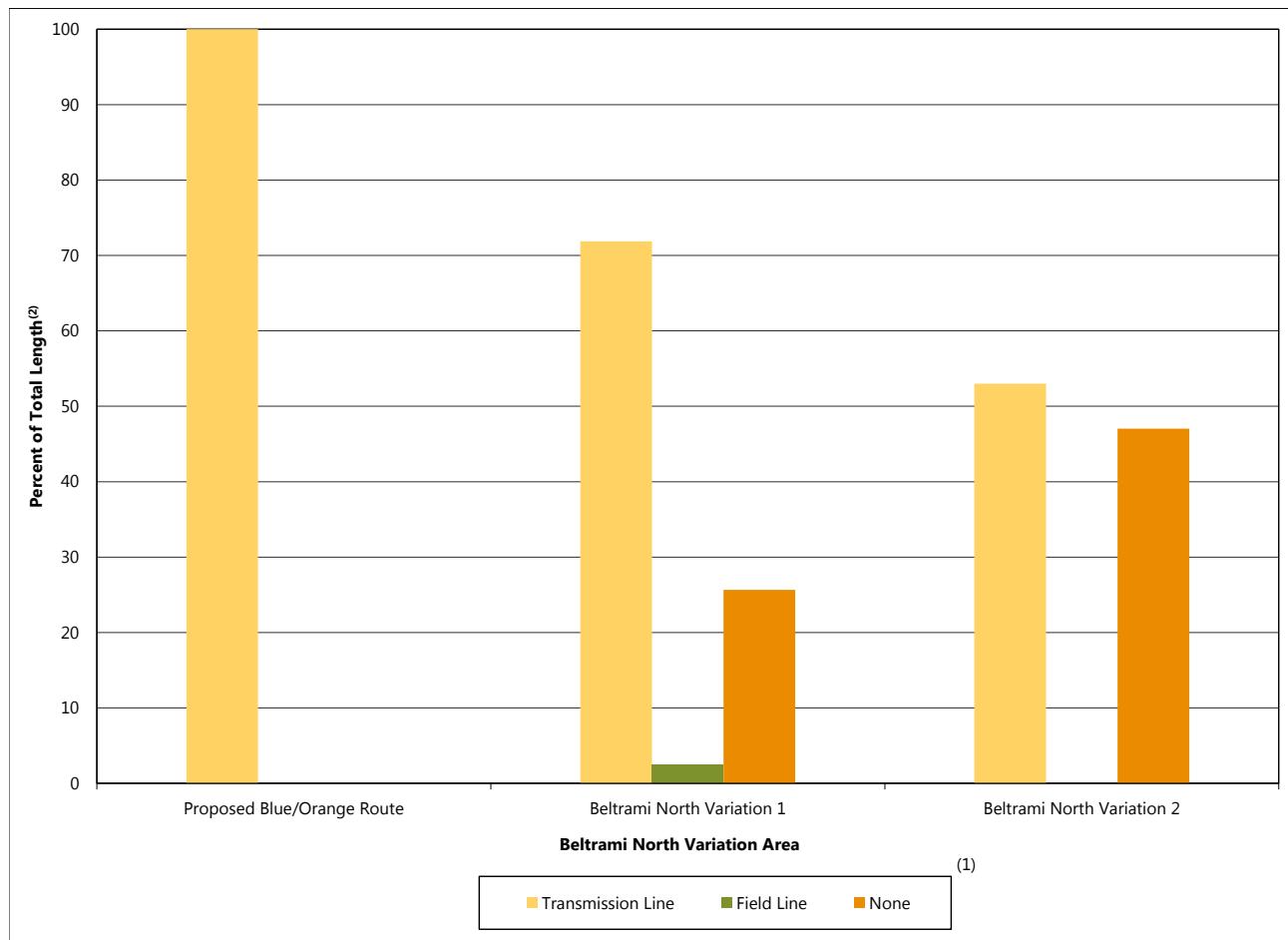
Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MnDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

(1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-40 Corridor Sharing in the Beltrami North Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS); Field Line (other linear features, but not transmission lines or roads/trails, may be present within the field line corridor; i.e., PLSS).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

half of their lengths paralleling existing transmission line corridors.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.2.4.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-48 summarizes the costs associated with constructing

the Proposed Blue/Orange Route and variations in the Beltrami North Variation Area. As indicated in Table 6-48, Beltrami North Variation 2 would be the most expensive to construct, while the Proposed Blue/Orange Route and Beltrami North Variation 1, which would have similar construction costs, would cost less to construct.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013, reference (135)). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$25,000 to \$32,000 annually for these alternatives in the Beltrami North Variation Area.

Table 6-48 Construction Costs in the Beltrami North Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|----------------|----------------------------|---------------------|-------------------------|-------------|
| Beltrami North | Proposed Blue/Orange Route | \$18,984,370 | \$1,150,568 | 16.5 |
| | Beltrami North Variation 1 | \$19,591,668 | \$1,239,979 | 15.8 |
| | Beltrami North Variation 2 | \$24,571,721 | \$1,247,295 | 19.7 |

Source(s): Minnesota Power 2015, reference (9)

6.2.5 Beltrami North Central Variation Area

The Beltrami North Central Variation Area encompasses six route alternatives: the Proposed Blue/Orange Route, Beltrami North Central Variation 1, Beltrami North Central Variation 2, Beltrami North Central Variation 3, Beltrami North Central Variation 4, and Beltrami North Central Variation 5. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Beltrami North Central Variation Area, depending on the route or variation considered.

6.2.5.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Beltrami North Central Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Border Crossing Variation (see Section 6.2.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment could have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Beltrami North Central Variation Area are summarized in Table 6-49 and shown on Maps 6-21, 6-22, 6-23, and 6-25.

As indicated in Table 6-49 for the Beltrami North Central Variation Area, the Proposed Blue/Orange Route and Beltrami North Central Variations 1, 2, 3, 4, and 5 would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including two state forests and one snowmobile trail (Map 6-23 and Map 6-25). Beltrami North Central Variation 4 and Beltrami North Central Variation 5

would also be located within one mile of one historic architectural site (Map 6-22). In addition, each of these alternatives would be located within 1,500 feet of two or more residences, which also have high visual sensitivity (Figure 6-41). Of the six routes in the Beltrami North Central Variation Area, Beltrami North Central Variation 4 would affect the most residences within 1,500 feet of the anticipated alignment (10), Beltrami North Central Variations 1 and Beltrami North Central Variation 1 and Beltrami North Central Variation 2 would affect the fewest residences (2 each). Of the total residences within 1,500 feet of the anticipated alignment for the Beltrami North Central Variation 4 would also have the most residences located within 1,000 feet (five) and 500 feet (three) of the alignment, compared to the Proposed Blue/Orange Route (two and one, respectively), Beltrami North Central Variation 1 (zero and zero, respectively), Beltrami North Central Variation 2 (one and one, respectively), Beltrami North Central Variation 3 (one and one, respectively), and Beltrami North Central Variation 5 (four and two, respectively).

The Proposed Blue/Orange Route and Beltrami North Central variations are similar in length, with the Proposed Blue/Orange Route the shortest (11.6 miles) and Beltrami North Central Variation 5 the longest (15.0 miles). Therefore, based on length, the Proposed Blue/Orange Route is likely to be slightly less noticeable and Beltrami North Central Variation 5 is likely to be slightly more noticeable to greater numbers of viewers in the Beltrami North Central Variation Area.

The Proposed Blue/Orange Route and Beltrami North Central variations all cross state forest lands (two each) and affect similar numbers of acres that would be cleared for the ROW (Table 6-49). Beltrami North Central Variation 3 and Beltrami North Central 4 would affect the fewest acres of state forest at 184 and 178 acres, respectively and Beltrami North Central Variation 2 would affect the most state forest lands (255 acres).

The Proposed Blue/Orange Route parallels an existing large transmission line for its entire length

Table 6-49 Aesthetic Resources within the ROI in the Beltrami North Central Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Beltrami North Central Variation Area | | | | | |
|---|--|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | Proposed Blue/Orange Route | 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 |
| Transmission Line | Length (mi) | 11.6 | 13.7 | 12.6 | 12.2 | 13.5 | 15.0 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 100 | 48 | 49 | 70 | 92 | 70 |
| Residences | Count within 0–500 ft | 1 | 0 | 1 | 1 | 3 | 2 |
| | Count within 0–1,000 ft | 2 | 0 | 1 | 1 | 5 | 4 |
| | Count within 0–1,500 ft | 3 | 2 | 2 | 4 | 10 | 8 |
| Historic Architectural Sites | Count within 0–1,500 ft | 0 | 0 | 0 | 0 | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 0 | 0 | 0 | 1 | 1 |
| State Forests | Acres within ROW | 224 | 237 | 255 | 184 | 178 | 230 |
| | Count within 0–1,500 ft | 2 | 2 | 2 | 2 | 2 | 2 |
| Snowmobile Trails | Count within 0–1,500 ft | 1 | 1 | 1 | 1 | 1 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2003, reference (148), MnDNR 2010 reference (150)

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

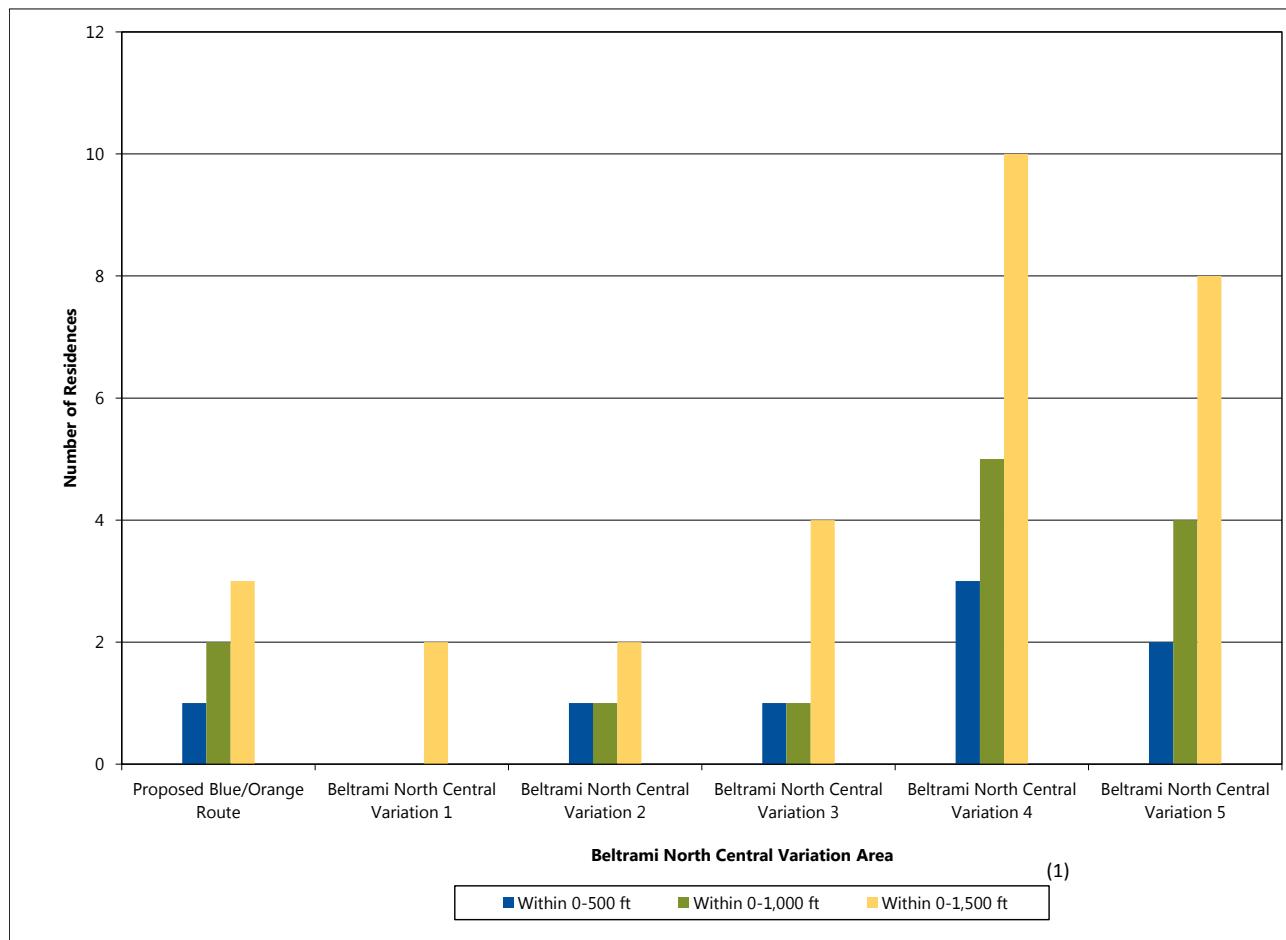
- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

and Beltrami North Central Variation 4 parallels existing large transmission lines for most of its length (92 percent). The other four Beltrami North Central variations parallel existing transmission lines for less of their lengths, ranging from 50 to 70 percent (Table 6-49). Although the Proposed Blue/Orange Route and Beltrami North Central Variation 4 would parallel existing transmission lines for all or most of their lengths, the Proposed Blue/Orange Route would parallel an existing 500 kV transmission line with similar structure design, while Beltrami North Central Variation 4 would parallel an existing 230 kV transmission line with a slightly different structure design. For these reasons, the Proposed Blue/Orange Route would produce less contrast than Beltrami North Central Variation 4 and substantially less contrast than the other four variations.

Because the Proposed Blue/Orange Route and Beltrami North Central Variations 3, 4, and 5 parallel

existing large transmission lines of similar size and design for all or most of their lengths (70 to 100 percent), and affect low numbers of residences (three to 10) and other sensitive visual resources (zero to one historic architectural sites, two state forests, and one snowmobile trail), potential aesthetic impacts of the Proposed Blue/Orange Route and Beltrami North Central Variations 3, 4, and 5 are expected to be minimal. Similarly, although Beltrami North Central Variations 1 and 2 parallel existing large transmission lines for smaller portions of their lengths (48 to 49 percent) as compared to the Proposed Blue/Orange Route and variations, they are comparable in length and affect very few residences (two each) and other sensitive visual resources (two state forests, and one snowmobile trail), therefore, potential aesthetic impacts of Beltrami North Central Variations 1 and 2 are expected to be minimal. Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are

Figure 6-41 Residences within the ROI in the Beltrami North Central Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

Land Uses

Table 6-50 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue/Orange Route, Beltrami North Central Variation 1, Beltrami North Central Variation 2, Beltrami North Central Variation 4, and Beltrami North Central Variation 5 in the Beltrami North Central Variation Area. Generally, the percentage of

each land use is representative of what is present within the ROW. The various land uses present in the variation area are shown in Map 5-5 and residences, churches, cemeteries, and airports near the Proposed Blue/Orange Route and Beltrami North Central variations are shown on Map 6-21.

The Proposed Blue/Orange Route and all variations would have some long-term direct impacts from removal of forested and/or swamp land. Beltrami North Central Variation 5 would impact the greatest amount of forested and/or swamp land compared to the Proposed Blue/Orange Route and other variations (Table 6-51). The Proposed Blue/Orange Route would impact fewer acres of forested and/or swamp land compared to all the variations. Beltrami North Central Variations 4 and 5 would impact the largest amount of agricultural land, while the Proposed Blue/Orange Route and Beltrami North

Table 6-50 Land Uses within the ROI in the Beltrami North Central Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Beltrami North Central Variation Area | | | | | |
|--|------------------------|-------------------------------------|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | | Proposed Blue/Orange Route | 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 |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 4,361 | 5,124 | 4,709 | 4,590 | 5,083 | 5,619 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 49 | 64 | 48 | 75 | 131 | 121 |
| | Agricultural | Acres within 0–1,500 ft | 1 | 49 | 0 | 49 | 276 | 277 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 4,305 | 5,005 | 4,653 | 4,460 | 4,674 | 5,219 |
| | Other | Acres within 0–1,500 ft | 6 | 6 | 8 | 6 | 2 | 2 |

Source(s): USGS 2001, reference (151)

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

- (1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Central Variation 2 would impact the least amount of agricultural land within their respective ROI.

Land Ownership and Management

As shown in Table 6-51, the Proposed Blue/Orange Route, Beltrami North Central Variation 1, Beltrami North Central Variation 2, and Beltrami North Central Variation 5 would impact a similar amount of state forest and state fee land, while the Beltrami North Central Variation 2 would impact a greater amount of state forest land and state fee land. The Beltrami North Central Variation 3 would impact the least amount of state forest and state fee land. The Proposed Blue/Orange Route and Beltrami North Central Variation 2 would both impact USFWS Interest Lands, while the other variations would not. The Proposed Blue/Orange Route would impact a total of approximately 18 acres of USFWS Interest Land, composed of two crossings with lengths of 1,691 feet and 2,289 feet (Map 6-21). Beltrami North Central Variation 2 would impact one acre of USFWS Interest Land and have a crossing length of one foot (Map 6-21).

The entire length of the Proposed Blue/Orange Route would parallel an existing corridor, while over 90 percent of Beltrami North Central Variation 4 and 70 percent of Beltrami North Central Variations 3 and 5 would parallel an existing corridor (Figure 6-42); therefore incompatibility with adjacent land would be minimized. Less than half of the

length of Beltrami North Central Variation 1 and Beltrami North Central Variation 2 would parallel an existing corridor (see Section 6.2.5.6).

Impacts to land use from the proposed Project in Beltrami North Central Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue/Orange Route and Beltrami North Central variations would all 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. The length of the alternative that would parallel an existing corridor is also important. In this case the Proposed Blue/Orange Route would parallel an existing corridor more of its length than any of the variations. Beltrami North Central Variation 4 avoids the greatest amount of state forest and state fee lands as compared to the Proposed Route, Beltrami North Central Variation 1, Beltrami North Central Variation 2, Beltrami North Central Variation 3, and Beltrami North Central Variation 5, thereby avoiding long-term changes to land use.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Table 6-51 Land Ownership/Management within the Anticipated ROW in the Beltrami North Central Variation Area

| Resource | Type | Evaluation Parameter | Beltrami North Central Variation Area | | | | | |
|--|---|----------------------|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | | Proposed Blue/Orange Route | 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 |
| Total Lands | -- | Acres within ROW | 281 | 332 | 305 | 296 | 329 | 365 |
| State Forests | -- | Acres within ROW | 224 | 237 | 255 | 184 | 178 | 230 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 213 | 217 | 246 | 184 | 178 | 210 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 195 | 217 | 246 | 184 | 178 | 210 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 0 | 0 | 0 | 0 | 0 | 0 |
| | Trust Fund | Acres within ROW | 0 | 0 | 0 | 0 | 0 | 0 |
| | Federal - State Lease | Acres within ROW | 18 | 0 | 1 | 0 | 0 | 0 |
| USFWS Interest Lands | -- | Acres within ROW | 18 | 0 | 1 | 0 | 0 | 0 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 68 | 115 | 59 | 112 | 151 | 155 |

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); USFWS 2014, reference (178)

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.

(2) Acreage for private lands was calculated as the difference between total lands and public lands.

6.2.5.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Beltrami North Central Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Beltrami North Central Variation Area are summarized in Table 6-52.

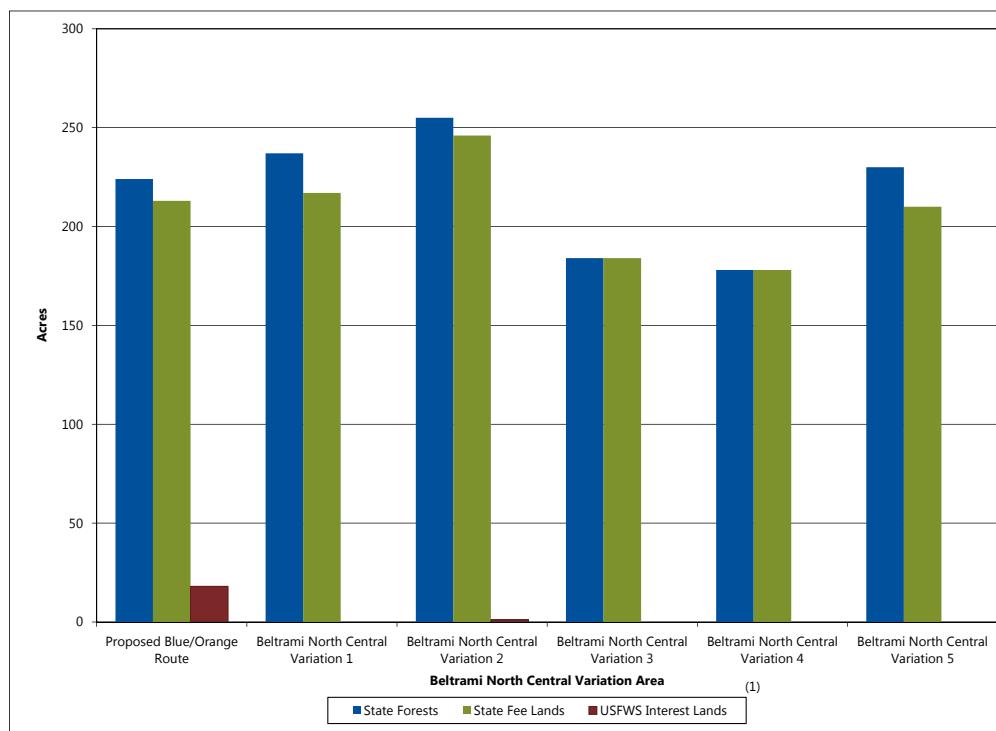
Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-52 and Figure 6-43 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue/Orange Route and Beltrami North Central variations in the ROI.

The Beltrami North Central Variations 4 and 5 would pass through the most acres of farmland, including

the most acres of prime farmland if drained, farmland of statewide importance, and prime farmland (Figure 6-43). The Proposed Blue/Orange Route and Beltrami North Central Variations 1, and 3 would impact 10 acres of farmland of statewide importance and would not impact prime farmland. The Beltrami North Central Variation 2, which parallels existing transmission line corridor for nearly half of its length, would not impact farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from

Figure 6-42 Public Land Ownership/Management within the ROI in the Beltrami North Central Variation Area⁽¹⁾

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); USFWS 2014, reference (178)

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.

Table 6-52 Land-Based Economy Resources within the Anticipated ROW in the Beltrami North Central Variation Area

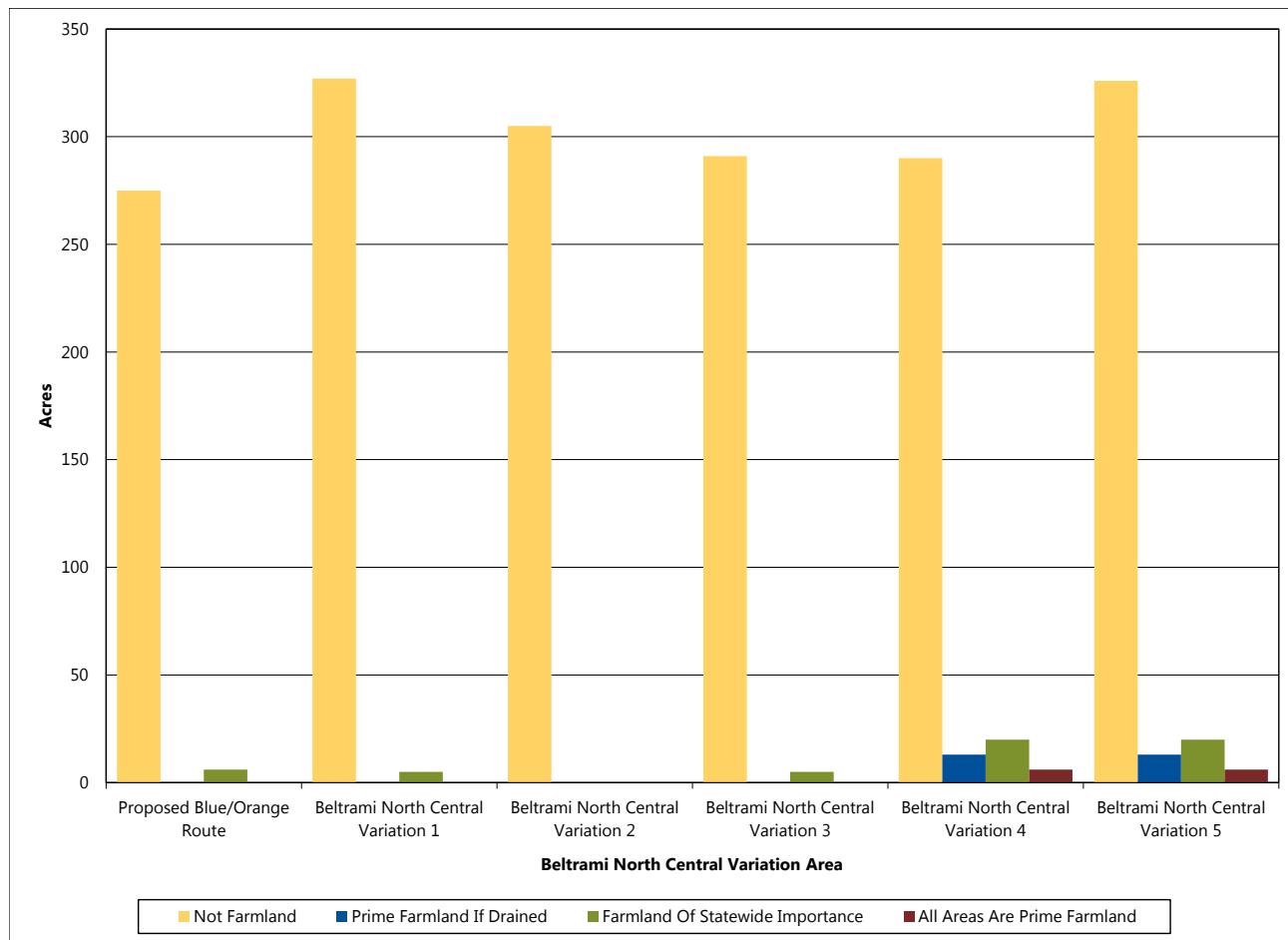
| Resource | Type | Evaluation Parameter | Beltrami North Central Variation Area | | | | | |
|---|-----------------------------------|--|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | | Proposed Blue/Orange Route | 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 |
| Transmission Line | -- | Length (mi) | 11.6 | 13.7 | 12.6 | 12.2 | 13.5 | 15.0 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 100 | 48 | 49 | 70 | 92 | 70 |
| Farmland | Not Farmland | Acres within ROW | 275 | 327 | 305 | 291 | 290 | 326 |
| | Prime Farmland if Drained | Acres within ROW | 0 | 0 | 0 | 0 | 13 | 13 |
| | Farmland of State-wide Importance | Acres within ROW | 6 | 5 | 0 | 5 | 20 | 20 |
| | All Areas are Prime Farmland | Acres within ROW | 0 | 0 | 0 | 0 | 6 | 6 |
| State Forest | -- | Acres within ROW | 224 | 237 | 255 | 184 | 178 | 230 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR 2003, reference (148)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-43 Acres of Farmland by Type within the Anticipated ROW in the Beltrami North Central Variation Area



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

Source(s): USDA NRCS 2014, reference (154)

the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-52 and Figure 6-44 identify the acreage of state forest land that would be impacted in the ROI by the Proposed Blue/Orange Route and variations. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue/Orange Route or the variations in the Beltrami North Central Variation Area.

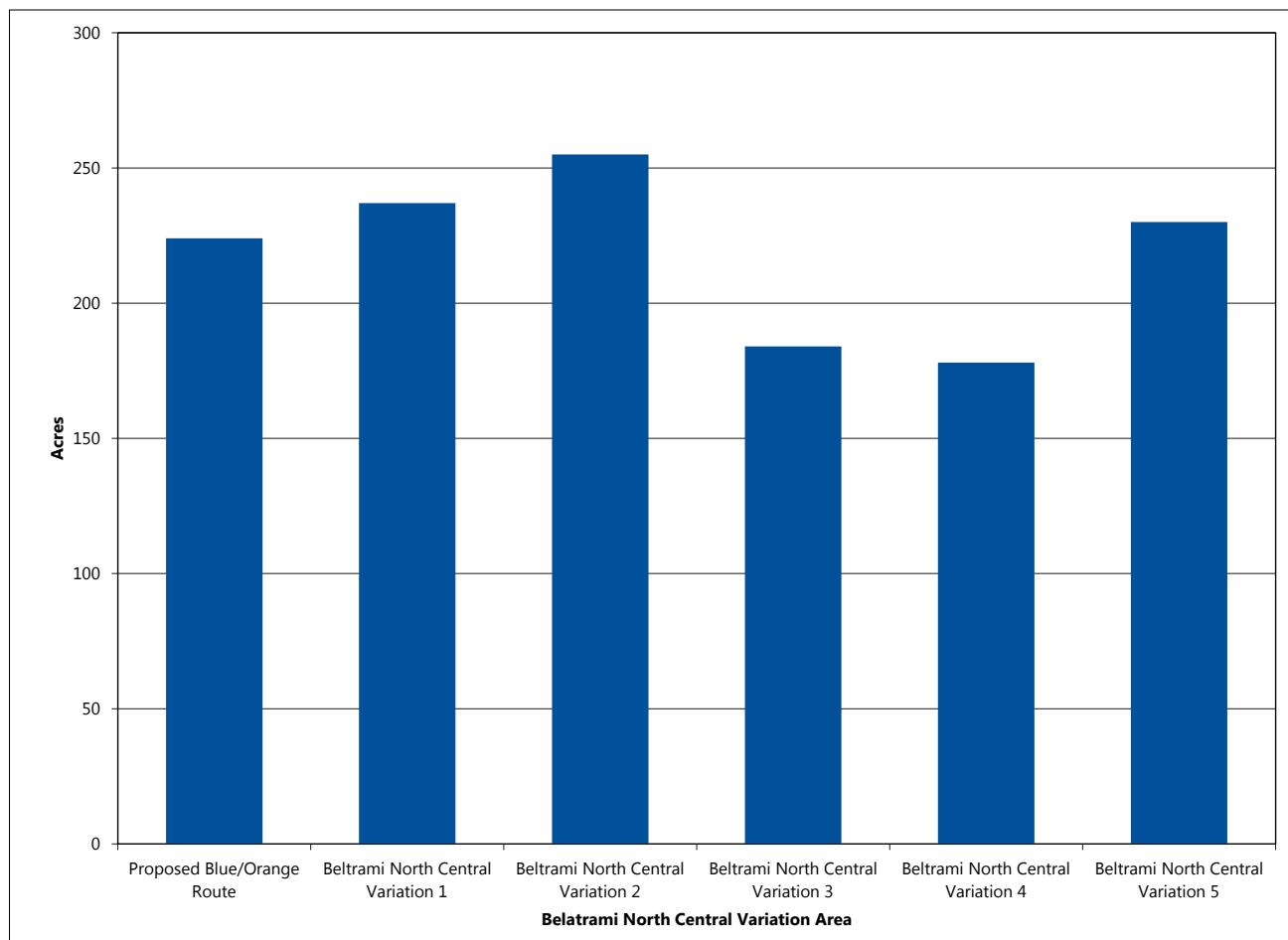
Beltrami North Central Variation 2, which would parallel an existing transmission line for 49 percent

of its length, would cross the most acres of state forest lands - the Beltrami Island State Forest (Figure 6-44, Map 6-21). The Beltrami North Central Variation 4, which parallels an existing 230 kV transmission line for 92 percent of its length, would be expected to have the fewest impacts on timber activities in the Beltrami Island State Forest.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct impacts on forest lands from the removal of vegetation, localized physical disturbance, and soil compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term

Figure 6-44 Acres of State Forest Land within the Anticipated ROW in the Beltrami North Central Variation Area



Source(s): MnDNR 2003, reference (148)

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

impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. There are no active or expired/terminated state mineral leases, records of current mineral mining, or known aggregate resources that would be impacted by the proposed route or the variations in within the Beltrami North Central Variation Area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. However, such impacts are not expected

from the proposed Project because such activities do not exist nor are planned in this area.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.5.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential indirect impacts to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural site.

Table 6-53 provides a summary of the previously recorded archaeological sites and historic architectural resources within the ROW (direct APE), within 1,500 feet of the anticipated alignment and within one mile of the anticipated alignment (indirect APE) for the Proposed Blue/Orange Route and Beltrami North Central Variations 1, 2, 3, 4, and 5 in the Beltrami North Central Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue/Orange Route and variations in the Beltrami North Central Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

No previously recorded archaeological sites or historic architectural resources are located within the ROW for the Proposed Blue/Orange Route and Beltrami North Central Variations 1, 2, 3, 4, and 5. Beltrami North Central Variations 4 and 5 are both located within the indirect, one mile, APE of a previously recorded historic resource (Map 6-22); site LW-UOG-038, a school, has not been evaluated for NRHP eligibility.

There is currently no identified potential for direct, adverse, long-term impacts on archaeological or historic architectural sites as there were no sites located within the direct APE in the Beltrami North Central Variation Area routes or variations, although cultural resource investigations have not yet occurred for the Proposed Route or variations. Indirect, long-term, adverse visual impacts on architectural resources within the indirect APEs could potentially occur for the architectural resource identified within Beltrami North Central Variation 4 and 5 if the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resource or within views to and from the architectural resource. Since the indirect APE for the Beltrami North Central Variation 5 contains historic architectural sites that have not been evaluated for NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse impact under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a

character defining feature that contributes to the significance of the resource.

The proposed route and variations have not, yet, been surveyed for cultural resources. As such, archaeological surveys, architectural site surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for cultural resources. These cultural resources investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate adverse impacts to cultural resources during construction and operation of the proposed Project.

Potential short- and long-term adverse impacts from construction, operation, maintenance, and emergency-repair related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.2.5.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Beltrami North Central Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to ROI for the water resources in the Beltrami North Central Variation Area are summarized in Table 6-54 and shown on Map 6-23. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmission structures in wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ across the Proposed Blue/Orange Route and the Beltrami North Central variations.

The Proposed Blue/Orange Route would not cross any PWI waters, but all of the Beltrami North Central variations would cross Winter River Road once, as well as several other smaller, unnamed PWI watercourses. As shown in Table 6-54, Beltrami

Table 6-53 Archaeological and Historic Resources within the Beltrami North Central Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Beltrami North Central Variation Area | | | | | |
|------------------------------|-------------------------------------|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | Proposed Blue/Orange Route | 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 |
| Historic Architectural Sites | Count within ROW | 0 | 0 | 0 | 0 | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 | 0 | 0 | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 0 | 0 | 0 | 1 | 1 |
| Archaeological Sites | Count within ROW | 0 | 0 | 0 | 0 | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 | 0 | 0 | 0 | 0 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-54 Water Resources within the Anticipated ROW in the Beltrami North Central Variation Area

| Resource | Evaluation Parameter | Beltrami North Central Variation Area | | | | | |
|-------------------------------|----------------------|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | Proposed Blue/Orange Route | 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 |
| Transmission Line | Length (mi) | 11.6 | 13.7 | 12.6 | 12.2 | 13.5 | 15.0 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 0 | 3 | 1 | 2 | 2 | 3 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 5 | 4 | 5 | 4 | 7 | 7 |
| Floodplains ⁽³⁾ | Acres within ROW | 1 | 2 | 2 | 2 | 2 | 2 |
| NWI Wetlands | Acres within ROW | 272 | 314 | 291 | 282 | 305 | 337 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); Minnesota Power 2014, reference (163)

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

(1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.

(2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

(3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

6.0 Comparative Environmental Consequences

North Central Variation 1 and Variation 5 would require the most PWI crossings. Neither the Proposed Blue/Orange Route nor the Beltrami North Central variations would cross PWI waterbodies or wetlands.

The Proposed Blue/Orange Route and all of the Beltrami North Central variations would require crossing non-PWI watercourses, as shown in Figure 6-45. Crossings are nearly evenly split between ditches and streams, including Williams Creek and several smaller, unnamed streams. Beltrami North Central Variation 4 would cross the most non-PWI waters.

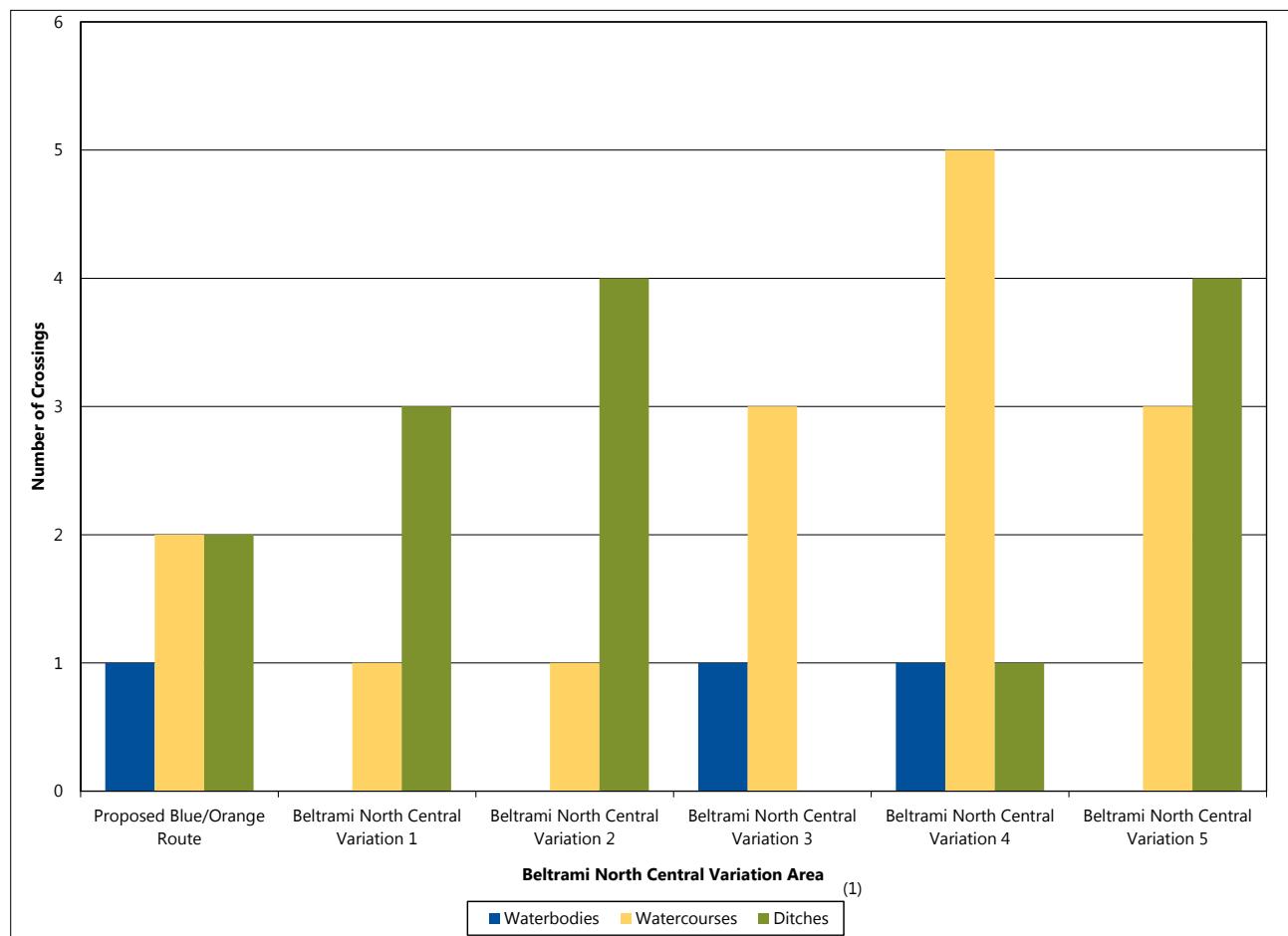
It is anticipated that PWI and non-PWI water crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Though the Proposed Blue/Orange Route and all of the Beltrami North Central variations would cross

Zone A floodplain of the Winter Road River, the crossings are small enough to be spanned (i.e. 2 acres or less) and would not require a transmission structure to be placed within the floodplain.

Based on the NWI, the Proposed Blue/Orange Route and all of the Beltrami North Central variations would require conversion of forested and shrub wetland areas to herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-46, Beltrami North Central Variation 1 and Variation 5 contain the most combined forested and shrub wetlands, and therefore would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these

Figure 6-45 Non-PWI Water Crossings by Type in the Beltrami North Central Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

impacts, as summarized in Section 5.3.4.1. The Proposed Blue/Orange Route and all of the Beltrami North Central variations would require placement of permanent fill in wetlands for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the West Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to the large wetland complexes in the area, it would be expected that the Proposed Blue/Orange Route and all of the Beltrami North Central variations would require temporary construction access through wetlands, which is also minimal likely be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-

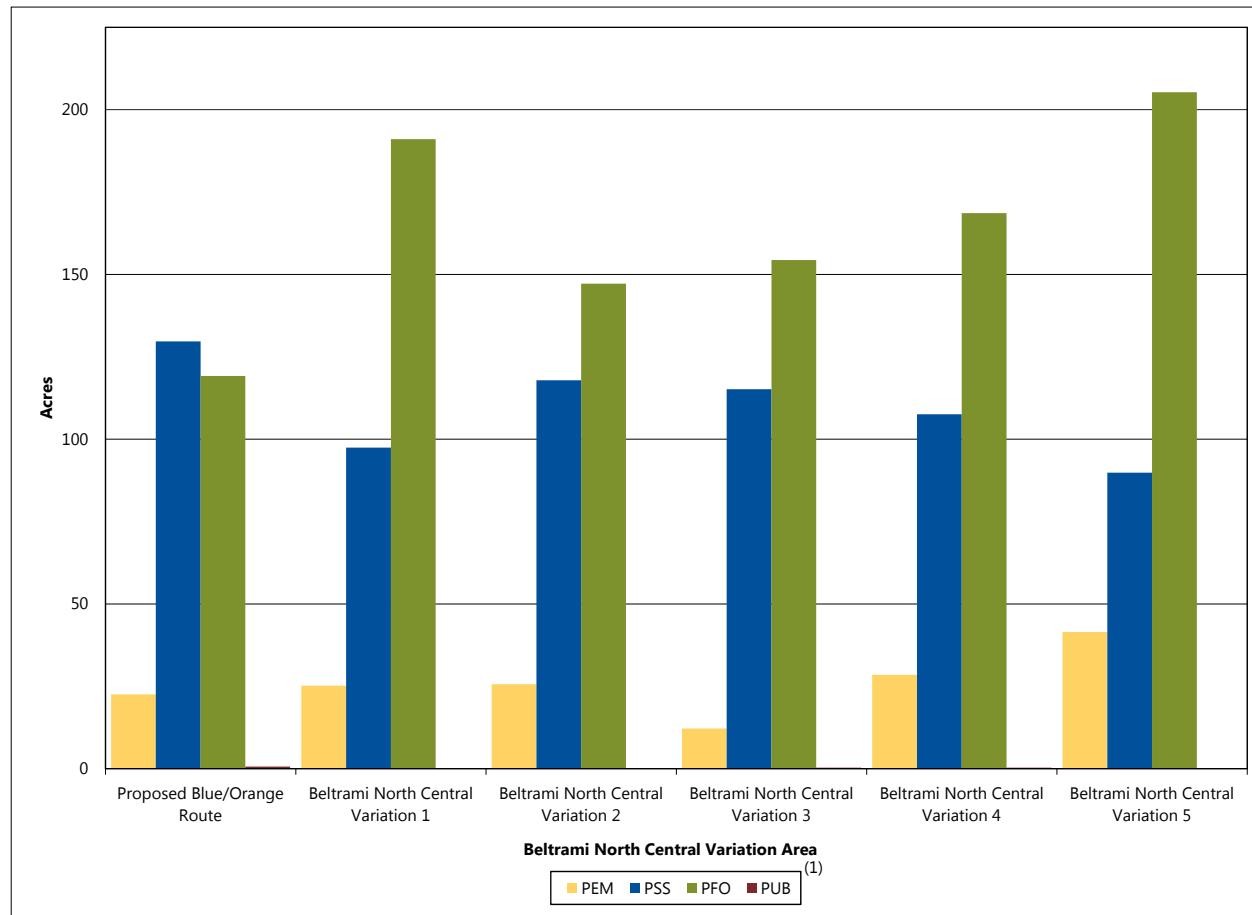
term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Beltrami North Central Variation Area are summarized in Table 6-55 and shown on Maps 5-5 and 6-23. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ across the Proposed Blue/Orange Route and the Beltrami North Central variations is the loss or fragmentation of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during

Figure 6-46 Acres of Wetland by Type within the Anticipated ROW in the Beltrami North Central Variation Area



Source(s): USFWS 1997, reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-55, the Proposed Blue/Orange Route and all of the Beltrami North Central variations would generally pass through similar amounts of forested land and state forest. However, the Proposed Blue/Orange Route would parallel an existing transmission line corridor for its entire length and Beltrami North Central Variation 4 would parallel an existing transmission line corridor for the majority of its length (Table 6-55). Because of this, the Proposed Blue/Orange Route and Beltrami North Central Variation 4 would fragment the least amount of intact forest. Because Beltrami North Central Variations 1, 2, 3, and 5 would require creation of new corridor in forested areas, they would result in more fragmentation of intact forest (Map 6-23). While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-5).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Beltrami North Central Variation Area are summarized in Table 6-56 and shown on Map 6-23. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ across the Proposed Blue/Orange Route and the Beltrami North Central variations include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue/Orange Route and the Beltrami North Central variations to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor and/or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.2.5.4 (Vegetation) summarizes potential impacts on forested

vegetation from the Proposed Blue/Orange Route and the Beltrami North Central variations.

The Proposed Blue/Orange Route and all of the Beltrami North Central variations would pass through a portion of the Big Bog Important Bird Area (Map 6-23). As indicated in Table 6-56, the Proposed Blue/Orange Route and Beltrami North Central Variation 2 would traverse more of this resource (Table 6-56). The Proposed Blue/Orange Route would parallel an existing transmission line corridor for its entire length and with the exception of Beltrami North Central Variation 2, the Beltrami North Central variations would traverse through the Big Bog Important Bird Area along an existing transmission line corridor (Map 6-23). In contrast, Beltrami North Central Variation 2 would require the creation of new transmission line corridor for approximately half of its length, including the portion that traverses into the Big Bog Important Bird Area (Map 6-23). Creation of new corridor in the Big Bog Important Bird Area would likely result in short-term indirect and long-term direct, adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat while the long-term direct impacts would be associated with the operation of the Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The 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 would be minimized through use of Applicant-proposed minimization measures (Section 2.13).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.2.5.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR

Table 6-55 Vegetation Resources within the Anticipated ROW in the Beltrami North Central Variation Area

| Resource | Evaluation Parameter | Beltrami North Central Variation Area | | | | | |
|--|--|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | Proposed Blue/Orange Route | 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 |
| Transmission Line | Length (mi) | 11.6 | 13.7 | 12.6 | 12.2 | 13.5 | 15.0 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 48 | 49 | 70 | 92 | 70 |
| State Forest | Acres within ROW | 224 | 237 | 255 | 184 | 178 | 230 |
| Total Forested GAP Land Cover | Acres within ROW | 277 | 323 | 303 | 287 | 306 | 342 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | | | | | |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 177 | 180 | 179 | 147 | 130 | 163 |
| North American Boreal Forest | Acres within ROW | 66 | 104 | 78 | 103 | 114 | 115 |
| Eastern North American Flooded and Swamp Forest | Acres within ROW | 30 | 34 | 42 | 31 | 53 | 55 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Table 6-56 Wildlife Resources within the Vicinity of the Beltrami North Central Variation Area

| Resource | Evaluation Parameter | Beltrami North Central Variation Area | | | | | |
|---|--|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | Proposed Blue/Orange Route | 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 |
| Transmission Line | Length (mi) | 11.6 | 13.7 | 12.6 | 12.2 | 13.5 | 15.0 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 48 | 49 | 70 | 92 | 70 |
| Important Bird Areas | Acres within ROW | 117 | 31 | 157 | 31 | 33 | 33 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Audubon Society 2014, reference (181)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5 where it explains that for federally listed species it includes the county for which the species is listed while state-listed species have a ROI that includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Beltrami North Central Variation Area are summarized in Table 6-57; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map

Proximity of state endangered, threatened, or special concern species differs across the Proposed Blue/Orange Route and the Beltrami North Central variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

As indicated in Table 6-57, the Proposed Blue/Orange Route and Beltrami North Central Variations 1, 2, 3, and 5 have the most documented rare species within one mile of the ROW, including the state-endangered upward-lobed moonwort in the Proposed Blue/Orange Route and Beltrami North Central Variations 1 through 3 and the state-threatened common moonwort in the Proposed Blue/Orange Route and Beltrami North Central Variations 1, 2, 3, and 5. According to the NHIS database, no state-endangered, threatened, or

special concern species have been documented within one mile of Beltrami North Central Variation 4. The Proposed Blue/Orange Route parallels an existing transmission line corridor for its entire length and Beltrami North Central Variation 4 parallels an existing transmission line corridor for the majority of its length (Table 6-57; Map 6-24). Beltrami North Central Variations 1, 2, 3, and 5 would require creation of new corridor for approximately one-third to one-half of their length (Map 6-24). Because of this and the higher concentration of state-endangered, threatened, and special concern species documented within one mile of the ROWs, Beltrami North Central Variations 1, 2, 3 and 5 may result in more impacts on rare species. However, the full extent of potential impacts from the Proposed Blue/Orange Route and the Beltrami North Central variations cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. 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.

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. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in

Table 6-57 Rare Species Documented within One Mile of the Anticipated ROW in the Beltrami North Central Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | Beltrami North Central Variation Area | | | | | |
|--------------------------------|-----------------------|----------------|-----------------|----------------|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | | | | Proposed Blue/Orange Route | 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 |
| <i>Botrychium ascendens</i> | Upward-lobed Moonwort | None | Endangered | Vascular Plant | X | X | X | X | | |
| <i>Botrychium lunaria</i> | Common Moonwort | None | Threatened | Vascular Plant | X | X | X | X | | X |
| <i>Botrychium pallidum</i> | Pale Moonwort | None | Special Concern | Vascular Plant | X | X | X | X | | X |
| <i>Botrychium simplex</i> | Least Moonwort | None | Special Concern | Vascular Plant | X | X | X | X | | X |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Beltrami North Central Variation Area are summarized in Table 6-58 and shown on Map 6-24; additional, more detailed data on rare communities and resources is provided in Appendix E and Appendix G.

The primary impact on rare communities and resources that would differ across the Proposed Blue/Orange Route and the Beltrami North Central variations is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-24 and in Table 6-58, the Proposed Blue/Orange Route and Beltrami North Central Variation 3 pass through the most MBS Sites of Biodiversity Significance, including sites ranked outstanding and/or high (Table 6-58; Map 6-24). However, it should be noted that not all biodiversity significance ranks have been determined for Lake of the Woods County (Personal communication between Barr and MnDNR, December 10, 2014, reference (134)) so significance ranks of outstanding

and high could be underestimated for some variations. As indicated in Table 6-58, the Proposed Blue/Orange Route would parallel an existing transmission line corridor for its entire length and Beltrami North Central Variation 4 parallels an existing transmission line corridor for the majority of its length. Beltrami North Central Variations 1, 2, and 5 would all require creation of new corridor through MBS Sites of Biodiversity Significance; because of this, these variations would likely result in the most impacts to these sites.

As mentioned in Section 5.3.5, areas of High Conservation Value Forest and MBS native plant communities have not been mapped in Lake of the Woods County, where the Beltrami North Central Variation Area is located. It is likely that both of these resources are present in the variation area, particularly in areas associated with MBS Sites of Biodiversity Significance (Map 6-24).

The rare communities and resources listed in Table 6-58 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a

Table 6-58 Rare Communities and Resources within the Vicinity of the Beltrami North Central Variation Area

| Resource | Type | Evaluation Parameter | Beltrami North Central Variation Area | | | | | |
|---|---------------------------|--|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | | Proposed Blue/Orange Route | 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 |
| Transmission Line | -- | Length (mi) | 11.6 | 13.7 | 12.6 | 12.2 | 13.5 | 15.0 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 100 | 48 | 49 | 70 | 92 | 70 |
| MBS Sites of Biodiversity Significance | Outstanding and High Rank | Acres within ROW | 101 | 15 | 115 | 15 | 0 | 0 |
| | Total | Acres within ROW | 145 | 97 | 174 | 105 | 102 | 94 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

6.0 Comparative Environmental Consequences

permit condition, which could include plant surveys along the permitted ROW.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.2.5.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6.

Map 6-25 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Beltrami North Central Variation Area.

Table 6-59 identifies the percentage of total transmission line length that the Proposed Blue/Orange Route and Beltrami North Central variations parallel an existing corridor or linear feature in Beltrami North Central Variation Area.

The Proposed Blue/Orange Route would parallel existing transmission line corridors for its entire length (Figure 6-47). Of the Beltrami North Central Variations, Beltrami North Central Variation 4 would parallel an existing transmission line for over 90

percent of its length and the remaining variations would parallel existing transmission line corridors for 50 to 70 percent of their lengths.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.2.5.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-60 summarizes the costs associated with constructing the Proposed Blue/Orange Route and variations in the Beltrami North Central Variation Area. As indicated in Table 6-60, Beltrami North Central Variation 4 would be the most expensive to construct, while the Proposed Blue/Orange Route would cost the least to construct.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$20,000 to \$24,000 annually for these alternatives in the Beltrami North Central Variation Area.

Table 6-59 Corridor Sharing in the Beltrami North Central Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Beltrami North Central Variation Area | | | | | |
|---|--|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | Proposed Blue/Orange Route | 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 |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, PLSS, and field line) | Percent of Total Length ⁽²⁾ | 100 | 48 | 49 | 70 | 92 | 70 |
| None | Percent of Total Length ⁽²⁾ | 0 | 52 | 51 | 30 | 8 | 30 |

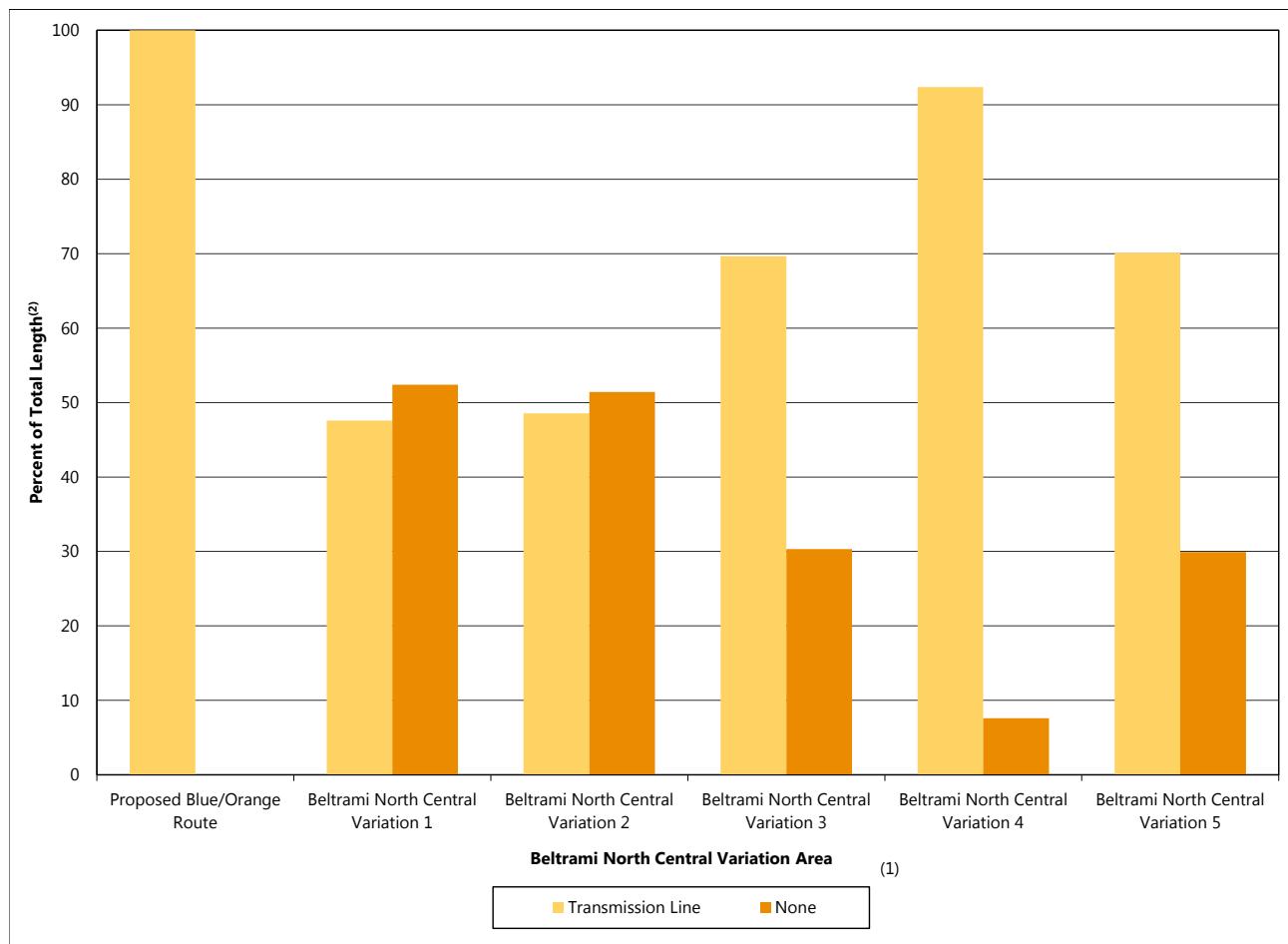
Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features is provided in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-47 Corridor Sharing in the Beltrami North Central Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, or PLSS).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-60 Construction Costs in the Beltrami North Central Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|------------------------|------------------------------------|--------------|-------------------------|-------------|
| Beltrami North Central | Proposed Blue/Orange Route | \$12,574,123 | \$1,083,976 | 11.6 |
| | Beltrami North Central Variation 1 | \$14,368,602 | \$1,048,803 | 13.7 |
| | Beltrami North Central Variation 2 | \$14,478,550 | \$1,149,091 | 12.6 |
| | Beltrami North Central Variation 3 | \$16,815,266 | \$1,378,300 | 12.2 |
| | Beltrami North Central Variation 4 | \$17,498,969 | \$1,296,220 | 13.5 |
| | Beltrami North Central Variation 5 | \$16,966,730 | \$1,131,115 | 15 |

Source(s): Minnesota Power 2015, reference (9)

6.2.6 Relative Merits Summary

As discussed in Section 1.2.1.1, the MN PUC is charged with selecting routes that minimize adverse human and environmental impacts while ensuring continued electric power system reliability and integrity. MN PUC must take into account the 14 factors identified in Minnesota Rules, part 7850.4100 when making a decision on a Route Permit.

On July 2, 2014, the MN PUC issued its order finding the Route Permit application complete. This order includes a requirement that the EIS will include an analysis of the relative merits of the route alternatives using the selection criteria established in Minn. Stat. § 216E.03, subd. 7, and Minn. R. 7850.4100.⁽⁸⁴⁾

Fatal Flaw Analysis

Neither of the Applicant's two proposed routes nor any route variation selected for evaluation during the scoping process—and included in this EIS—appear to have fatal flaws based on applicable statutory and regulatory factors. Any routes or variations with a known fatal flaw were eliminated from consideration during the scoping process.

As a result, the relative merits analysis, described in more detail below, compares each of the selected alternatives in each variation area based on their merits relative to the routing factors. For routing factors where impacts are anticipated to vary with alternatives, the anticipated impacts are compared across alternatives. For routing factors that meet the State of Minnesota's interest in the efficient use of resources (for example, the use and paralleling of existing ROWs), the relative merits discussion compares alternatives based on their consistency with these interests.

Relative Merits Analysis Methodology

The relative merits discussion in this chapter focuses on the following nine specific routing factors of Minnesota Rules, part 7850.4100:

- Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services

- Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining
- Effects on archaeological and historic resources
- Effects on the natural environment, including effects on air and water quality resources and vegetation and wildlife
- Effects on rare and unique natural resources
- Use or paralleling of existing ROW, survey lines, natural divisions lines, and agricultural field boundaries
- Use of existing transportation, pipeline, and electrical transmission systems or ROWs
- Electrical systems reliability
- Costs of constructing, operating, and maintaining the facility which are dependent on design and route

The remaining five routing factors are not considered in this relative merits analysis for a number of reasons: (1) related to use of existing large electric power generating plant sites, it is not relevant, and is not discussed here; (2) all proposed routes and variations are essentially equal with regard to maximizing energy efficiencies, accommodating expansion of transmission capacity, and potential impacts to public health and safety (Section 5.2.2); and (3) the routing factors related to the unavoidable and irreversible impacts of the proposed Project are discussed in Section 7.6.

Definition of the Term "Mitigation"

The term "mitigation" is used in various ways in various contexts, and is often used as a general term for any method to avoid, minimize, or compensate for potential negative impacts. See, for example, the executive summary in Minnesota Power's Presidential permit and Route Permit Application (Minnesota Power 2014, reference (1).

Under Minnesota regulations, the principle of "mitigation" is derived from Minnesota's general environmental review statutes and rules. Specifically, the applicable Minnesota rule defines "mitigation" to include a range of activities including avoiding and minimizing impacts, repairing affected areas, or compensating for impacts through off-site restoration or financial payments⁽⁸⁵⁾. Under Minn. R. 4410.0200, Subp. 51, "mitigation" means:

- A. Avoiding impacts altogether by not undertaking a certain project or parts of a project.

84. Order Finding Application Complete and Referring Matter to the Office of Administrative Hearings, Docket No. E-015/TL-14-21, Document No. 20147-101165-01, July 2, 2014, Section VII p. 5-6, available at: <http://mn.gov/puc/energyfacilities/siting-routing/index.html> and <https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={D5CECBBD-A277-4EE8-9B6F-3FAEACB3457B}>

- B. Minimizing impacts by limiting the degree of magnitude of a project.
- C. Rectifying impacts by repairing, rehabilitating, or restoring the affected environment.
- D. Reducing or eliminating impacts over time by preservation and maintenance operations during the life of the project.
- E. Compensating for impacts by replacing or providing substitute resources or environments.
- F. Reducing or avoiding impacts by implementation of pollution prevention measures.

Many of the impacts of the proposed Project, relative to the applicable routing factors, are anticipated to be avoided or minimized by the (1) route selection, (2) general and special conditions in the MN PUC route permit, (3) prudent transmission structure placement and placement of the alignment within the permitted route, and (4) the requirements of "downstream" permits such as the construction stormwater NPDES permit.

For purposes of this relative merits analysis, therefore, the potential impacts of the Applicant's proposed routes and other route variations assume that the Applicant's proposed BMPs and other measures will be included as MN PUC permit conditions so as to avoid or minimize impacts as much as possible. These potential MN PUC permit conditions are in effect the "mitigation" measures listed in Minnesota Rules 4410.0200, Subp. 51, A-D, and F.

However, this relative merits analysis does not take into account potential compensatory mitigation as listed Minnesota Rules 4410.0200, Subp. 51, E, such as wetland replacement/restoration or financial compensation. Compensatory mitigation may also include payments for habitat conservation, ROW easements, etc. Although such compensatory mitigation will likely be required for the permitted route as part of the Section 404 wetland permit or other permits, this relative merits analysis does not take compensatory mitigation into account because avoidance and minimization is generally preferred to compensation for most impacts.

Relative Merits Color Graphic Guide

The discussion in the relative merits sections of this EIS uses text and a color graphic to compare the alternatives (proposed route or route variation) in each variation area. The color graphics and the related notes for a particular alternative for a specific factor or element are not meant to be determinative of the "best" route but are provided as a general comparison to be evaluated together with all other factors. For example, alternatives that are "red" for a particular factor or element are not meant to indicate that a specific route or route variation has a "fatal flaw". Instead, for routing factors where impacts are anticipated to vary with alternatives, the color graphic represents the magnitude of difference between the anticipated impacts and compares the anticipated impacts across the alternatives, as described below. For routing factors that meet the State of Minnesota's interest in the efficient use of resources (for example, the use and paralleling of existing ROWs), the graphic represents the degree of consistency of alternatives with these interests and compares the alternatives.

| Anticipated Impacts or Consistency with Routing Factor | Color |
|--|--------|
| Least: The alternative(s) with the least impact in the same variation area, which serves as the basis for the remainder of the analysis. | Green |
| Moderate: Impacts are anticipated to be between two to four times more than that of the alternative with the least impact in the same variation area. | Yellow |
| Most: Impacts are anticipated to be four or more times that of the alternative with the least impact in the same variation area. | Red |
| No impacts or similar impacts: There are either no impacts or it is anticipated that there are relatively minor differences between the impacts for the alternatives. | Grey |

For each variation area, the Relative Merit Summary Table provides an overview of the relative differences between the alternatives for each factor and element. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.2.6.1 Border Crossing Variation Area

Within the Border Crossing Variation Area, the analysis indicates a general trade-off between impacts to elements of the human settlement factors (e.g. the aesthetics element of the human settlement factor and the agriculture element of

85. Available at: <https://www.revisor.mn.gov/rules/?id=0200>

land-based economies) and impacts to elements of the natural environment factors (e.g. the water resources element of the natural environment factor and the **federally and state-listed species and state rare communities** element of the rare and unique **natural resources** factor). The Border Crossing Pine Creek Variation would pass the most farmland and would therefore have more potential impacts to the agriculture element of land-based economies.

The Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation would have more impacts to all three elements of the natural environment factor and to the **state rare communities** element of the rare and unique natural resources factor. In particular, the Proposed Border Crossing-Blue/Orange Route and the Border Crossing Pine Creek Variation are the longest alternatives and would have the most potential impacts to forested and shrub wetlands and MBS native plant communities and MBS Sites of Biodiversity Significance. The Border Crossing Pine Creek Variation would avoid some of these impacts to these elements of the natural environment and rare and unique natural resources factors by avoiding the wetlands, state forest land, and MBS Sites of Biodiversity Significance ranked outstanding immediately south of the international border. This variation would also provide more distance between the proposed Project and the Pine Creek Peatland SNA than the Proposed Border Crossing-Blue/Orange Route, but by doing so would create more aesthetic and farmland impacts by passing near one more residence than the Proposed Border Crossing-Blue/Orange Route and crossing more agricultural land.

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

The Border Crossing 230 kV Variation and Border Crossing 500 kV Variation are also much shorter than the other alternatives in this variation area.

However, the variations would cost less than the Proposed Border Crossing-Blue/Orange Route in terms of the cost construction factor.

Impacts to the archaeological and historic architectural resources factor are expected to be slightly greater for the **Border Crossing Hwy 310 Variation**, Border Crossing 500 kV Variation, and Border Crossing Pine Creek Variation, as **these** variations would cross sections identified as containing known cultural resources.

Table 6-61 provides an overview of this relative merits assessment for the alternatives in the Border Crossing Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.2.6.2 Roseau Lake WMA Variation Area

Similar to the Border Crossing Variation Area, the analysis of the Roseau Lake WMA Variation Area indicates a trade-off between impacts to human settlement factors and impacts to natural environment factors. **Roseau Lake WMA Variation 1** would have fewer impacts on all three elements of natural environment and on the rare communities element of the rare and unique resource factor than the **Roseau Lake WMA Variation 2 and Proposed Blue/Orange Route** as it would avoid crossing the Roseau Lake WMA, MBS Sites of Biodiversity Significance ranked moderate, and extensive wetland areas. However, Roseau Lake WMA Variation 1 would impact the **land-use compatibility element** of the human settlement factor and the agricultural element of the land-based economies factor more than the Proposed Blue/Orange Route. Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 would pass through **more** agricultural land and are located near more residences. Roseau Lake WMA Variation 1 would also have more impact on the elements of human settlement and land-based economies because it would parallel a minimal amount of existing corridors and therefore, it would create new aesthetic impacts and a new encumbrance on farmland. Both variations are longer than the Proposed Blue/Orange Route and would result in a greater total area of impact and higher impact in terms of the cost of construction factor.

Impacts to the cultural resources factor are expected to be greater for **Roseau Lake WMA Variation 1** and Variation 2 than for the **Proposed Blue/Orange Route** in this variation area, as they pass near

or through more sections identified with known cultural resources.

Table 6-62 provides an overview of this relative merits assessment for the alternatives in the Roseau Lake WMA Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.2.6.2 Cedar Bend WMA Variation Area

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

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

Table 6-63 provides an overview of this relative merits assessment for the alternatives in the Cedar Bend WMA Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.2.6.3 Beltrami North Variation Area

The alternatives in the Beltrami North Variation Area are differentiated primarily in terms of three factors: impacts to the natural environment, **rare and unique natural resources**, cost of construction, and potential cultural resource impacts. The Proposed Blue/Orange Route would minimize impacts to the **wildlife** element of the natural environment factor by paralleling existing corridors and avoiding habitat fragmentation. Beltrami North Variation 1 would parallel less existing corridor than the Proposed Blue/Orange Route, but would minimize impacts to the water resources and **vegetation** elements of the natural environment factor by passing through fewer wetlands and fewer acres of forest. In terms of the construction costs factor, both the variations would be more expensive to construct compared to the Proposed Blue/Orange Route.

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

Table 6-64 provides an overview of this relative merits assessment for the alternatives in the Beltrami North Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.2.6.4 Beltrami North Central Variation Area

Within the Beltrami North Central Variation Area, the analysis indicates that impacts to the aesthetics element of the human settlement factor and the agriculture element of the land-based economies factor would be minimized by Beltrami North Central Variation 1 and the Proposed Blue/Orange

Route, as these alternatives would combine paralleling existing transmission line corridors and passing by relatively fewer residences than any of the other alternatives in this variation area. In contrast, Beltrami North Central Variation 4 and Beltrami North Central Variation 5 would result in more impacts to the aesthetics element of the human settlement factor and the agricultural element of and land-based economies factor, as they would cross slightly more farmland and would be in proximity to more residences. The Proposed Blue/Orange Route and **Beltrami North Central Variation 2 would pass through USFWS Interest Lands** and Beltrami North Central Variation 4 and Beltrami North Central Variation 5 would pass through more private land; because of this, these alternatives would have the most impacts to the land use compatibility element of the human settlement factor.

Of all the alternatives in this variation area, Beltrami North Central Variation 2 would have more impacts to the **wildlife** element of the natural environment factor and to the **state rare community element of the rare and unique natural resources factor** because it would pass through the Big Bog Important Bird Area and an MBS Site of Biodiversity Significance ranked high, without paralleling any existing infrastructure corridors through these areas. While the Proposed Blue/Orange Route would cross some of these same sensitive areas, paralleling the existing 500 kV transmission line corridor would result in fewer impacts to the **wildlife** element of the natural environment factor associated with habitat fragmentation. Beltrami North Central Variation 4 would have fewer impacts to the **federal and state listed species and rare communities elements of the rare and unique resources factor** than the other alternatives in this variation area, **there are no NHIS records identified within one mile** and it would avoid the sensitive areas crossed by the Beltrami North Central Variation 2 and the Proposed Blue/Orange Route, and would also parallel an existing 230 kV transmission line corridor for its entire length.

The Proposed Blue/Orange Route would cost **the least** to build.

Table 6-65 provides an overview of this relative merits assessment for the alternatives in the Beltrami North Central Variation Area. **Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.**

Table 6-61 Relative Merits Assessment for the Border Crossing Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | Border Crossing Variation Area | | | | | |
|--|----------------------------------|--|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|--|
| Factor | Element | Proposed Border Crossing-Blue/Orange Route | Border Crossing Pine Creek Variation | Border Crossing Hwy 310 Variation | Border Crossing 500 kV Variation | Border Crossing 230 kV Variation | Notes |
| Human settlement | Aesthetics | | | | | | Border Crossing Hwy 310 Variation would pass by the least number of residences within 1,500 feet of the anticipated alignment. Border Crossing 500 kV Variation and Border Crossing 230 kV Variation would parallel an existing transmission line for their entire lengths. |
| | Land use compatibility | | | | | | Border Crossing Pine Creek Variation would cross the most private land. An airstrip would be located within 1,500 feet from the anticipated alignment for the Border Crossing Hwy 310 Variation. |
| Land-based economics | Agriculture | | | | | | Border Crossing Pine Creek Variation would cross the most farmland. |
| | Forestry | | | | | | Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation would cross the most state forest land. |
| | Mining and mineral resources | | | | | | No active or terminated/expired mineral lease lands or aggregate resources are present in the ROW of any alternative. |
| Archaeological and historic architectural resources | | | | | | | Border Crossing Pine Creek Variation and Border Crossing 500 kV Variation would cross sections identified as containing known archaeological resources; the other alternatives do not cross any of these sections. There is one historic architectural site within 1,500 feet of the Border Crossing Hwy 310 Variation. |
| Natural environment | Water resources | | | | | | Border Crossing Pine Creek Variation would cross the most watercourses/waterbodies; however, all crossings are expected to be spanned. Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation ROWs would have areas of FEMA-designated floodplain that cannot be spanned. All alternatives would cross wetlands that are too large to span. Proposed Border Crossing-Blue/Orange Route has the most total wetland and the most forested wetland, requiring the most forested wetland type conversion. Border Crossing 500 kV Variation would cross the most shrub wetland, requiring the most shrub wetland type conversion. |
| | Vegetation | | | | | | Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation cross the most forested land cover. These alternatives parallel minimal existing corridor. |
| | Wildlife | | | | | | Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation cross a WMA and/or Grassland Bird Conservation Areas. Border Crossing Hwy 310 Variation has a Gray Owl Management Area located within 1,500 feet, but none of this area is within ROW. |
| Rare and unique natural resources | Federal and state-listed species | | | | | | Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation have an NHIS record for a federal candidate species (Sprague's pipit) within one mile. Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek Variation have the most NHIS records within one mile, including records of state threatened or endangered species. |
| | State rare communities | | | | | | Proposed Border Crossing-Blue/Orange Route would be located within 1,500 feet of an SNA. Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation would cross SNA WPAs. Proposed Border Crossing-Blue/Orange Route would cross the most MBS Sites of Biodiversity Significance, including those ranked outstanding or high, followed by the Border Crossing Pine Creek Variation and Border Crossing Hwy 310 Variation. Proposed Border Crossing-Blue/Orange Route would cross through the most MnDNR High Conservation Value Forest areas, followed by the Border Crossing Pine Creek Variation and the Border Crossing Hwy 310 Variation. Proposed Border Crossing-Blue/Orange Route would cross the most MBS native plant communities, followed by the Border Crossing Pine Creek Variation and the Border Crossing Hwy 310 Variation. Only the Border Crossing 230 kV Variation would avoid MBS native plant communities with a conservation status ranks of S2 or S3. Border Crossing 500 kV would parallel an existing corridor through these native plant communities. |
| Use or paralleling of existing ROWs | | | | | | | Border Crossing 230 kV Variation and Border Crossing 500 kV Variation parallel existing transmission line, roadway, and/or trail corridors for their entire lengths. The other alternatives would parallel existing corridors for approximately one-third of their lengths. |
| Electrical system reliability | | | | | | | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | | | | | | The alternatives cost less than the Proposed Border Crossing-Blue/Orange Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-62 Relative Merits Assessment for the Roseau Lake WMA Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | Roseau Lake WMA Variation Area | | | |
|--|----------------------------------|--------------------------------|-----------------------------|-----------------------------|--|
| Factor | Element | Proposed Blue/Orange Route | Roseau Lake WMA Variation 1 | Roseau Lake WMA Variation 2 | Notes |
| Human settlement | Aesthetics | Green | Yellow | Green | Roseau Lake WMA Variation 1 would pass by the most residences within 1,500 feet of the anticipated alignment. Roseau Lake WMA Variation 1 parallels the least amount of existing transmission line corridor. |
| | Land use compatibility | Green | Yellow | Yellow | Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 would cross the most private land. |
| Land-based economics | Agriculture | Green | Yellow | Yellow | Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 would cross the most amount of farmland. |
| | Forestry | Red | Green | Red | Proposed Blue/Orange Route would cross more state forest land, followed by Roseau Lake WMA Variation 2. |
| | Mining and mineral resources | Gray | Gray | Gray | No active or expired/terminated mineral lease lands or aggregate resources are present in the ROW of any alternative. |
| Archaeological and historic architectural resources | | Green | Yellow | Yellow | Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 would cross sections identified as containing known archaeological sites. |
| Natural environment | Water resources | Red | Green | Yellow | All alternatives would cross relatively similar numbers of watercourses/waterbodies, which are expected to be spanned. All alternatives would cross relatively similar areas of FEMA-designated floodplain that are too large to span. All alternatives would cross wetlands that are too large to span. Proposed Blue/Orange Route has the most total wetland. Proposed Blue/Orange Route would also have the most forested and shrub wetland; therefore, it would require the most wetland type conversion. |
| | Vegetation | Yellow | Green | Yellow | Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would cross the most forested land cover. |
| | Wildlife | Yellow | Green | Yellow | Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 cross a WMA and more acres of Grassland Bird Conservation Area. |
| Rare and unique natural resources | Federal and state-listed species | Yellow | Green | Yellow | Proposed Blue/Orange Route has a NHIS record for a federal candidate species (Sprague's pipit; also state-endangered) within 1 mile. Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 have a state-threatened species documented within 1 mile. |
| | State rare communities | Red | Green | Red | Proposed Blue/Orange Route would be located close to an SNA, but not within 1,500 feet. Proposed Blue/Orange Route would cross the most acres of SNA WPAs than the variations. Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would cross the most acres of MBS Sites of Biodiversity Significance, including those ranked outstanding or high. Proposed Blue/Orange Route would cross the most acres of High Conservation Value Forest. Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would cross the most MBS native plant communities, including those with conservation status ranks of S2 and S3. |
| Use or paralleling of existing ROWs | | Green | Yellow | Green | Roseau Lake WMA Variation 1 would parallel the least existing transmission line, roadway, and/or trail corridor. |
| Electrical system reliability | | Gray | Gray | Gray | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Red | Red | The cost of the alternatives are more than 20% above the cost of the Proposed Blue/Orange Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-63 Relative Merits Assessment for the Cedar Bend WMA Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | Cedar Bend WMA Variation Area | | |
|--|----------------------------------|-------------------------------|--------------------------|---|
| Factor | Element | Proposed Blue/Orange Route | Cedar Bend WMA Variation | Notes |
| Human settlement | Aesthetics | Green | Red | Cedar Bend WMA Variation 1 would pass by more residences within 1,500 feet of the anticipated alignment. Both alternatives parallel transmission line corridors for their entire lengths. |
| | Land use compatibility | Yellow | Yellow | Proposed Blue/Orange Route would cross USFWS Interest Lands, while Cedar Bend WMA Variation would not. Cedar Bend WMA Variation would cross more private land. |
| Land-based economics | Agriculture | Gray | Gray | All alternatives would cross a relatively similar amount of farmland. |
| | Forestry | Red | Green | Proposed Blue/Orange Route would cross more state forest land. |
| | Mining and mineral resources | Yellow | Green | Proposed Blue/Orange Route would cross expired/terminated mineral lease lands; Cedar Bend WMA Variation would not cross any mineral lease lands. |
| Archaeological and historic architectural resources | | Green | Yellow | Cedar Bend WMA Variation would cross more sections identified as containing known archaeological sites. There are 8 historic architectural sites within 1 mile of the Cedar Bend WMA Variation, but none in the ROW. |
| Natural environment | Water resources | Yellow | Green | Both alternatives have the same number of crossings of watercourses and waterbodies, which are expected to be spanned. Cedar Bend WMA would cross floodplain that cannot be spanned. Proposed Blue/Orange Route would not cross floodplain. Both alternatives would cross wetlands that are too large to span. Proposed Blue/Orange Route has the most total wetland. Proposed Blue/Orange Route would also have the most forested and shrub wetland; therefore, it would require the most wetland type conversion. |
| | Vegetation | Yellow | Green | Proposed Blue/Orange Route would cross more forested land cover. |
| | Wildlife | Yellow | Green | Proposed Blue/Orange Route crosses a WMA, more acres of Grassland Bird Conservation Area, and crosses a shallow lake. |
| Rare and unique natural resources | Federal and state-listed species | Gray | Green | There are no federally listed species identified for these alternatives. Proposed Blue/Orange Route has more NHIS records within 1 mile, including threatened NHIS records. |
| | State rare communities | Yellow | Green | Proposed Blue/Orange Route would cross more MBS Sites of Biodiversity Significance (including outstanding or high rank), High Conservation Value Forest, and more MBS native plant communities, including communities with a conservation status rank of S2 and S3. |
| Use or paralleling of existing ROWs | | Gray | Gray | Both alternatives parallel existing transmission line, roadway, and/or trail corridors for their entire lengths. |
| Electrical system reliability | | Gray | Gray | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Gray | Gray | The range of cost for the Cedar Bend WMA Variation is less than the cost of the Proposed Blue/Orange Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-64 Relative Merits Assessment for the Beltrami North Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | Beltrami North Variation Area | | | |
|--|----------------------------------|-------------------------------|----------------------------|----------------------------|---|
| Factor | Element | Proposed Blue/Orange Route | Beltrami North Variation 1 | Beltrami North Variation 2 | Notes |
| Human settlement | Aesthetics | Green | Yellow | Green | Beltrami North Variation 1 would pass by the most residences within 1,500 feet of the anticipated alignment. |
| | Land use compatibility | Yellow | Yellow | Green | Proposed Blue/Orange Route would cross USFWS Interest Lands, while the other alternatives would not. Beltrami North Variation 1 would cross more private land. |
| Land-based economics | Agriculture | Gray | Gray | Gray | All alternatives would cross a relatively similar amount of farmland. |
| | Forestry | Gray | Gray | Gray | All alternatives would cross a relatively similar amount of state forest land. |
| | Mining and mineral resources | Gray | Gray | Gray | All alternatives would cross a relatively similar amount of expired/terminated mineral lease lands. |
| Archaeological and historic architectural resources | | Green | Green | Yellow | Beltrami North Variation 2 crosses near more sections identified as containing known archaeological sites. There are 2 historic architectural sites within 1 mile of Beltrami North Variation 2. |
| Natural environment | Water resources | Gray | Gray | Gray | All alternatives would cross relatively similar numbers of watercourses/waterbodies. None of the alternatives would cross FEMA-designated floodplain. All alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | Gray | Gray | Gray | All alternatives would cross a relatively similar amount of forested land cover. The Beltrami North Variation 2 parallels the least amount of existing transmission line, roadway, or trail corridor. |
| | Wildlife | Yellow | Green | Red | Beltrami North Variation 2 would cross an Important Bird Area. Both the Proposed Blue/Orange Route and the Beltrami North Variation 1 cross a shallow lake but would parallel an existing corridor in this area. |
| Rare and unique natural resources | Federal and state-listed species | Yellow | Green | Red | There are no federally listed species identified for these alternatives. Beltrami North Variation 2 has more NHIS records, including records of state threatened and/or endangered species, within 1 mile. |
| | State rare communities | Yellow | Yellow | Red | Beltrami North Variation 2 would cross the most MBS Sites of Biodiversity Significance ranked outstanding or high, followed by Beltrami North Variation 1. Both the Proposed Blue/Orange Route and Beltrami North Variation 2 would cross High Conservation Value Forest. Beltrami North Variation 2 would cross MBS native plant communities, including communities with a conservation status rank of S2 and S3, while the other alternatives would not cross any MBS native plant communities. |
| Use or paralleling of existing ROWs | | Gray | Gray | Gray | All alternatives would parallel existing transmission line, roadway, and/or trail corridor for at least one-half of their length. |
| Electrical system reliability | | Gray | Gray | Gray | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Yellow | Red | The maximum cost for the Beltrami North Variation 1 is within 20% of the cost of the Proposed Blue/Orange Route. The cost of the Beltrami North Variation 2 is more than 20% above the cost of the Proposed Blue/Orange Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-65 Relative Merits Assessment for the Beltrami North Central Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | Beltrami North Central Variation Area | | | | | | |
|--|----------------------------------|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|--|
| Factor | Element | Proposed Blue/Orange Route | 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 | Notes |
| Human settlement | Aesthetics | Green | Green | Green | Yellow | Red | Red | Beltrami North Central Variation 4 and Beltrami North Central Variation 5 would pass by the most residences within 1,500 feet of the anticipated alignment. Beltrami North Central Variation 4 would parallel existing corridor for more of its length than Beltrami North Central Variation 5. |
| | Land use compatibility | Yellow | Green | Yellow | Green | Yellow | Yellow | Proposed Blue/Orange Route and Beltrami North Central Variation 2 would cross USFWS Interest Lands (18 acres and 1 acre, respectively). Beltrami North Central Variation 4 and Beltrami North Central Variation 5 would cross the most private land. |
| Land-based economics | Agriculture | Green | Green | Green | Green | Yellow | Yellow | Beltrami North Central Variation 4 and Beltrami North Central Variation 5 would cross the most farmland. Beltrami North Central Variation 4 would parallel existing transmission line, roadway, or trail corridor for 92% of its length. |
| | Forestry | Gray | Gray | Gray | Gray | Gray | Gray | All alternatives would cross similar amounts of state forest. The Proposed Blue/Orange Route and Beltrami North Central Variation 4 would parallel the most existing transmission line, roadway, or trail corridor. |
| | Mining and mineral resources | Gray | Gray | Gray | Gray | Gray | Gray | No active or expired/terminated mineral lease lands or aggregate resources are present in the ROW of any alternative. |
| Archaeological and historic architectural resources | | Green | Green | Green | Green | Yellow | Yellow | There are no known archaeological sites that would be affected by the alternatives. Beltrami North Central Variation 4 and Beltrami North Central Variation 5 have one historic architectural site within 1 mile. |
| Natural environment | Water resources | Gray | Gray | Gray | Gray | Gray | Gray | All alternatives would cross relatively similar numbers of watercourses/waterbodies. All alternatives would cross relatively similar small areas of FEMA-designated floodplain that are expected to be spanned. All alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | Gray | Gray | Gray | Gray | Gray | Gray | All alternatives would cross a relatively similar amount of forested land cover. The Proposed Blue/Orange Route and Beltrami North Central Variation 4 would parallel the most existing transmission line, roadway, or trail corridor. |
| | Wildlife | Yellow | Green | Yellow | Green | Green | Green | Proposed Blue/Orange Route and Beltrami North Central Variation 2 cross more of the Big Bog Important Bird Area. The Proposed Blue/Orange Route would parallel existing corridor through this area while Beltrami North Central Variation 2 would not parallel existing corridor. |
| Rare and unique natural resources | Federal and state-listed species | Yellow | Red | Yellow | Yellow | Green | Yellow | There are no federally listed species identified for these alternatives. Beltrami North Central Variation 1 has the most NHIS records within 1 mile. All alternatives (except Beltrami North Central Variation 4) have threatened and endangered NHIS records within 1 mile. |
| | State rare communities | Yellow | Yellow | Red | Yellow | Green | Green | Beltrami North Central Variation 2 would cross a SNA WPA. Proposed Blue/Orange Route and Beltrami North Central Variation 2 would cross the most MBS Sites of Biodiversity Significance ranked outstanding or high. Proposed Blue/Orange Route and Beltrami North Central Variation 4 would parallel the most existing transmission line, roadway, or trail corridor. |
| Use or paralleling of existing ROWs | | Green | Yellow | Yellow | Green | Green | Green | Beltrami North Central Variation 1 and Beltrami North Central Variation 2 would parallel the least existing transmission line, roadway, and/or trail corridor. |
| Electrical system reliability | | Gray | Gray | Gray | Gray | Gray | Gray | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Yellow | Yellow | Red | Red | Red | The maximum cost for the Beltrami North Central Variation 1 and Beltrami North Central Variation 2 are within 20% of the cost of the Proposed Blue/Orange Route. The cost of the Beltrami North Central Variation 3, Beltrami North Central Variation 4, and Beltrami North Central Variation 5 are more than 20% above the cost of the Proposed Blue/Orange Route. |

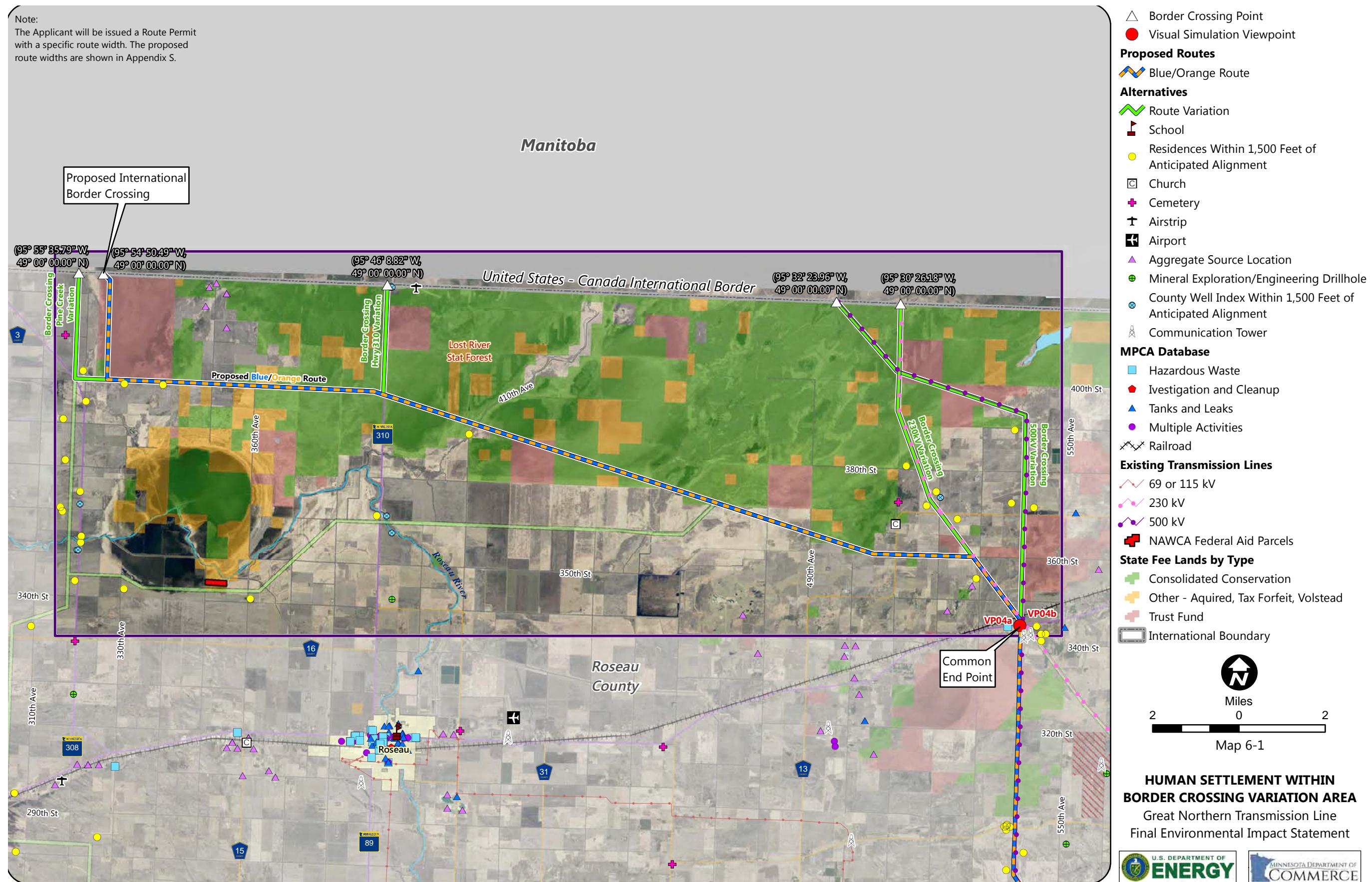
(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

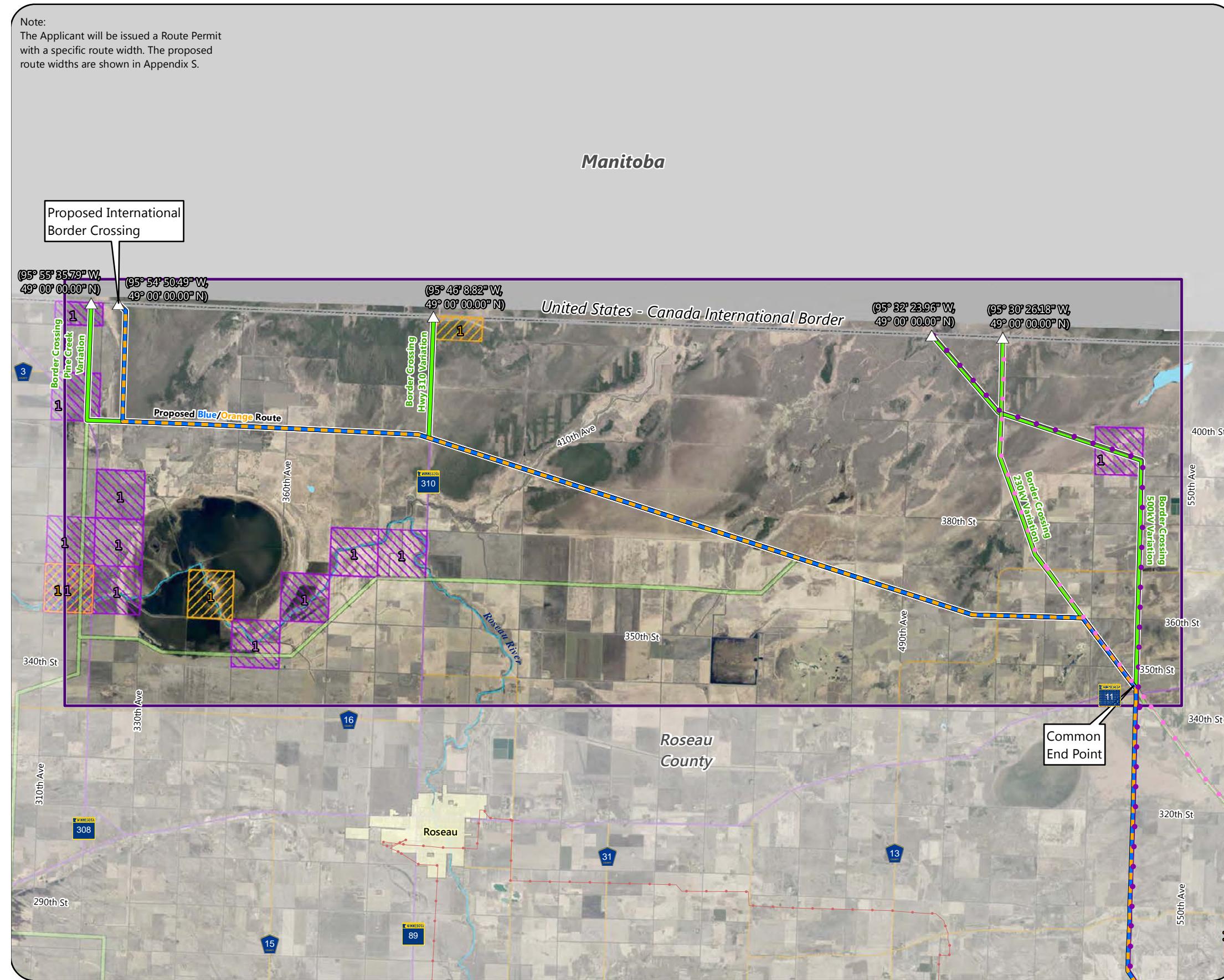
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Map 6-1 Human Settlement within Border Crossing Variation Area

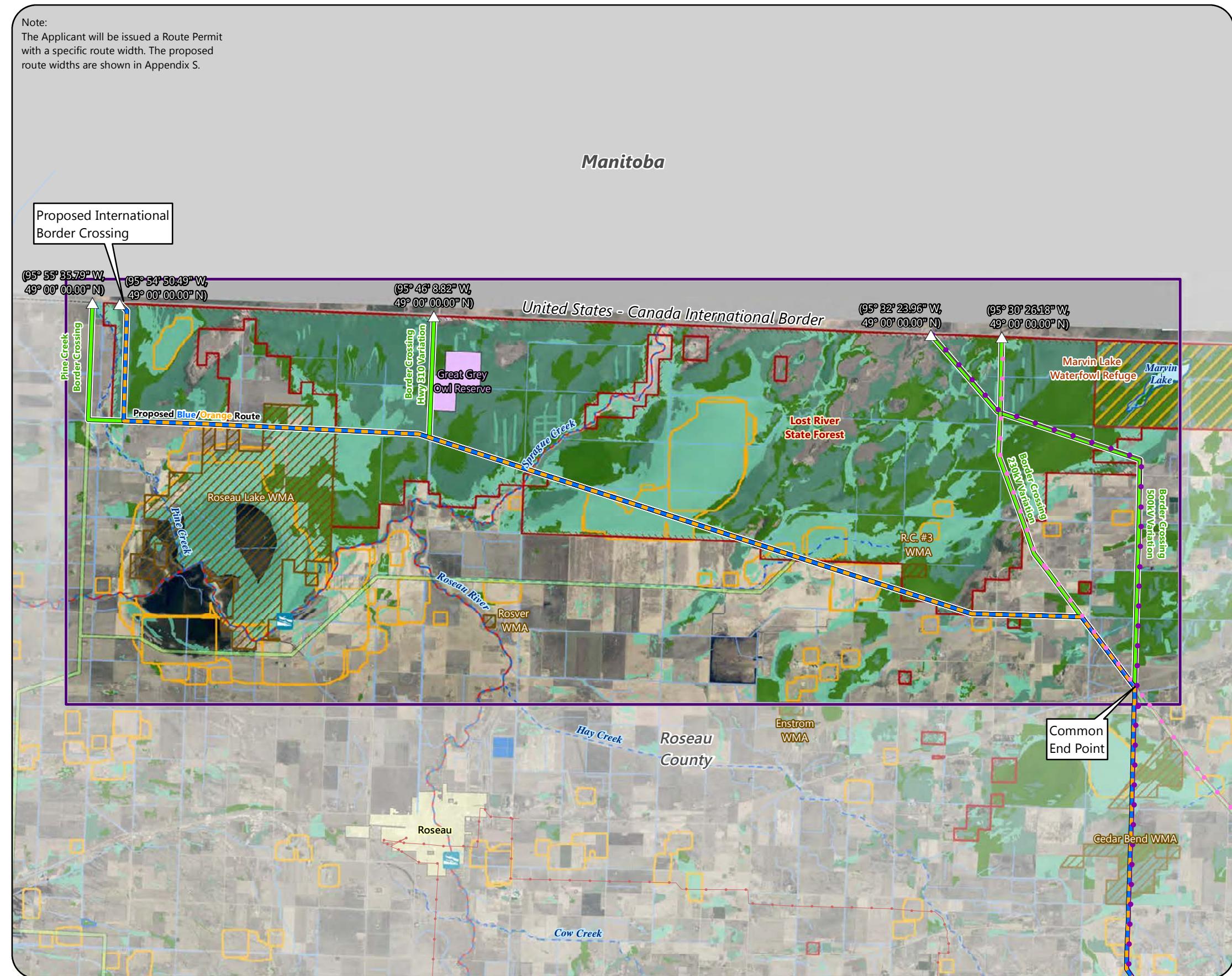
Note:
The Applicant will be issued a Route Permit with a specific route width. The proposed route widths are shown in Appendix S.



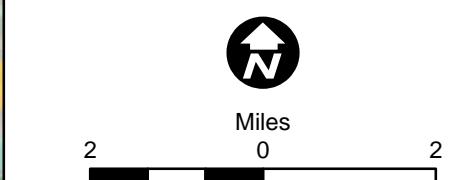
Map 6-2 Cultural Resources within Border Crossing Variation Area



Map 6-3 Water and Wildlife Resources within Border Crossing Variation Area



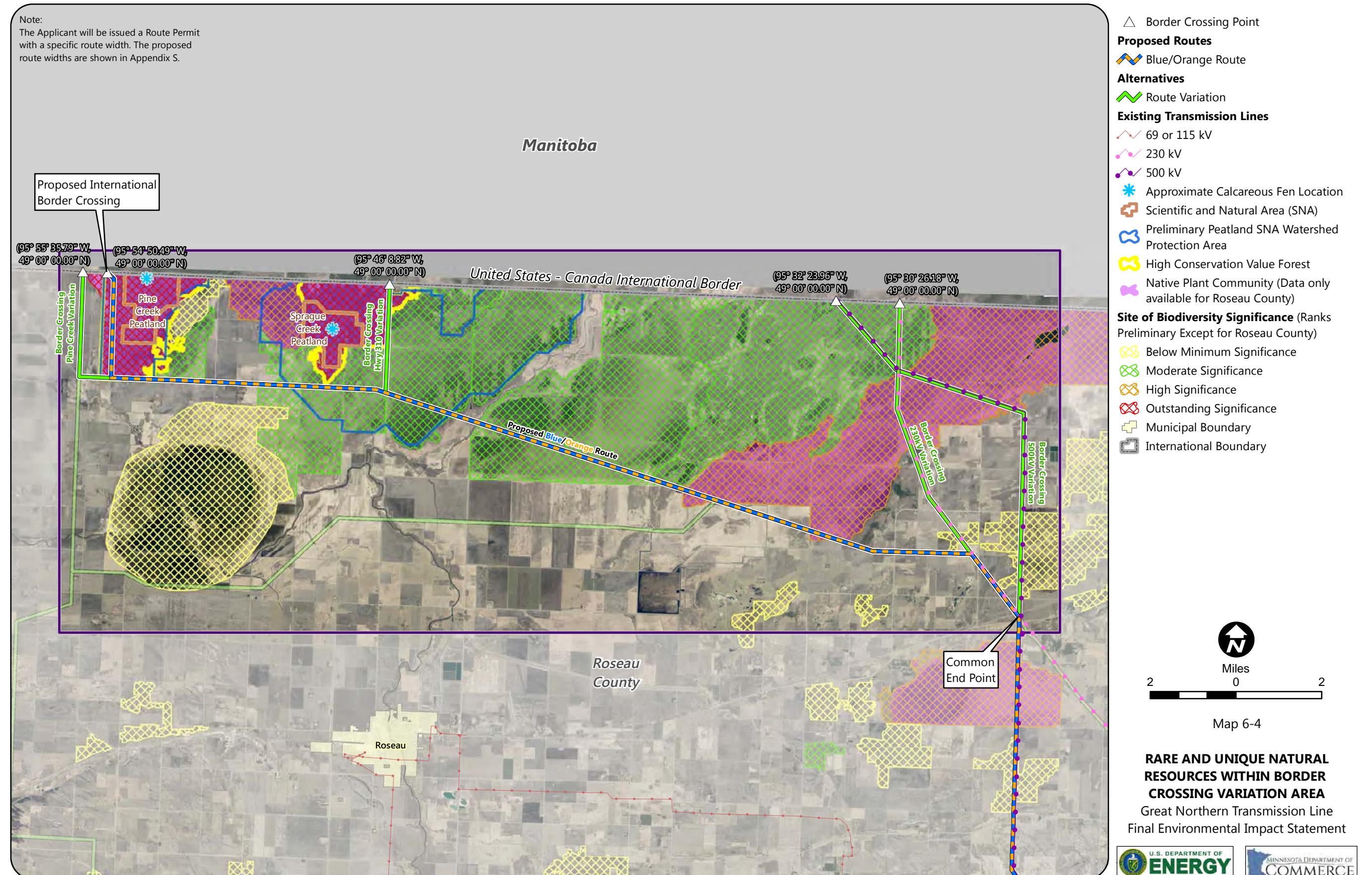
- △ Border Crossing Point
- Proposed Routes**
- Blue/Orange Route
- Alternatives**
- Route Variation
- Existing Transmission Lines**
- 69 or 115 kV
- 230 kV
- 500 kV
- Trailer Launch Water Access
- NHD Watercourse
- PWI Watercourse
- MPCA Impaired Stream
- NHD Waterbody
- PWI Waterbody
- Shallow Lake
- Great Grey Owl Reserve
- State Game Refuge
- Wildlife Management Area (WMA)
- State Forest Boundary
- Grassland Bird Conservation Core Areas
- National Wetland Inventory**
- PUB, Freshwater Pond & Other
- PUS, Other
- PEM, Freshwater Emergent Wetland
- PFO, Freshwater Forested/Shrub Wetland
- PSS, Freshwater Forested/Shrub Wetland
- Lake
- Riverine
- Municipal Boundary
- International Boundary



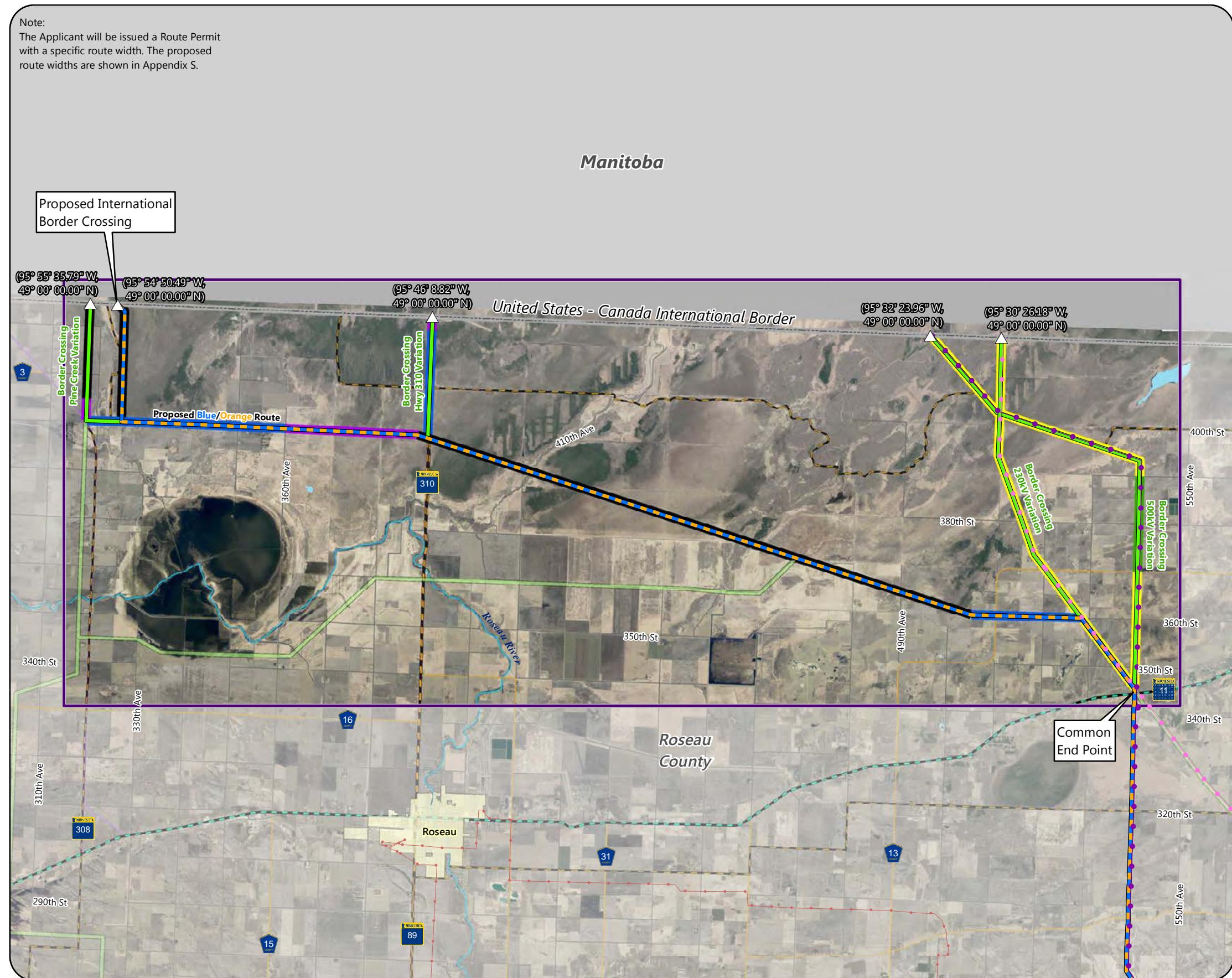
**WATER AND WILDLIFE
RESOURCES WITHIN BORDER
CROSSING VARIATION AREA**
Great Northern Transmission Line
Final Environmental Impact Statement



Map 6-4 Rare and Unique Natural Resources within Border Crossing Area

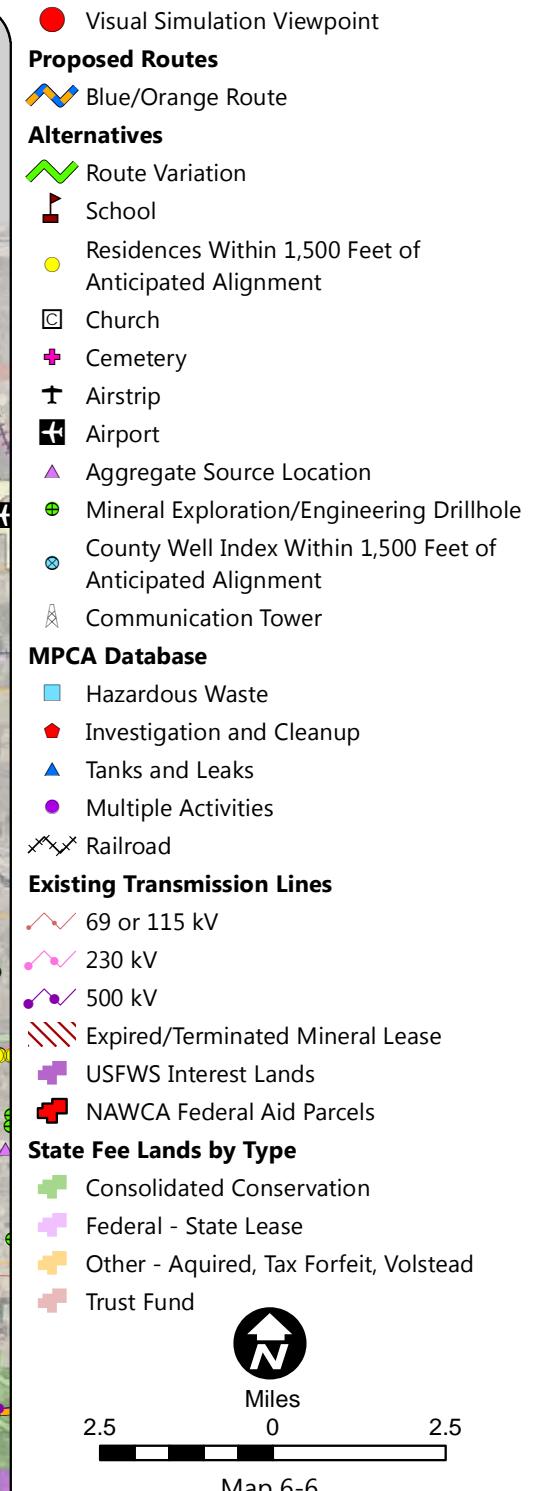
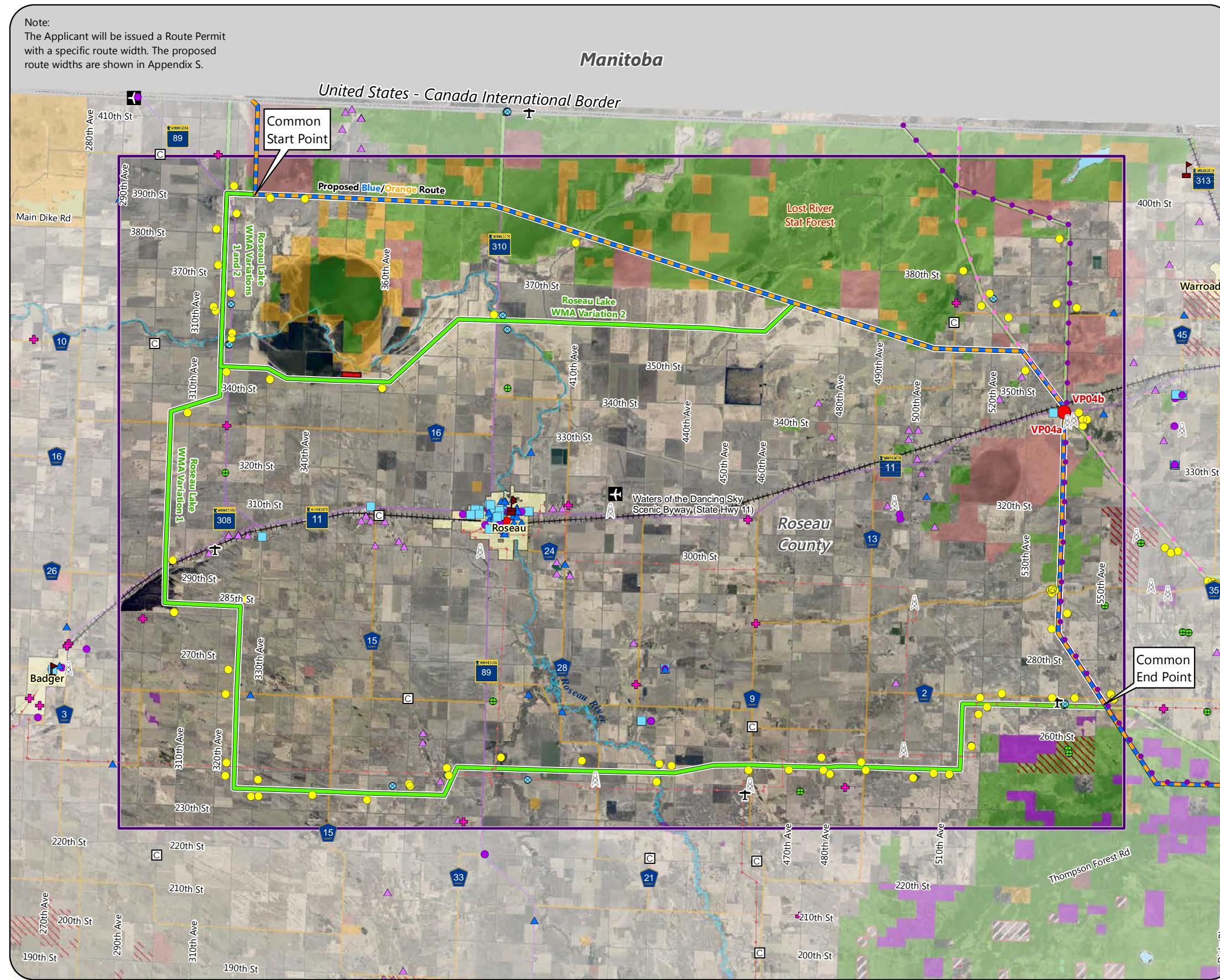


Map 6-5 Corridor Sharing within Border Crossing Variation Area



6.0 Comparative Environmental Consequences

Map 6-6 Human Settlement Area within Roseau Lake WMA Variation Area

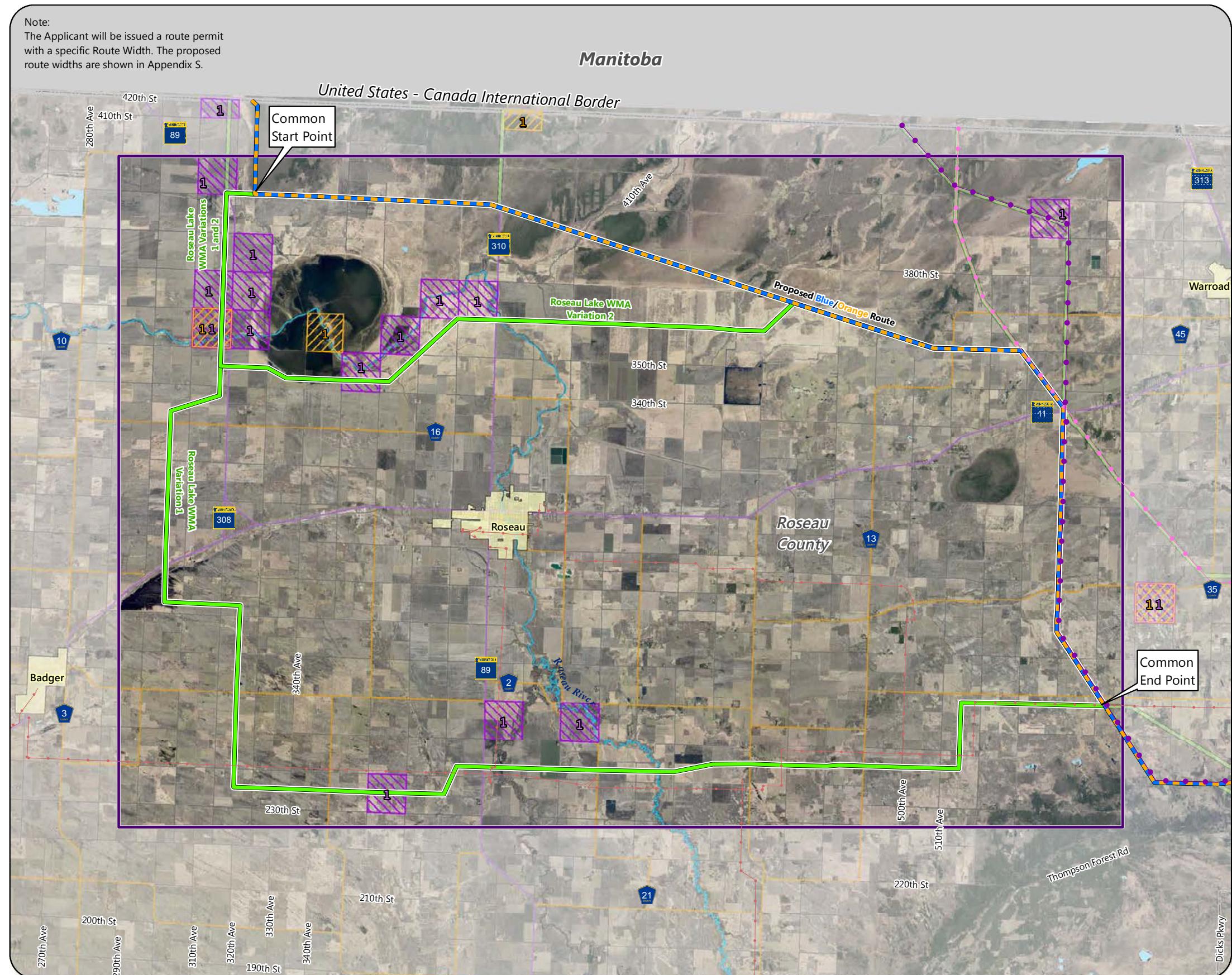


HUMAN SETTLEMENT WITHIN ROSEAU LAKE WMA VARIATION AREA

Great Northern Transmission Line
Final Environmental Impact Statement



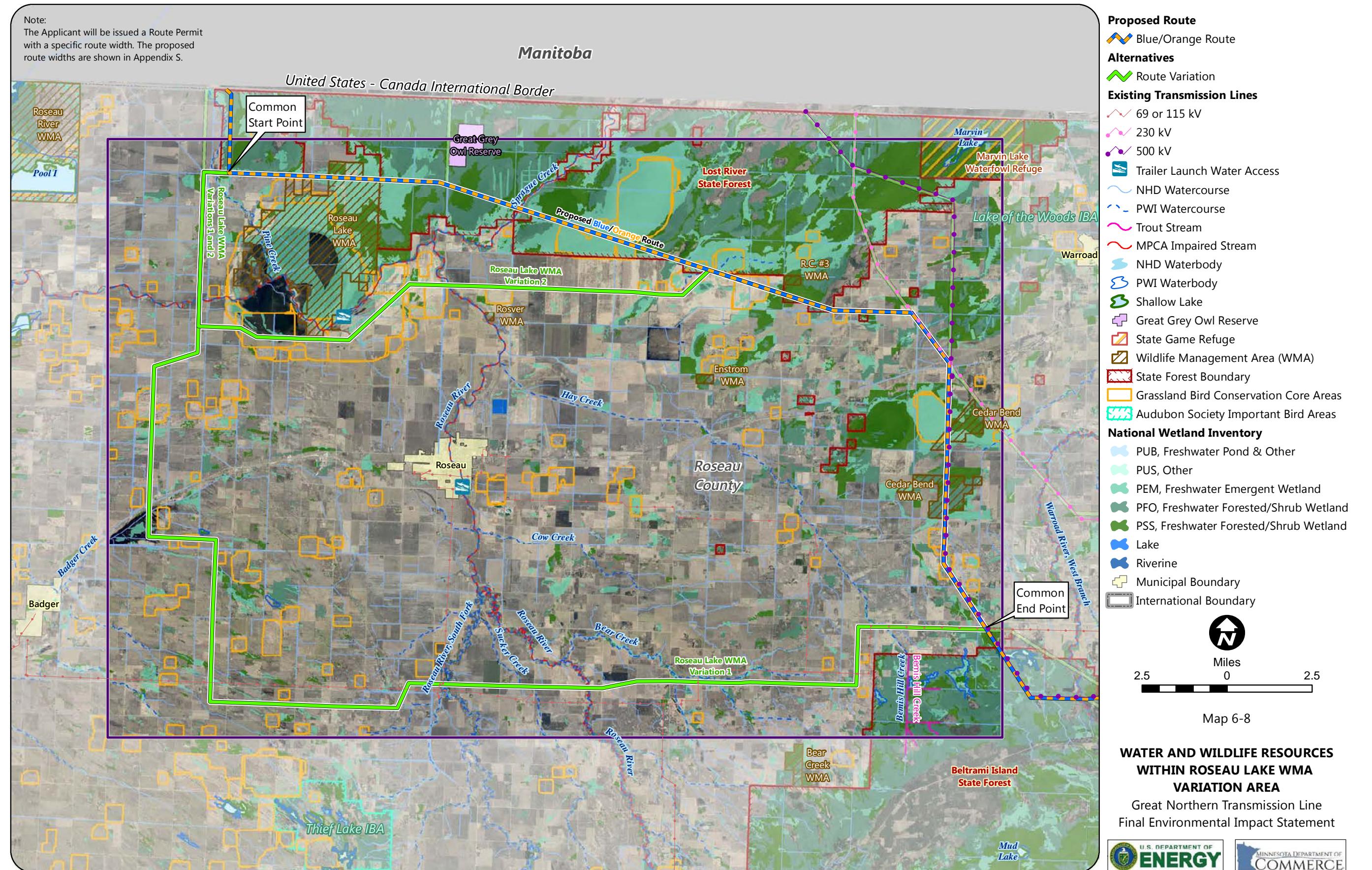
Map 6-7 Cultural Resources within Roseau Lake WMA Variation Area



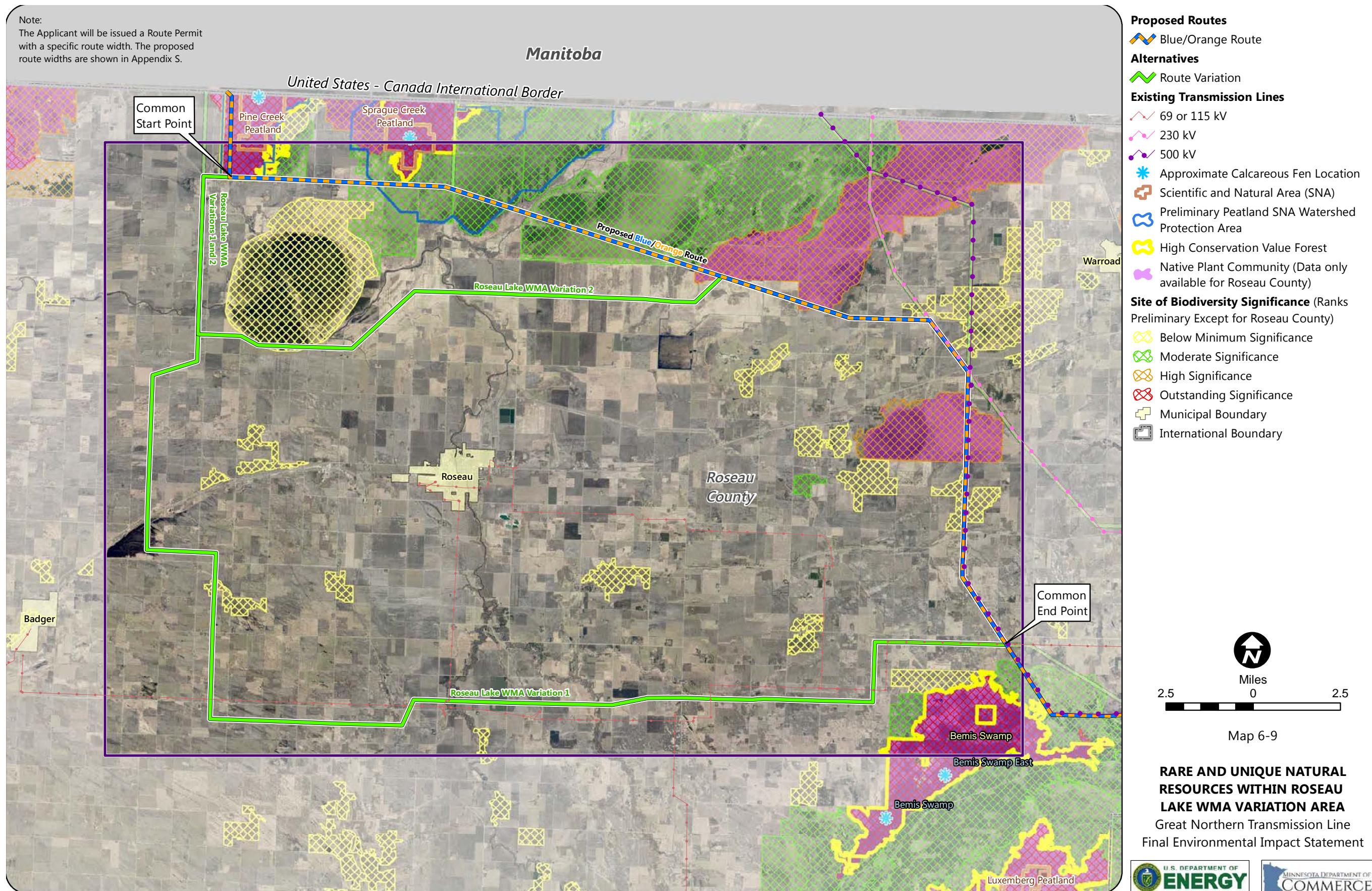
**CULTURAL RESOURCES WITHIN
ROSEAU LAKE WMA VARIATION AREA**
Great Northern Transmission Line
Final Environmental Impact Statement



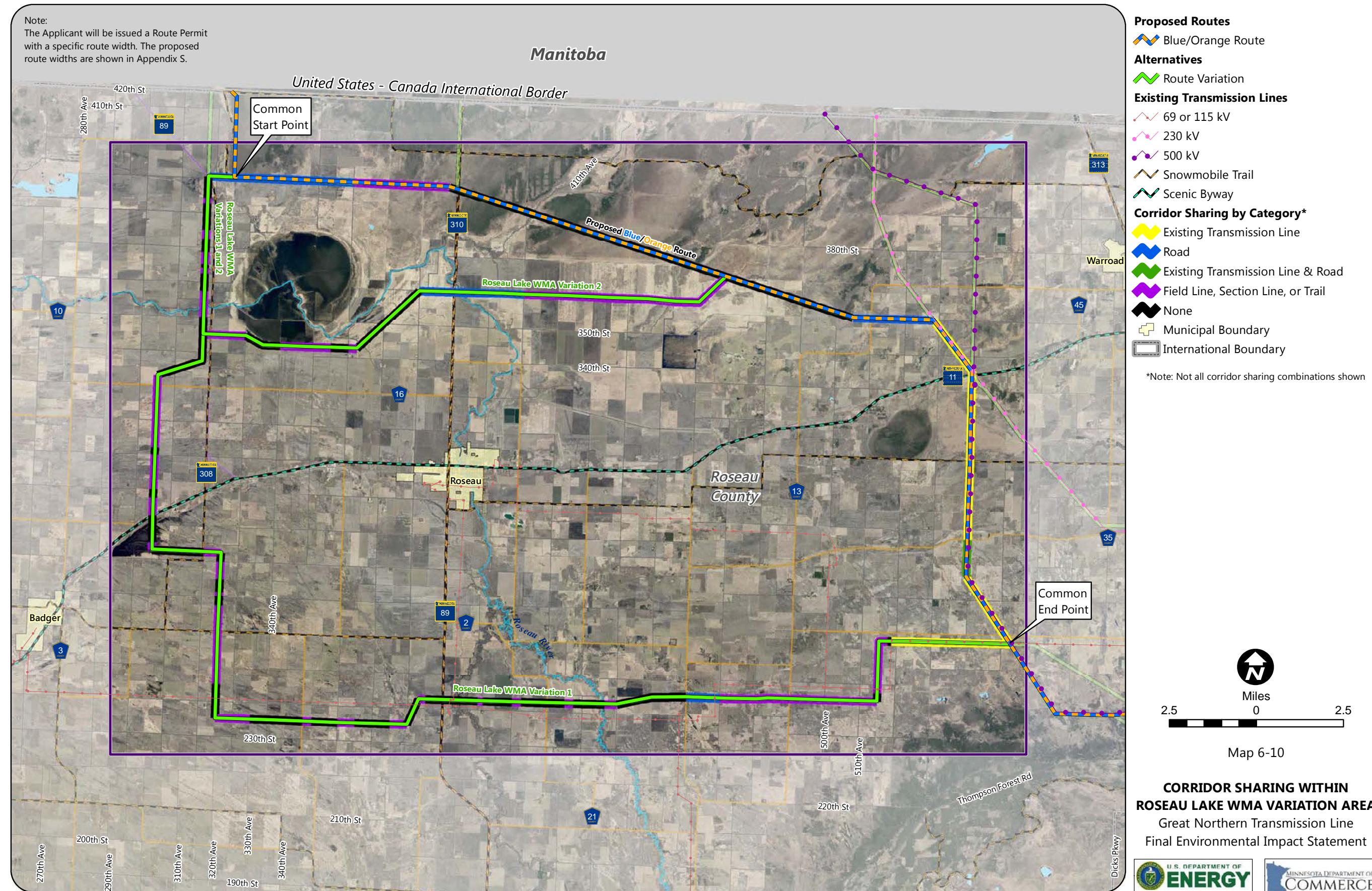
Map 6-8 Water and Wildlife Resources within Roseau Lake WMA Variation Area



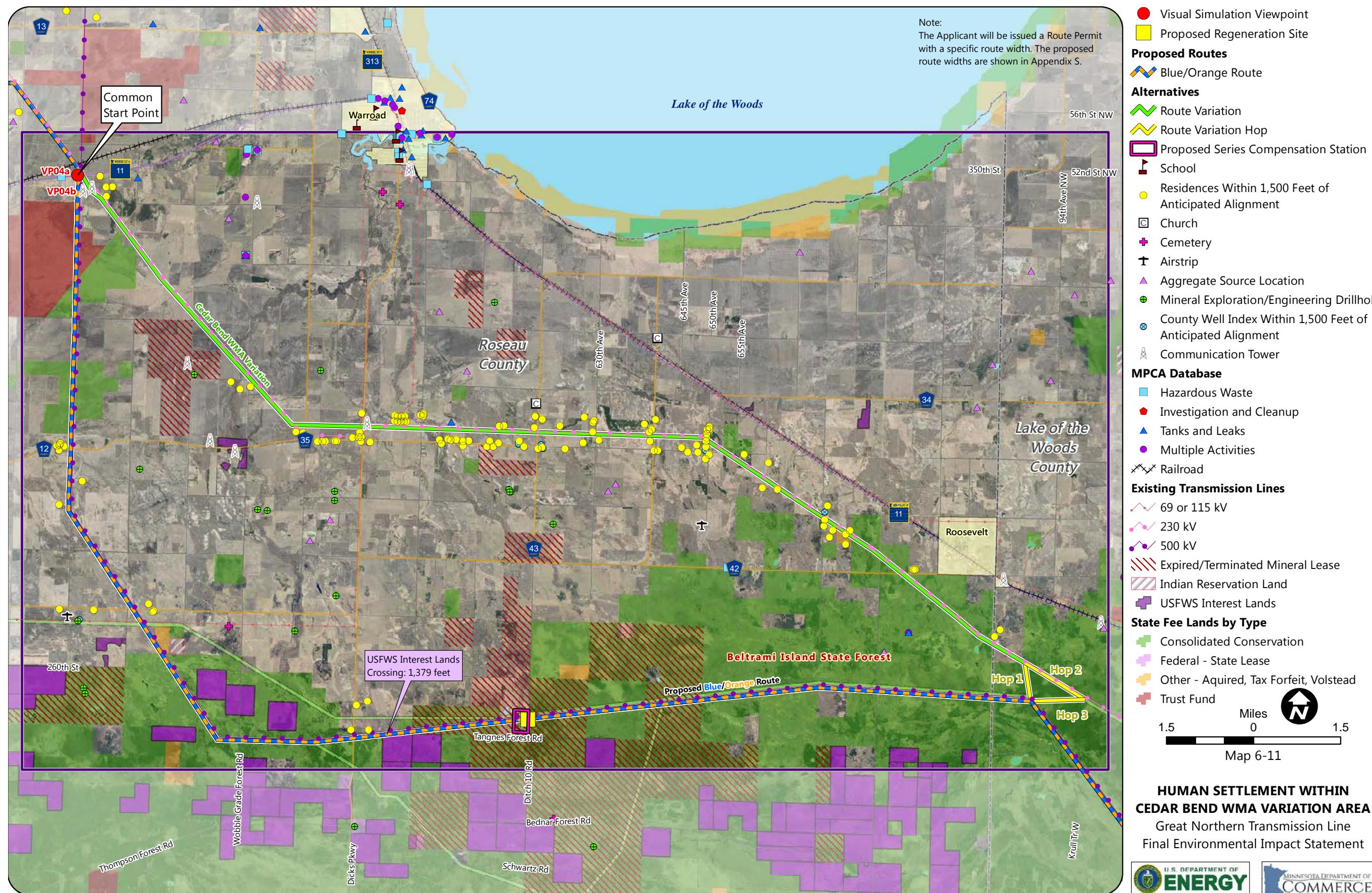
Map 6-9 Rare and Unique Natural Resources within Roseau Lake WMA Variation Area



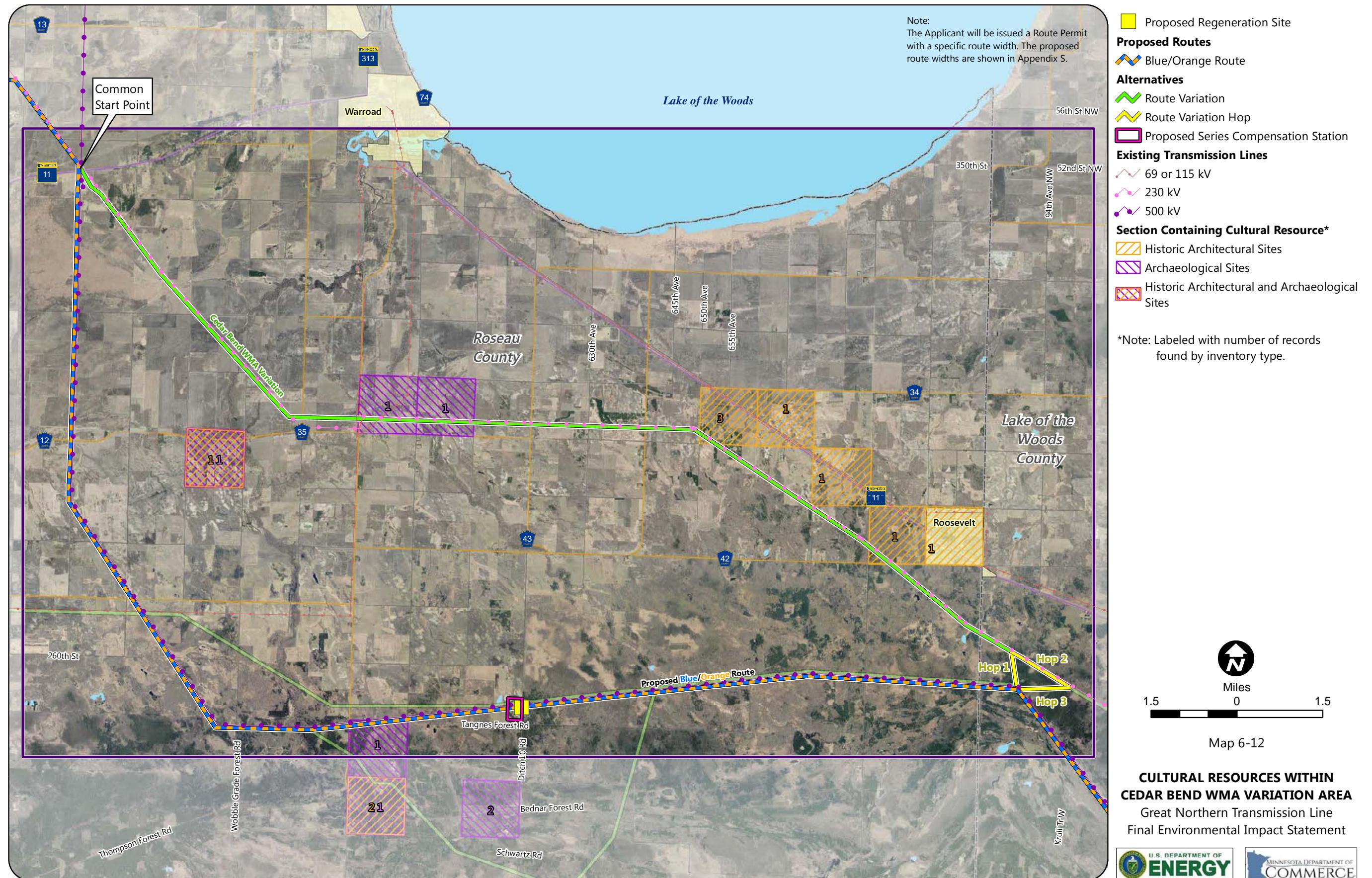
Map 6-10 Corridor Sharing within Roseau Lake WMA Variation Area



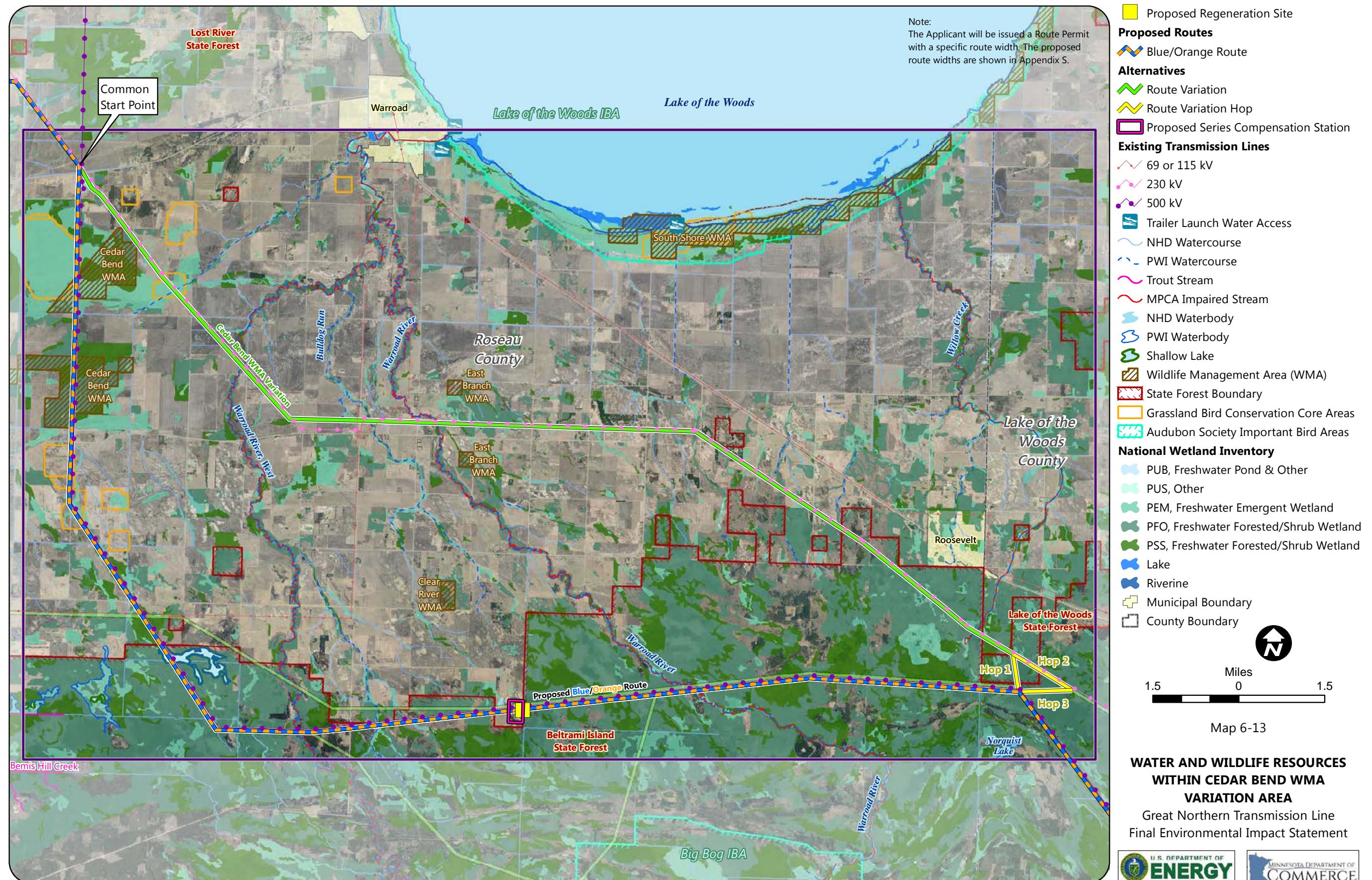
Map 6-11 Human Settlement within Cedar Bend WMA Variation Area



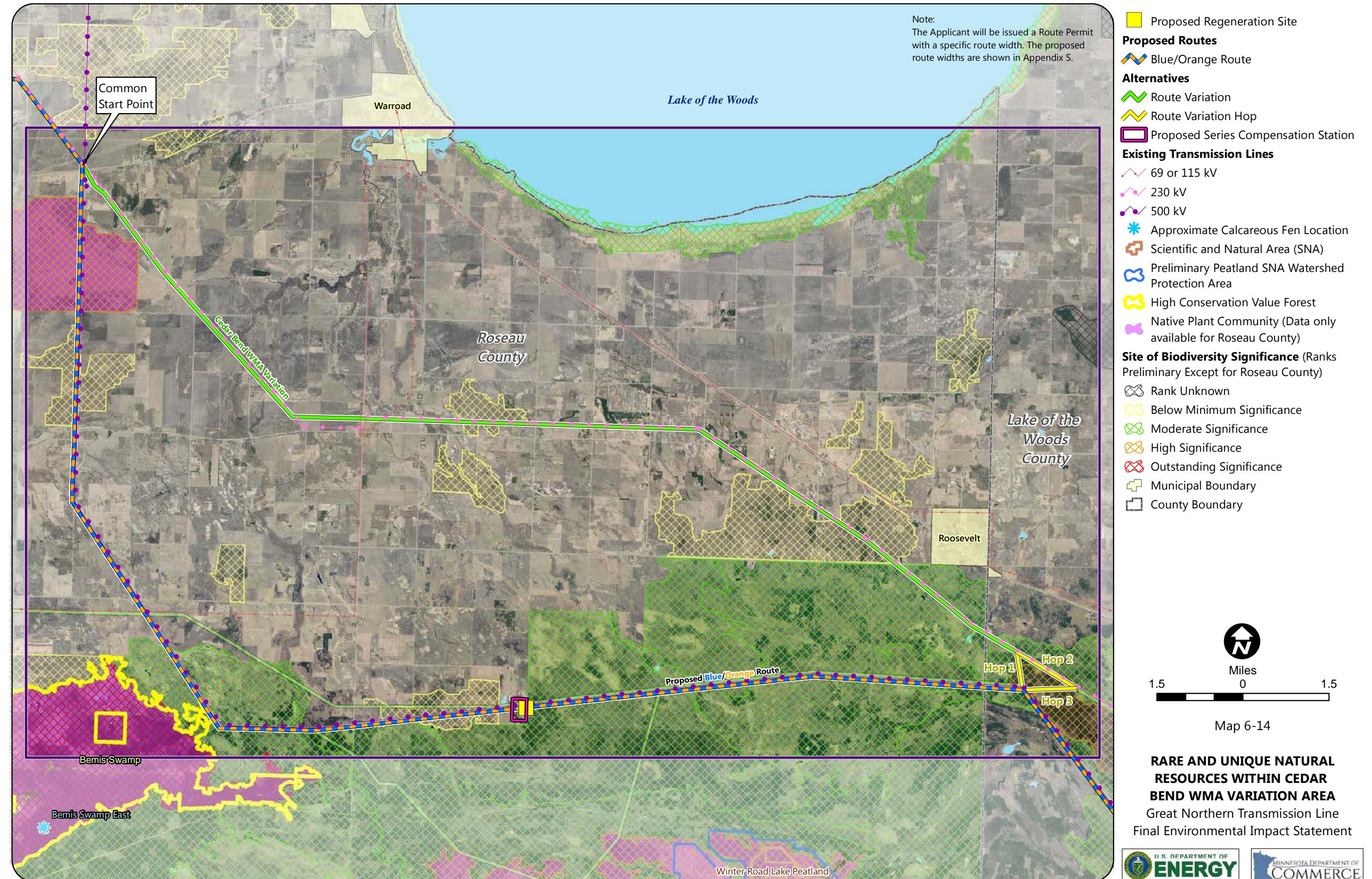
Map 6-12 Cultural Resources within Cedar Bend WMA Variation Area



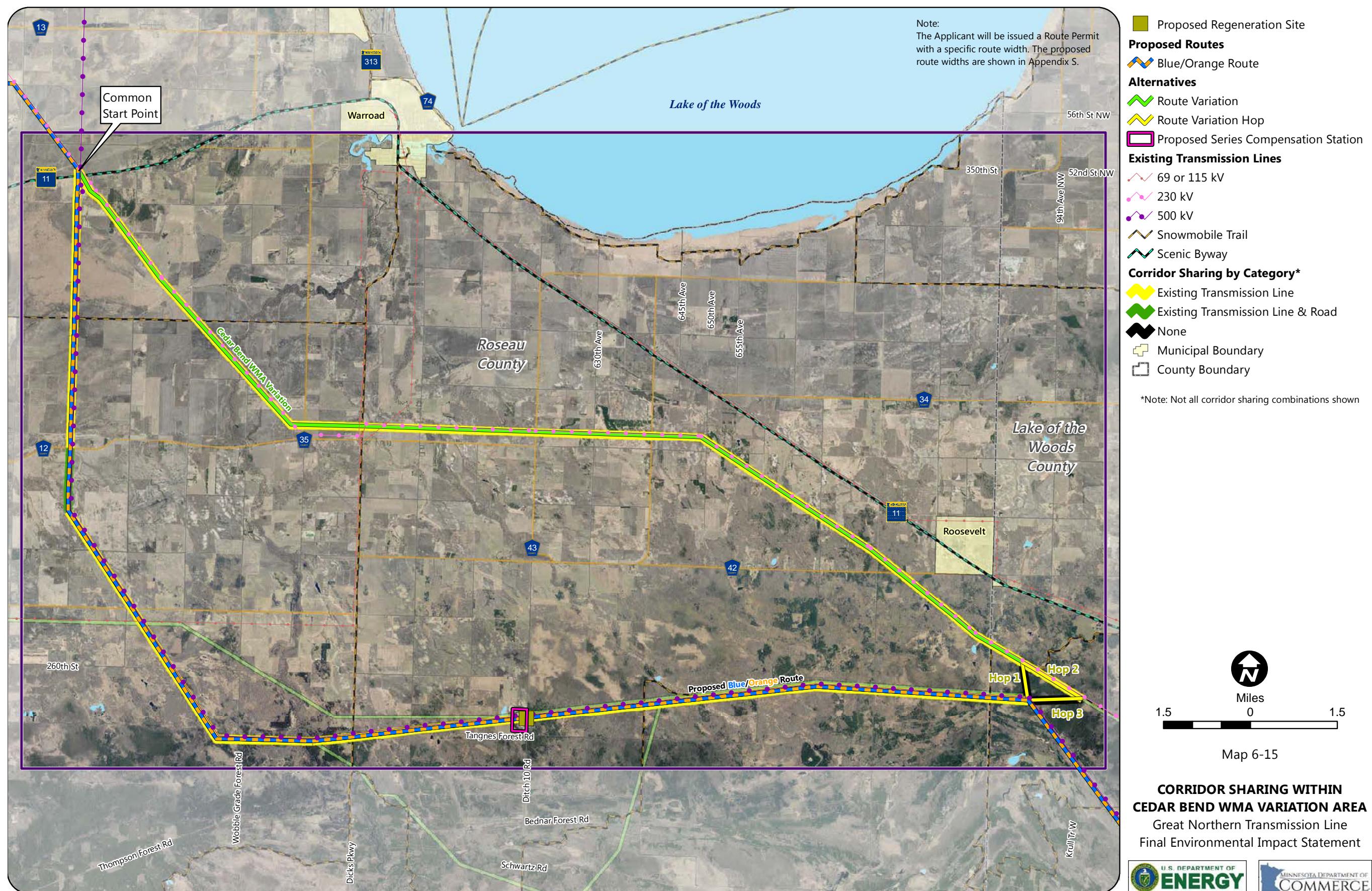
Map 6-13 Water and Wildlife Resources within Cedar Bend WMA Variation Area



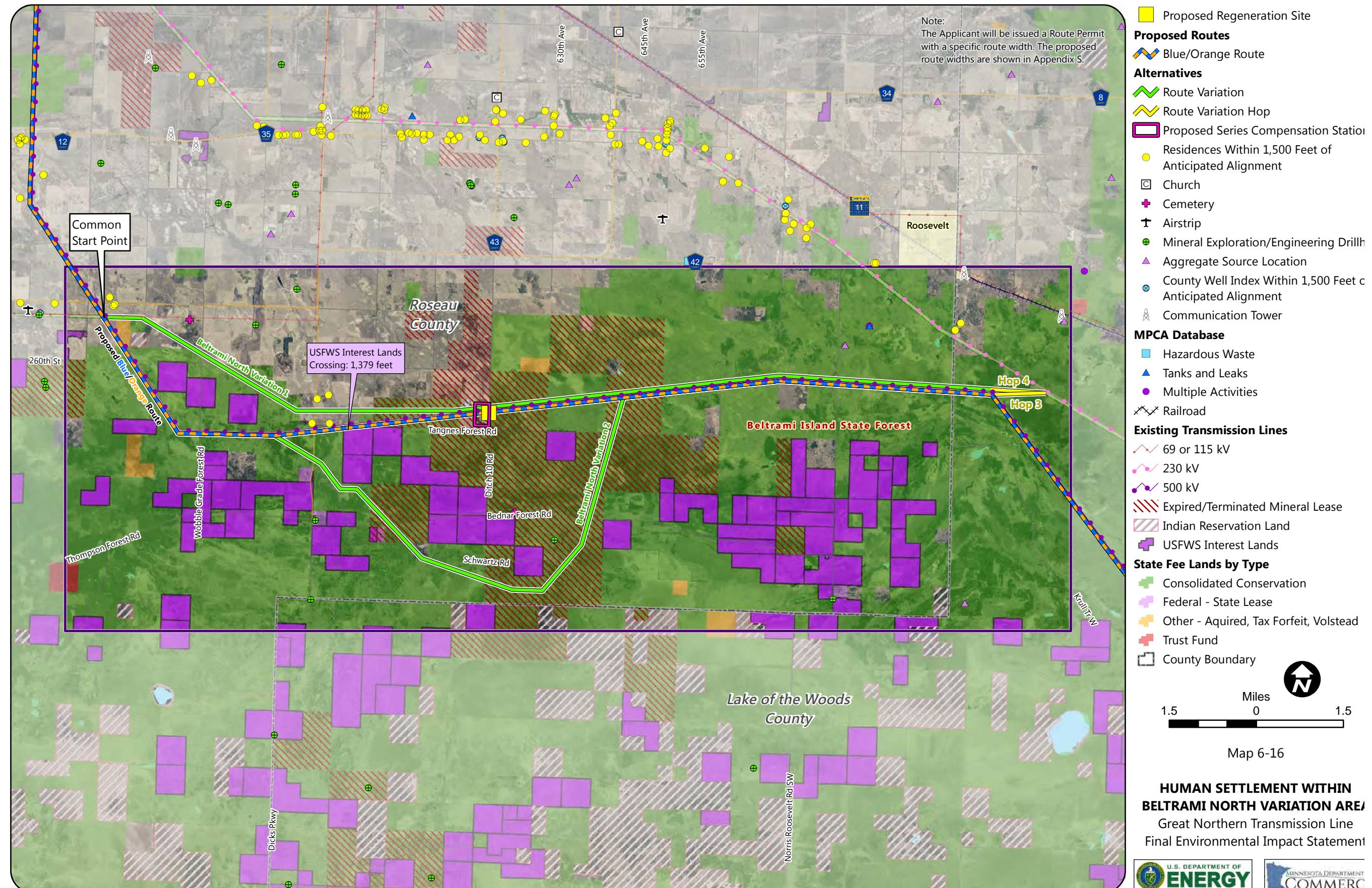
Map 6-14 Rare and Unique Natural Resources within Cedar Bend WMA Variation Area



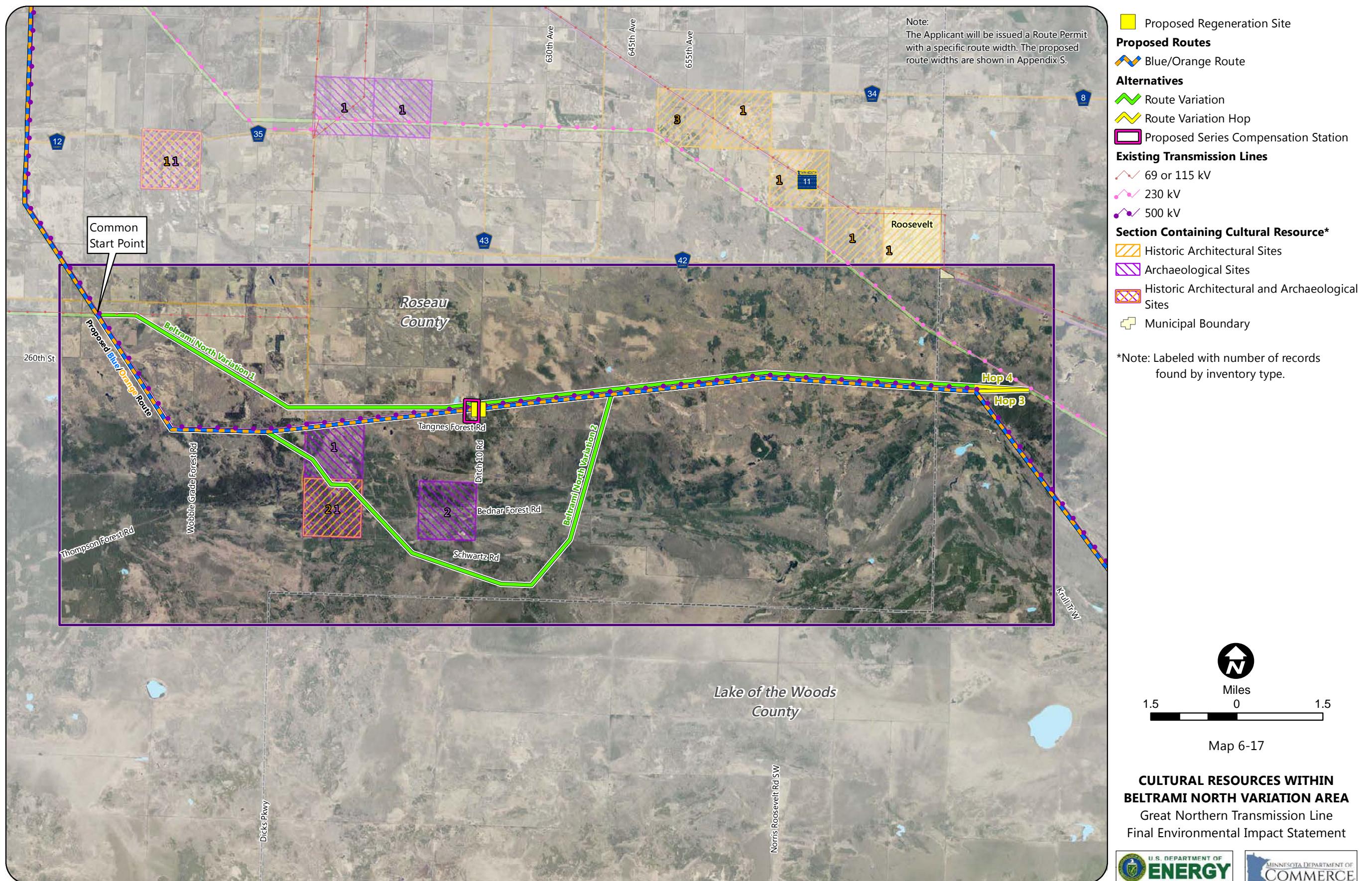
Map 6-15 Corridor Sharing within Cedar Bend WMA Variation Area



Map 6-16 Human Settlement within Beltrami North Variation Area

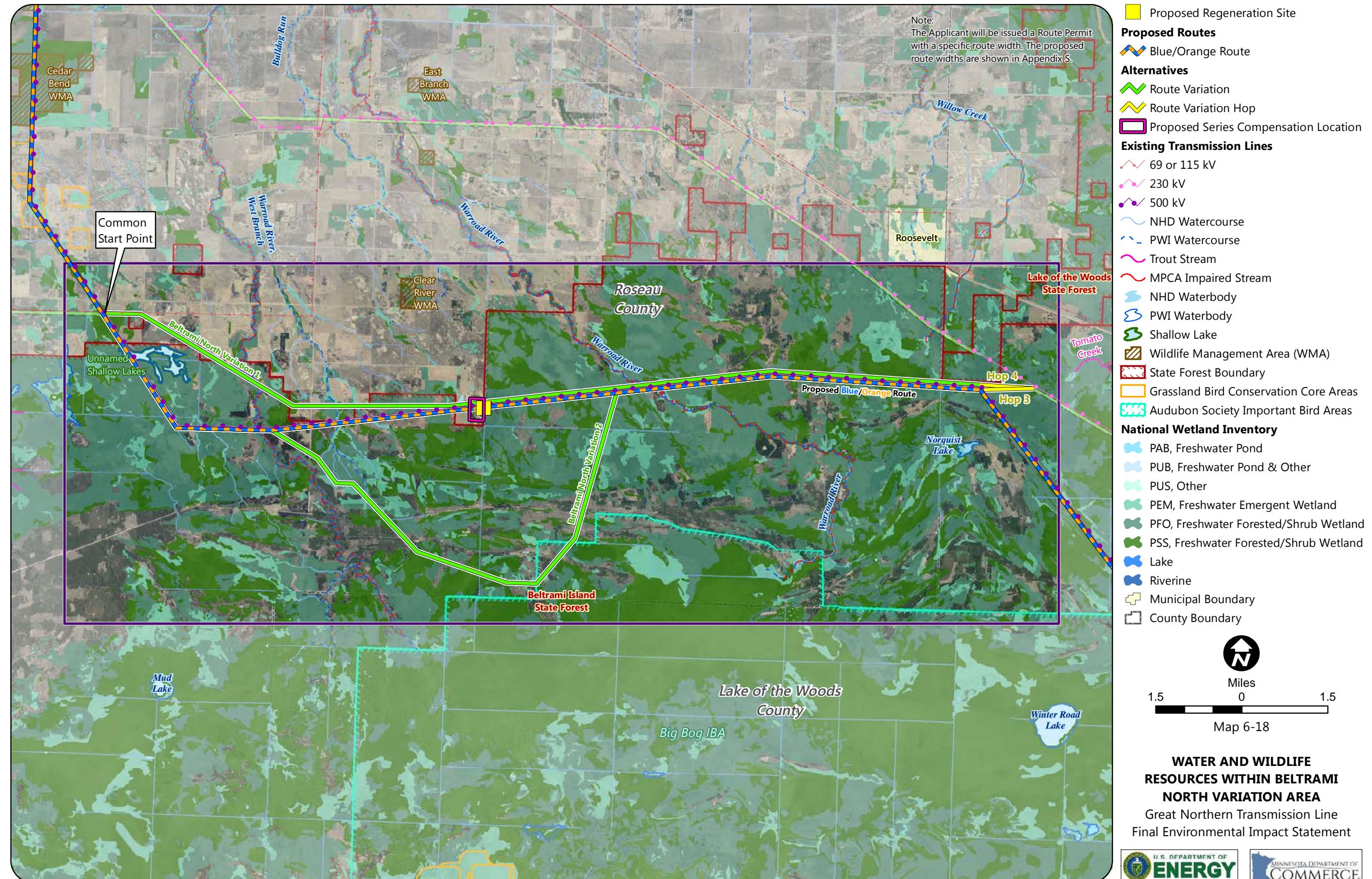


Map 6-17 Cultural Resources within Beltrami North Variation Area

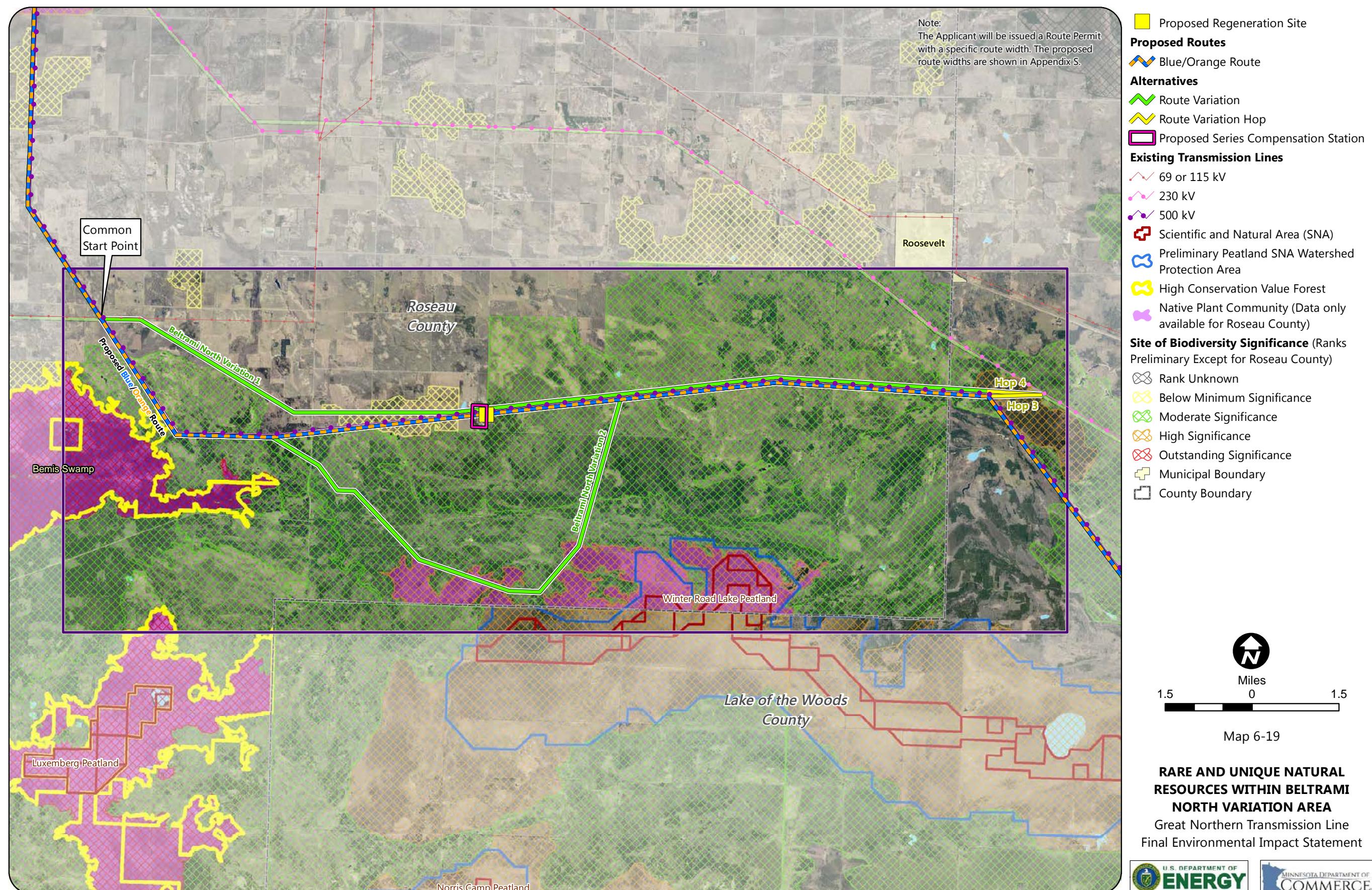


6.0 Comparative Environmental Consequences

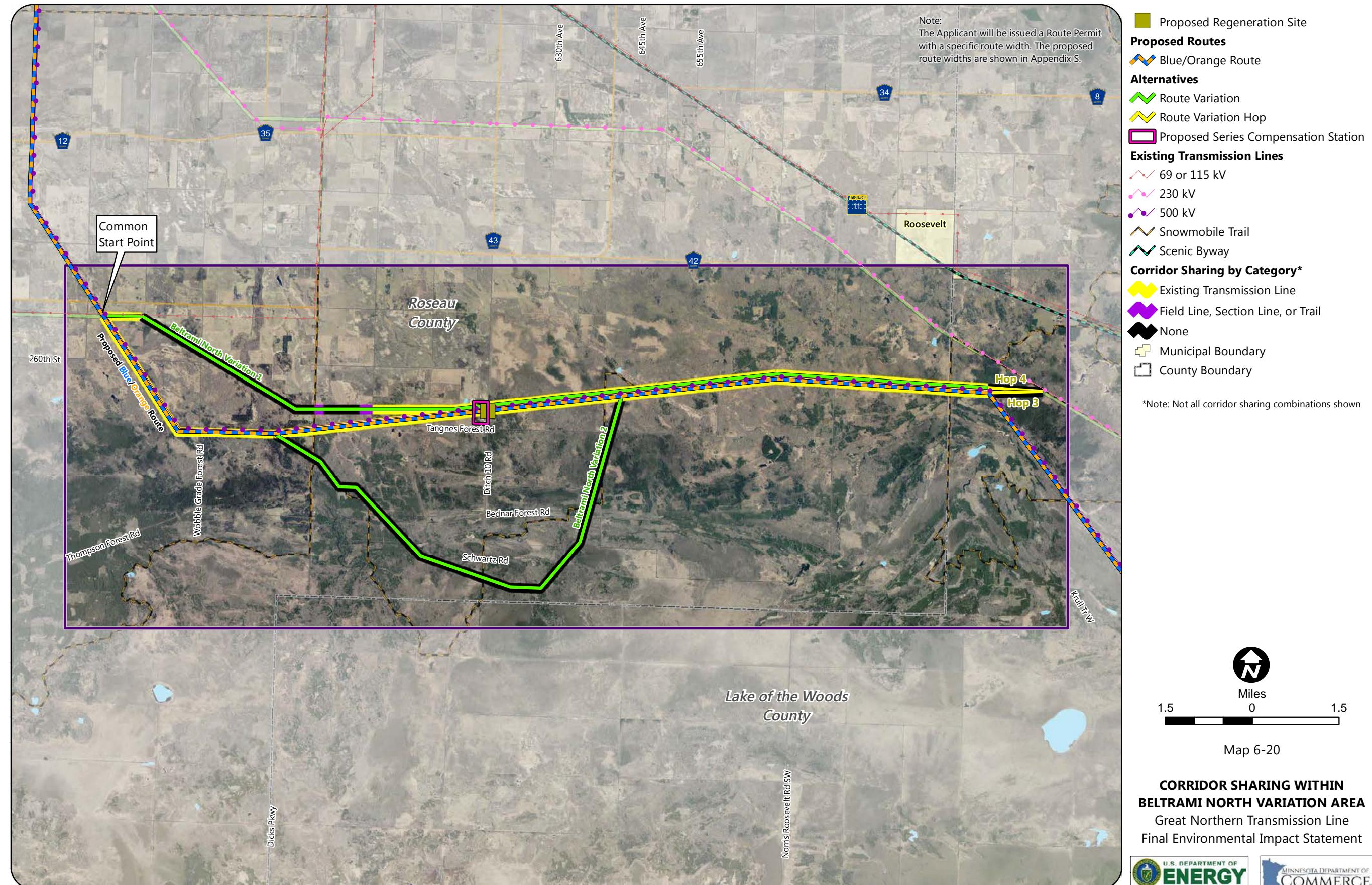
Map 6-18 Water and Wildlife Resources within Beltrami North Variation Area



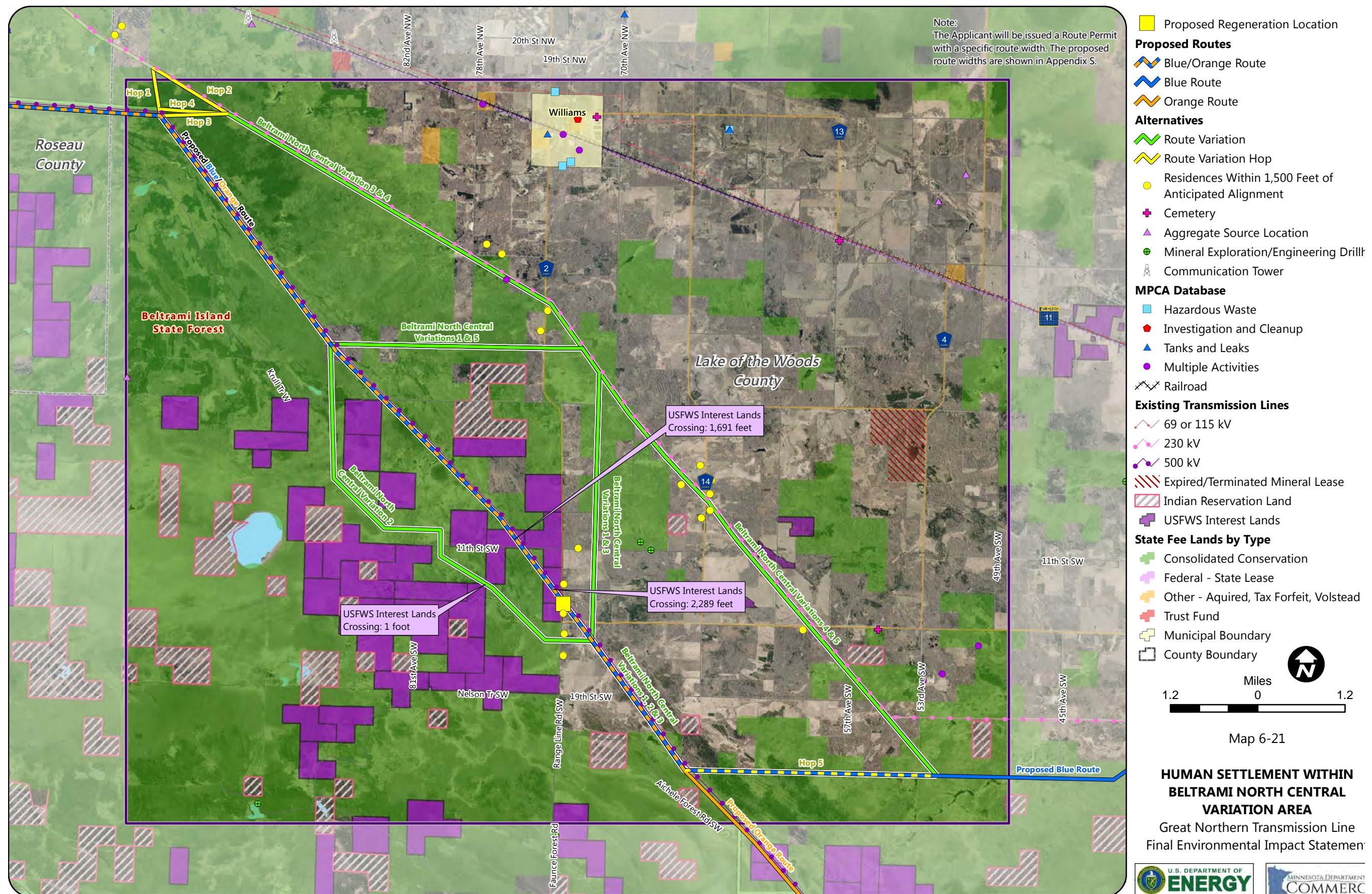
Map 6-19 Rare and Unique Natural Resources within Beltrami North Variation Area



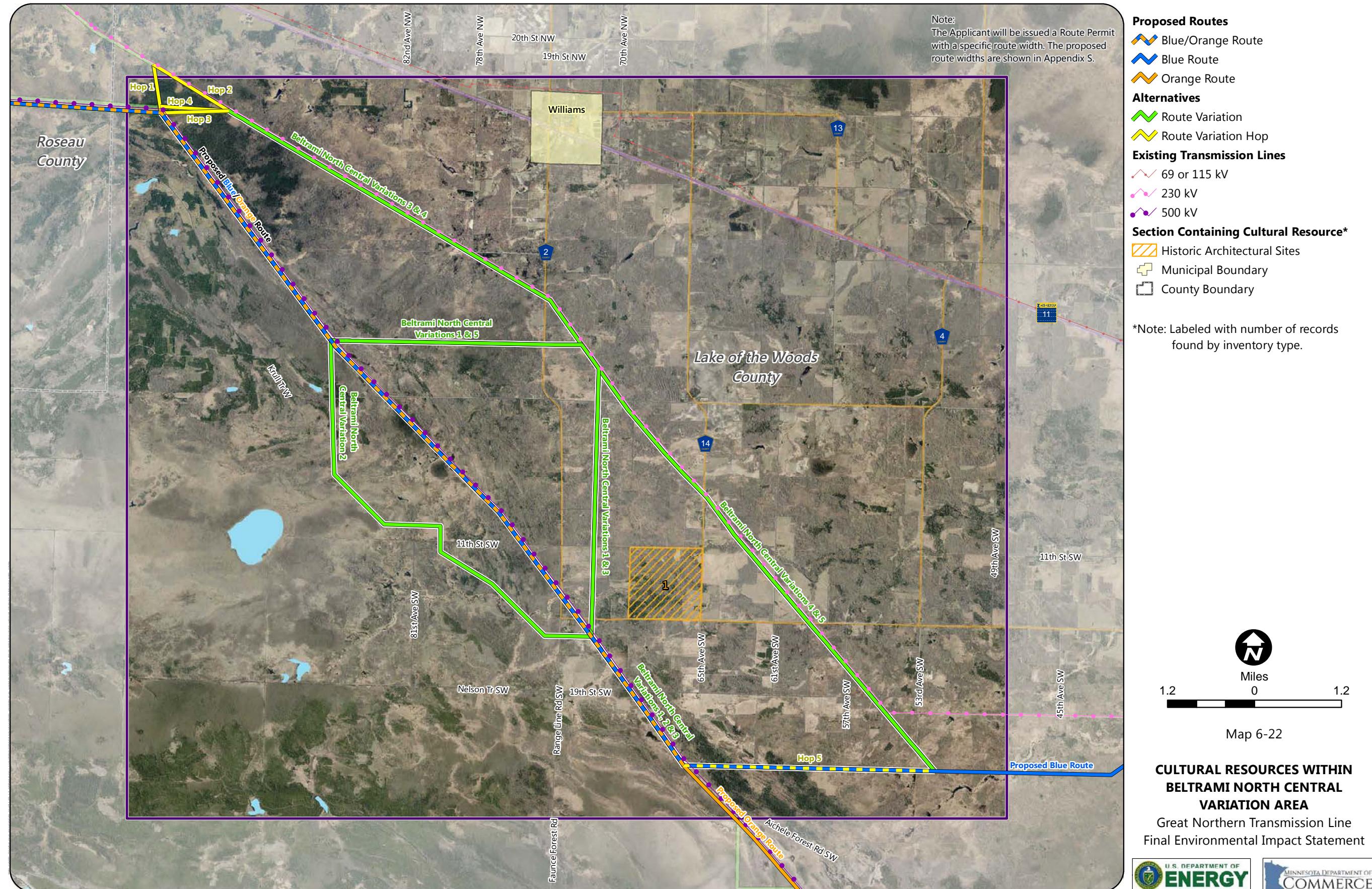
Map 6-20 Corridor Sharing within Beltrami North Variation Area



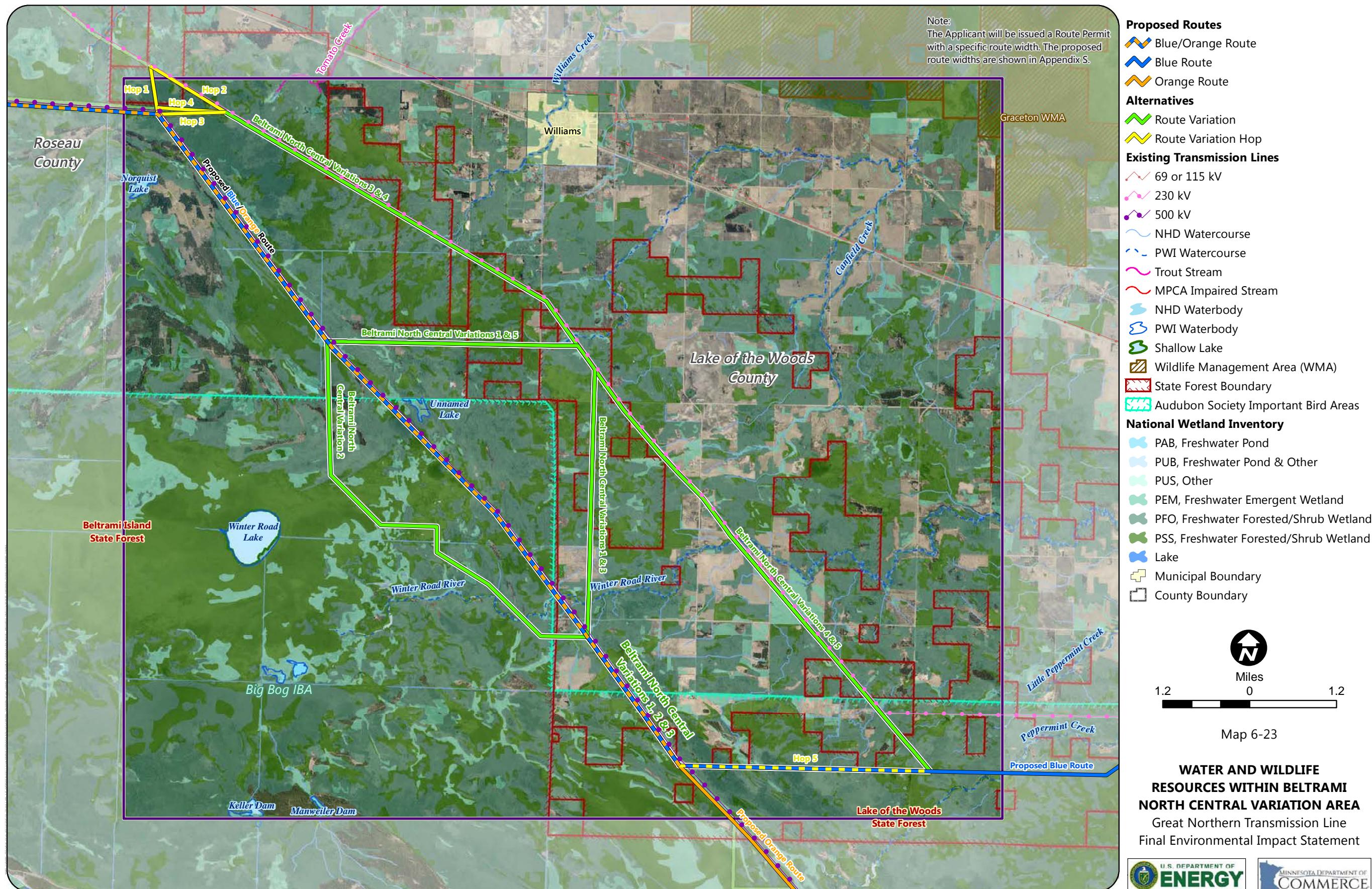
Map 6-21 Human Settlement within Beltrami North Central Variation Area



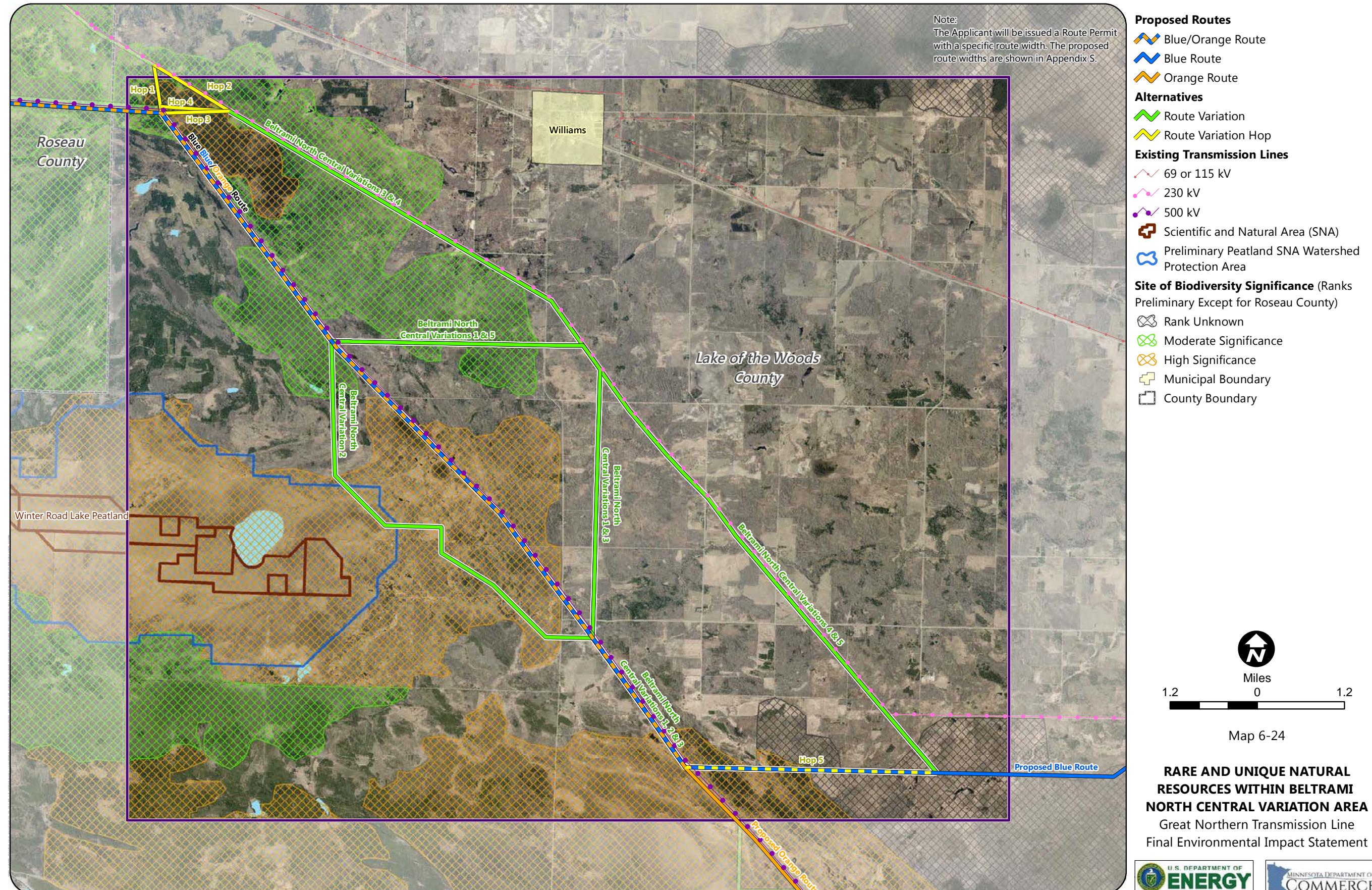
Map 6-22 Cultural Resources within Beltrami North Central Variation Area



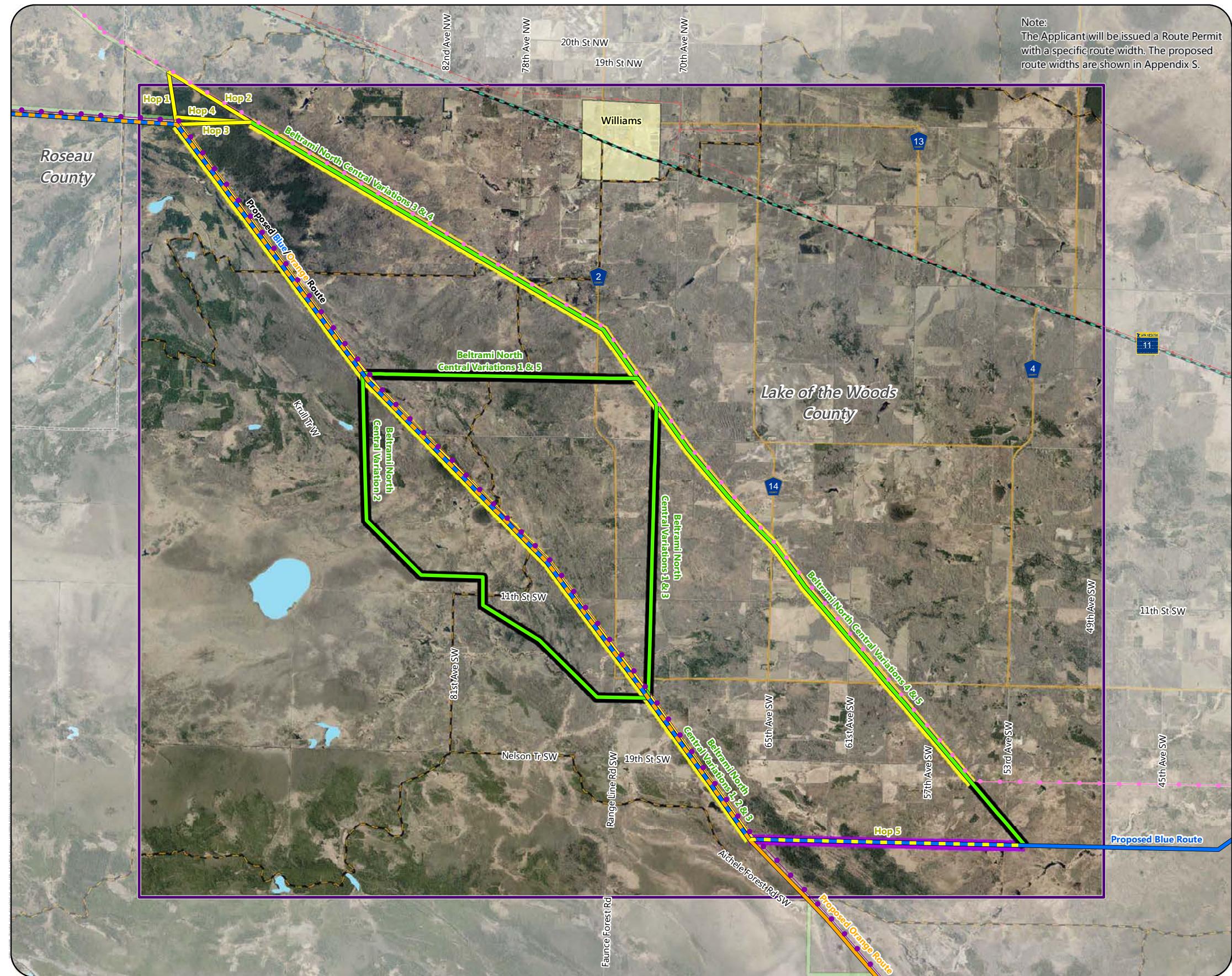
Map 6-23 Water and Wildlife Resources within Beltrami North Central Variation Area



Map 6-24 Rare and Unique Natural Resources within Beltrami North Central Variation Area



Map 6-25 Corridor Sharing within Beltrami North Central Variation Area



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6.3 Central Section

Chapter 5 provides a discussion of general impacts for each resource, and that discussion provides the general nature of the impacts, such as the duration, extent, whether it is direct or indirect and whether it is adverse or beneficial. It also describes the general nature of the disturbances such as tree clearing, soil disturbance, structure placement, access road construction, and other impacts related to components of the proposed Project. Those general details are not repeated in Chapter 6, which focuses on site specific resources and impacts and refers back to the general details of Chapter 5.

As described in Section 4.4 and identified on Map 4-8, the Central Section is composed of eight variation areas: Pine Island, Beltrami South Central, Beltrami South, North Black River, C2 Segment Option, J2 Segment Option, Northome, and Cutfoot. Section 5.4 previously described, in general, the human settlement, land-based economies, archaeological and historic architectural resources, natural environment, rare and unique natural resources, corridor sharing, electric system reliability, costs of constructing, operating, and maintaining the facilities as they relate to the Central Section and the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project. The following sections provide a more detailed description and analysis of the resources present and potential impacts from the proposed Project within the variation areas in the Central Section.

6.3.1 Pine Island Variation Area

The Pine Island Variation Area encompasses two route alternatives: the Proposed Blue Route and the Proposed Orange Route. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Pine Island Variation Area, depending on the route or variation considered.

6.3.1.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Pine Island Variation Area and the potential impacts from the proposed Project.

Aesthetics

Impacts on aesthetic resources within the Pine Island Variation Area would be determined based largely on the level of increased contrast in views by

sensitive viewers as a result of the proposed Project. These impacts are based on the number of visual resources, including residences, with high visual sensitivity in close proximity to the transmission line that are likely to have views of and be affected by the proposed Project. Aesthetic impacts are likely to be greatest for views of the proposed Project by sensitive viewers at close distances (e.g., in the foreground distance zone), but may also be substantial for views from greater distances. The vegetation surrounding high visual sensitivity areas can also affect the degree of aesthetic impact from the proposed Project. Areas with high visual sensitivity located in densely forested areas may be less likely to have views of the transmission line, even at a close distance, than high visual sensitivity areas located in open, agricultural areas and at greater distances from the transmission line. Because of the difference in site-specific landscape characteristics (e.g., the amount of screening provided by vegetation or terrain) among areas deemed as having a high visual sensitivity, the actual impact of the proposed Project could vary widely.

Residences and other aesthetic resources within 1,500 feet from the anticipated alignment of the proposed Project would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI for aesthetic resources. Also, within this distance, there is a high probability that the proposed Project would produce high contrast in the landscape. If existing large transmission lines would be followed, a new transmission line would not require clearing of new corridors, but rather an expansion of existing corridors. By paralleling an existing transmission line with structures of similar design and height, a new transmission line would produce less contrast than a line that does not parallel an existing large transmission line.

Data related to aesthetic resources in the Pine Island Variation Area are summarized in Table 6-66 and shown on Maps 6-26, 6-27, 6-28, and 6-30.

The Proposed Orange Route would be located near the Big Bog State Recreation Area, east of State Route 72 and north of Upper Red Lake (Map 6-28). This state recreation area has trails, interpretive facilities, and other visitor facilities and is an aesthetic resource with high visual sensitivity. The Proposed Blue Route and Proposed Orange Route would be located within one mile of two and seven historic architectural sites, respectively, with high visual sensitivity (Map 6-27). In addition, both the Proposed Blue Route and Proposed Orange Route could be located within 1,500 feet of two or more residences, which also have high visual sensitivity.

Table 6-66 Aesthetic Resources within the ROI in the Pine Island Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Pine Island Variation Area | |
|---|--|----------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | Length (mi) | 109.8 | 105.4 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 39 | 23 |
| Residences | Count within 0–500 ft | 1 | 0 |
| | Count within 0–1,000 ft | 9 | 0 |
| | Count within 0–1,500 ft | 14 | 2 |
| Historic Architectural Sites | Count within 0–1,500 ft | 2 | 0 |
| | Count within 0–5,280 ft | 2 | 7 |
| State Trails | Count within 0–1,500 ft | 1 | 1 |
| State Forests | Count within 0–1,500 ft | 4 | 6 |
| Snowmobile Trails | Count within 0–1,500 ft | 3 | 4 |
| State Water Trails | Count within 0–1,500 ft | 1 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2003, reference (182); MnDNR 2003, reference (148); MnDNR 2010 reference (150); MnDNR 2010, reference (183)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

(Figure 6-48). Of the proposed alternatives in the Pine Island Variation Area, the Proposed Blue Route would affect the most residences within 1,500 feet of the anticipated alignment (14), including nine of those within 1,000 feet of the anticipated alignment and one within 500 feet. The Proposed Orange Route would only affect the two residences, none of which are within 1,000 or 500 feet of the anticipated alignment.

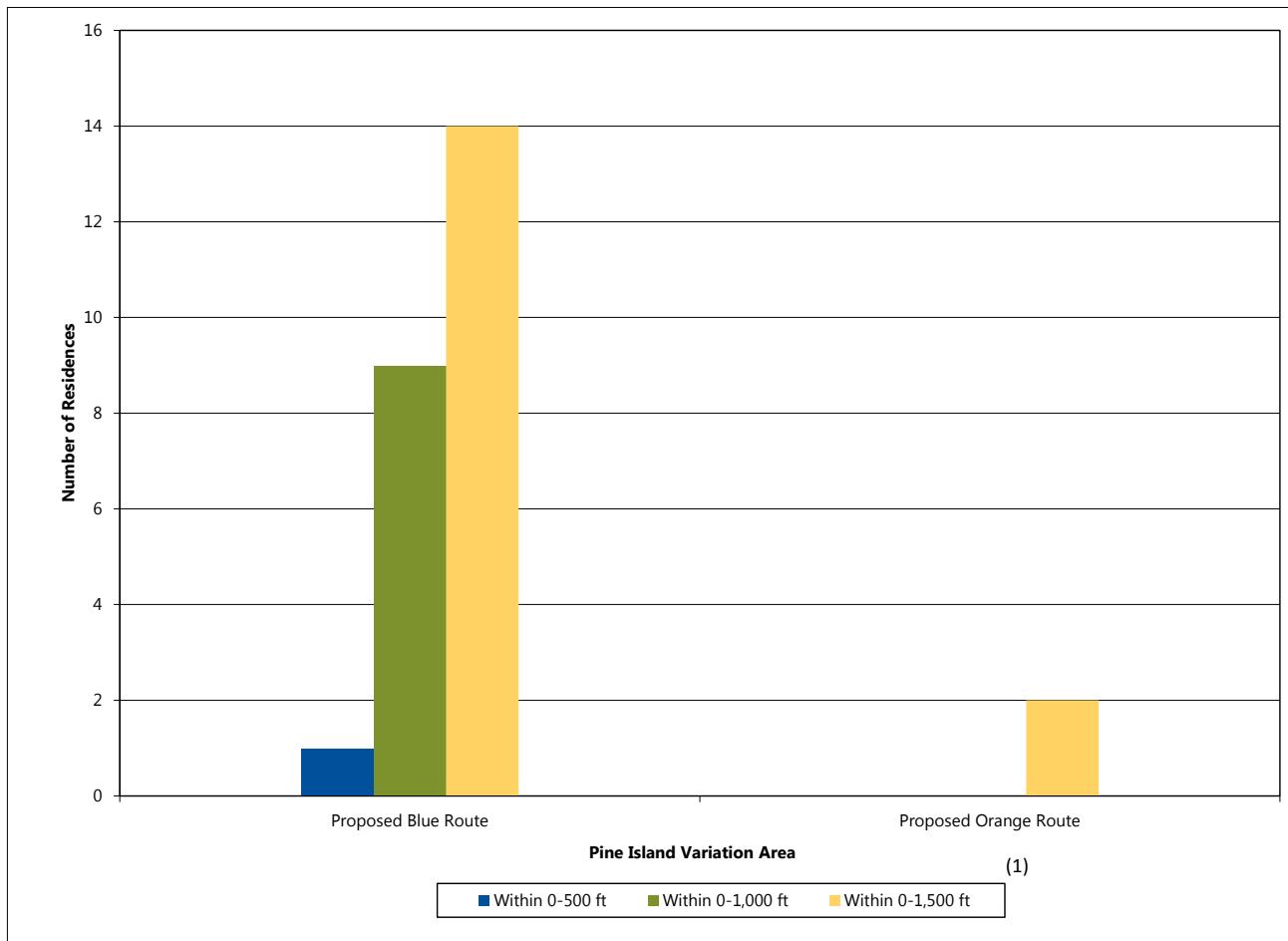
Because of concerns raised during the scoping period regarding potential aesthetic impacts to views from the Big Bog Boardwalk, photosimulations were generated to provide a more realistic indication of how the viewpoint would look if the proposed Project was constructed. Appendix N shows the existing view looking northeast (Viewpoint 01a) and looking east-northeast (Viewpoint 01b) from the Big Bog boardwalk and interpretive viewing location in the recreation area. In addition to the existing view, Viewpoints 01a and 01b show photosimulations of what the proposed constructed Project would look like as well as showing the constructed Proposed Orange Route, with the tower structures and wires indicated in yellow, for reference. In these views the Proposed Orange Route would be located approximately 1.6 miles away at its nearest point. As indicated in the photosimulations, the Proposed Orange Route would be screened from view from this viewpoint by dense forest and would not

diminish the visual character or quality of views from this area.

The Proposed Orange Route would also be located east of Upper Red Lake where a number of residences and other facilities are located. Viewpoint 02 in Appendix N shows the existing view looking east-southeast in the direction of the Proposed Orange Route from a fire lookout tower located just north of Waskish on the east side of Upper Red Lake. Similar to the series of existing views and proposed view simulations for Viewpoint 01a and 01b, Appendix N shows the existing view from the fire lookout tower (Viewpoint 02) as well as a photosimulation of the constructed proposed Project and the same view with the constructed Proposed Orange Route indicated in yellow. In this view the Proposed Orange Route would be located approximately 6.5 miles away at its nearest point. As indicated in the photosimulation, at this distance the Proposed Orange Route would appear very small on the horizon and be mostly screened from view by the dense and expansive forest. From this viewpoint, the Proposed Orange Route would not be noticeable to casual viewers and it would not diminish the visual character or quality of views from this area.

The Proposed Blue Route is slightly longer (109.8 miles) than the Proposed Orange Route (105.4

Figure 6-48 Residences within the ROI in the Pine Island Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

miles; Table 6-66) and both proposed routes parallel existing large transmission lines for a portion of their entire lengths (39 and 23 percent, respectively). Although the Proposed Blue Route parallels an existing large transmission line for a greater percentage of its length than the Proposed Orange Route, the Proposed Orange Route parallels a 500 kV transmission line with similar structure design, while the Proposed Blue Route parallels a 230 kV transmission line which has a slightly different structure design. By paralleling an existing 500 kV transmission line of similar design, the Proposed Orange Route is likely to produce slightly less design contrast in terms of its form, line, and scale than the Proposed Blue Route. However, given that the Proposed Blue Route parallels an existing large transmission line for nearly twice the distance as the Proposed Orange Route, the Proposed Blue Route would likely produce less contrast overall than the Proposed Orange Route.

The Proposed Blue Route affects more residences within 1,500 feet (14) than the Proposed Orange Route (two), but affects slightly fewer aesthetic resources (one state trail, one snowmobile trail, one state water trails, and two historic architectural sites) than the Proposed Orange Route (one state trails each, six state forests, four snowmobile trails, one state water trail, and seven historic architectural sites), and would likely produce less contrast by paralleling an existing large transmission line for a substantially greater percentage of its length than the Proposed Orange Route. For these reasons, the Proposed Blue Route would result in less aesthetic impact than the Proposed Orange Route in the Pine Island Variation Area.

Although the Proposed Blue Route and the Proposed Orange Route affect relatively small numbers of residences and other sensitive visual resources, both proposed routes are long and only parallel existing transmission lines of similar size and design for somewhat moderate to moderately

Table 6-67 Land Uses within the ROI in the Pine Island Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Pine Island Variation Area | |
|--|------------------------|-------------------------------------|----------------------------|-----------------------|
| | | | Proposed Blue Route | Proposed Orange Route |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 40,046 | 38,457 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 655 | 335 |
| | Agricultural | Acres within 0–1,500 ft | 985 | 308 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 38,203 | 37,685 |
| | Other | Acres within 0–1,500 ft | 203 | 129 |

Source(s): USGS 2001, reference (151)

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

- (1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

short portions of their full lengths (23 to 39 percent, respectively). For these reasons, aesthetic impacts of both proposed routes are expected to be significant.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

Land Uses

Table 6-67 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue Route and Proposed Orange Route in the Pine Island Variation Area. The various land uses present in the Pine Island Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the proposed routes are shown on Map 6-26.

Both the Proposed Blue Route and Proposed Orange Route are primarily located in forested and/or swamp land (Table 6-68). The Proposed Blue Route would impact more acres of forested and/or swamp land compared to the Proposed Orange Route.

Land Ownership and Management

Table 6-68 and Figure 6-49 shows that the Proposed Blue Route would impact more acres of state forest compared to the Proposed Orange Route, and the Proposed Orange Route would impact a greater amount of state fee lands compared to the

Proposed Blue Route. The Proposed Blue Route would impact a small number of acres of county land and a greater amount of state conservation land, while the Proposed Orange Route would not impact these land ownership categories. The Proposed Orange Route would impact a greater amount of USFWS Interest Lands (16 acres, crossing length of 3,493 feet) compared to the Proposed Blue Route (8 acres, 2,630 feet crossing length) (Map 6-26).

The Proposed Blue Route would parallel an existing corridor for 39 percent of its length, while the Proposed Orange Route would parallel an existing corridor for 23 percent of its length (see Section 6.3.1.6); therefore, the incompatibility with adjacent land uses would be minimal in some sections of both Proposed Routes.

Impacts to land use from the proposed Project in the Pine Island Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route and Proposed Orange Route would both result in long-term changes 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. The length of the alternative that would parallel an existing corridor is also important. The Proposed Blue Route avoids a greater amount of state forest and state fee lands than the Proposed Orange Route thereby avoiding long-term changes to land use and the Proposed Blue Route would also parallel a greater length of existing corridor compared to the Proposed Orange Route and would therefore avoid major indirect impacts to state forests and state fee lands such as forest fragmentation.

Table 6-68 Land Ownership/Management within the anticipated ROW in the Pine Island Variation Area

| Resource | Type | Evaluation Parameter | Pine Island Variation Area | |
|--|---|----------------------|----------------------------|-----------------------|
| | | | Proposed Blue Route | Proposed Orange Route |
| Total Lands | -- | Acres within ROW | 2,661 | 2,556 |
| State Forests | -- | Acres within ROW | 2,291 | 1,980 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 2,095 | 2,310 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 836 | 956 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 326 | 640 |
| | Trust Fund | Acres within ROW | 934 | 698 |
| | Federal - State Lease | Acres within ROW | 0 | 16 |
| County Lands | -- | Acres within ROW | 4 | 0 |
| State Conservation Easements | -- | Acres within ROW | 120 | <0.5 |
| USFWS Interest Lands | -- | Acres within ROW | 8 | 16 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 562 | 246 |

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); Itasca County 2014, reference (153); MnDNR 2010, reference (184); USFWS 2014, reference (178)

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.

(2) Acreage for private lands was calculated as the difference between total lands and public lands.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.1.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Pine Island Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Pine Island Variation Area are summarized in Table 6-69.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-69 and Figure 6-50 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route and Proposed Orange Route in the ROI.

The Proposed Orange Route would pass through more acres of farmland, including the most acres of prime farmland if drained (Figure 6-50). The

Proposed Blue Route and Proposed Orange Route would each impact 70 acres of prime farmland. The Proposed Blue Route, which would parallel existing corridors for approximately half its length, would be expected to impact the fewest acres of farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

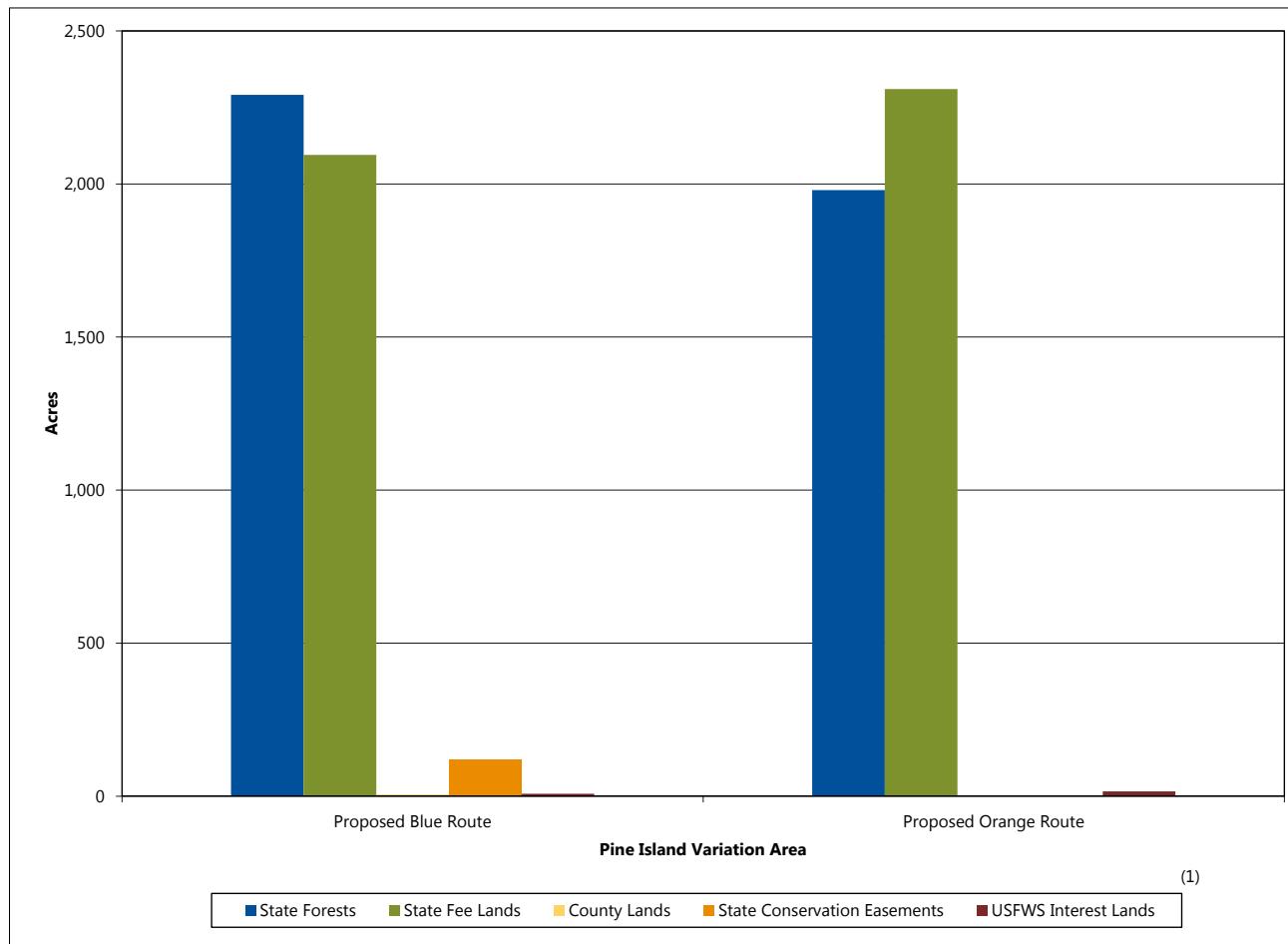
Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed

6.0 Comparative Environmental Consequences

Figure 6-49 Public Land Ownership/Management within the ROI in the Pine Island Variation Area



Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); Itasca County 2014, reference (153); MnDNR 2010, reference (184); USFWS 2014, reference (178)

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.

Project is the ROW of the transmission line. Table 6-69 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Blue Route and Proposed Orange Route. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue Route or Proposed Orange Route in the Pine Island Variation Area.

The Proposed Blue Route would pass through more acres of state forest lands - Beltrami Island, Lake of the Woods, Pine Island, Koochiching, and George Washington State Forests (Figure 6-51, Map 6-28). The Proposed Orange Route would have less impact on these state forest lands as it would cross fewer acres of forest lands.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct

adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and soil compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the

Table 6-69 Land-Based Economy Resources within the Anticipated ROW in the Pine Island Variation Area

| Resource | Type | Evaluation Parameter | Pine Island Variation Area | |
|---|----------------------------------|--|----------------------------|-----------------------|
| | | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | -- | Length (mi) | 109.8 | 105.4 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 39 | 23 |
| Farmland | Not Prime Farmland | Acres within ROW | 1,995 | 1,863 |
| | Farmland if Drained | Acres within ROW | 307 | 503 |
| | Farmland of Statewide Importance | Acres within ROW | 289 | 120 |
| | All Areas are Prime Farmland | Acres within ROW | 70 | 70 |
| State Forest | -- | Acres within ROW | 2,291 | 1,980 |
| State Mineral Leases (active and/or terminated/expired) | -- | Acres within ROW | 1,205 | 370 |

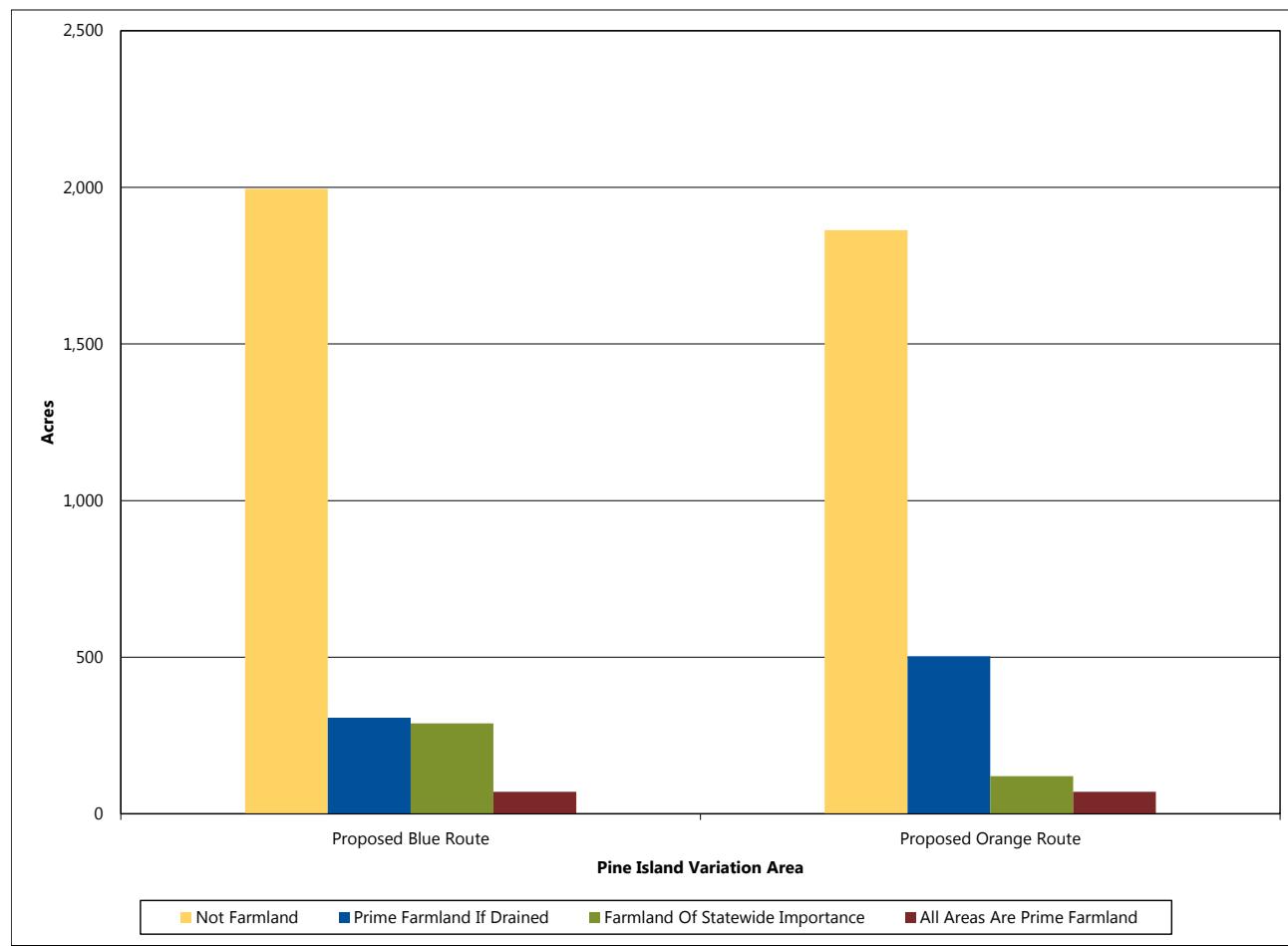
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

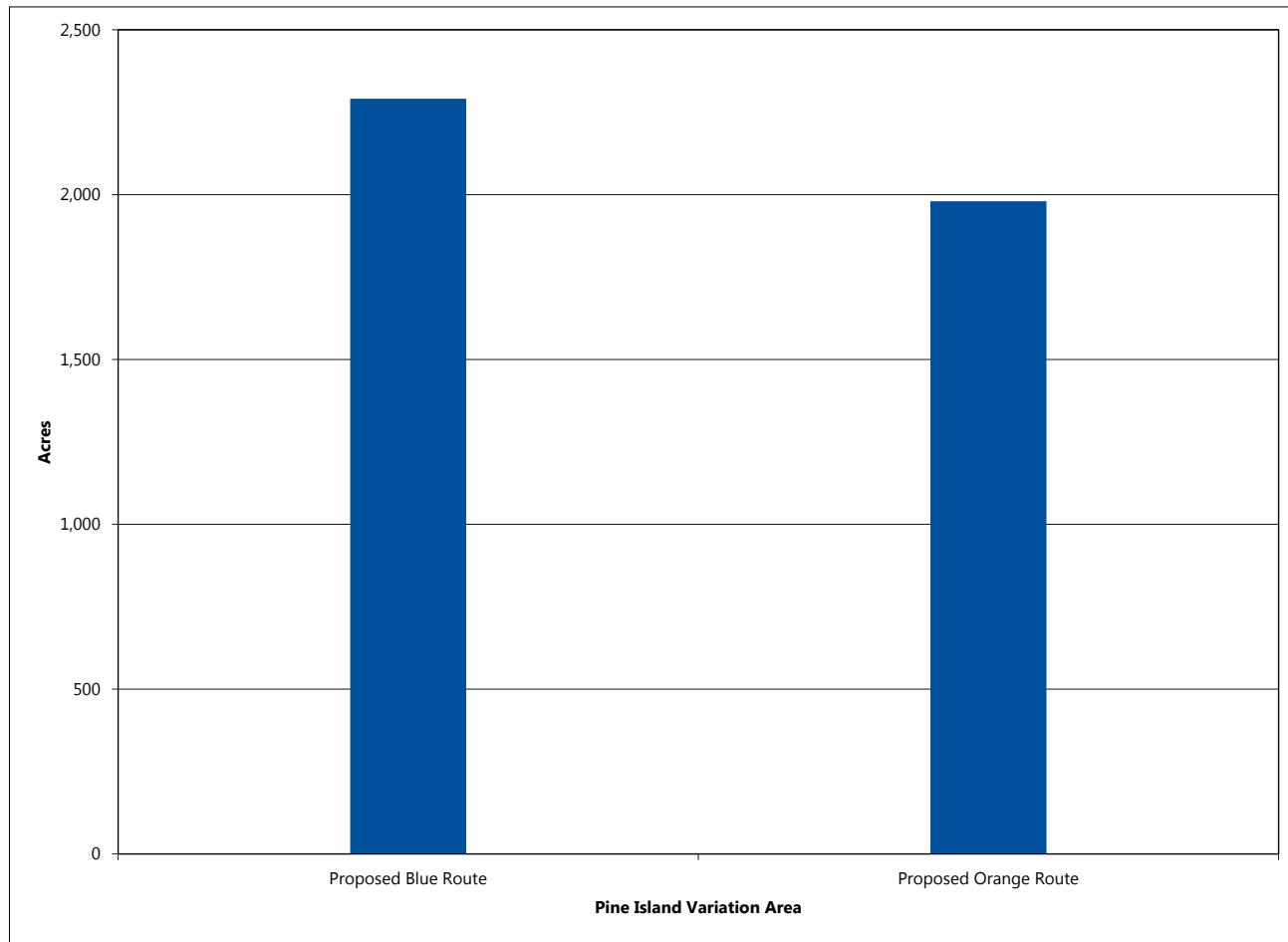
Figure 6-50 Acres of Farmland by Type within the Anticipated ROW in the Pine Island Variation Area



Source(s): USDA NRCS 2014, reference (154)

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

Figure 6-51 Acres of State Forest Land within the Anticipated ROW in the Pine Island Variation Area



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

Source(s): MnDNR 2003, reference (148)

transmission line. Table 6-69, Figure 6-52, and Map 6-26 identify the acreage of mining lands with state mineral leases that may be impacted in the Pine Island Variation Area. Map 6-26 identifies the state aggregate resources that may be impacted in the Pine Island Variation Area.

As indicated in Table 6-69 and Figure 6-52, both the Proposed Blue Route and the Proposed Orange Route would traverse several acres of mining lands with state terminated/expired mineral leases, **but no active mineral leases**. The Pine Island proposed Blue Route **would pass through** more of these lands. While both of the proposed routes could potentially interfere with future mining activities in this area, the Proposed Blue Route could have more potential impacts on future mining activity because it crosses through more acres of state mineral lease lands.

According to the Minnesota Department of Transportation Aggregate Source Information System data, aggregate resources are present within the vicinity of both proposed routes (Map 6-26). Based on review of the aggregate resource data in

conjunction with 2013 aerial photographs (described in Section 5.3.2.3, Land-based Economies), there are two aggregate resources within the ROI of the Proposed Orange Route and no aggregate resources within the ROI of the Proposed Blue Route. The Proposed Orange Route could interfere with current or future aggregate mining activities. However, the full extent of impacts on aggregate resources in the Pine Island Variation Area cannot be determined without field surveys.

As discussed in Section 5.3.2.3, construction of transmission lines could affect current and future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. Generally, routes impacting fewer acres of state mineral leases and state aggregate resources are likely to cause fewer of these impacts than routes that impact more acres of state mineral leases.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources

are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

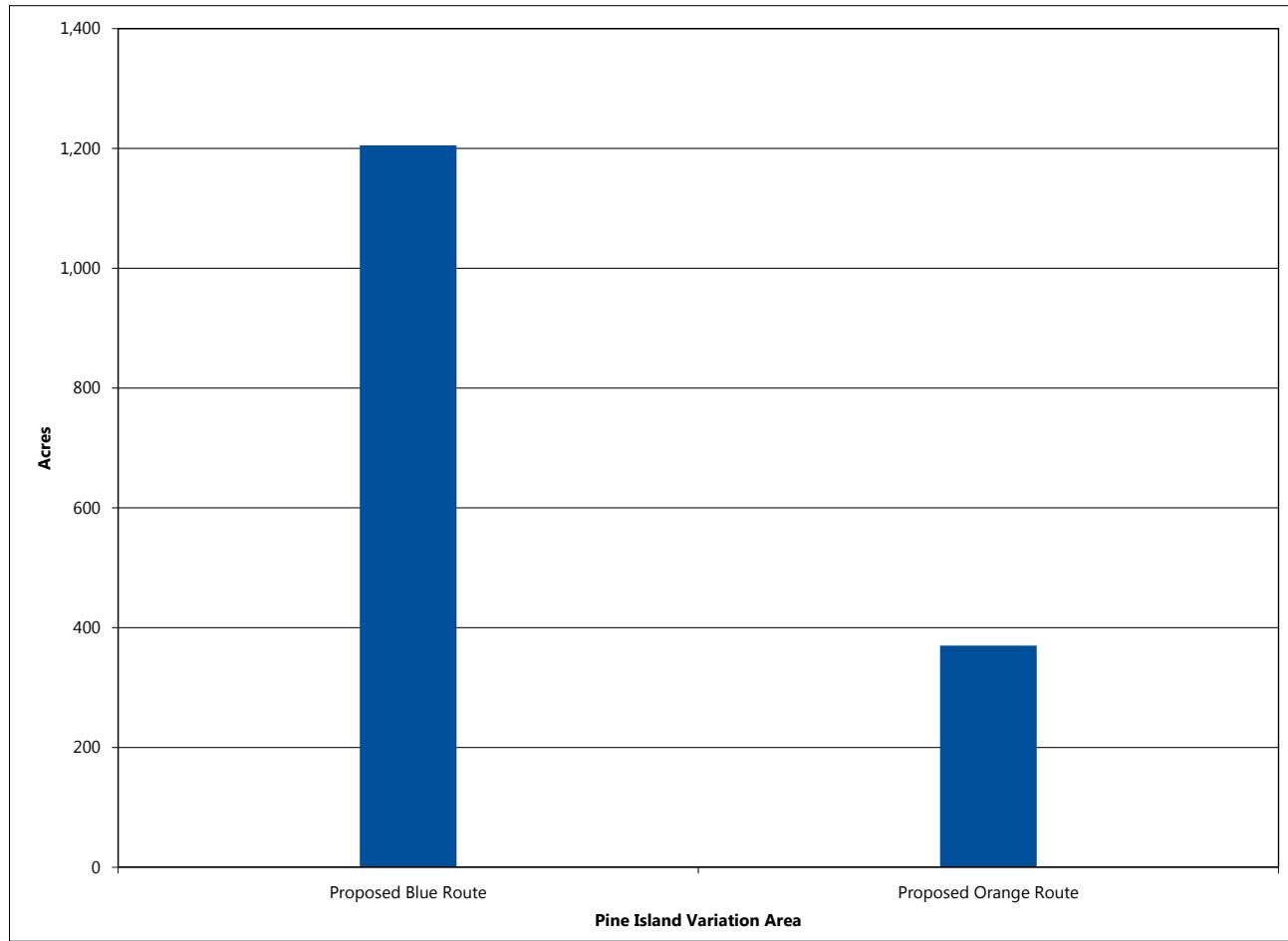
6.3.1.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the proposed transmission line, however, potential indirect effects to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites. Table 6-70 and Map 6-27 provide a summary of the archaeological sites and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignment (indirect APE) for the Proposed Blue Route and Proposed Orange Route in the Pine Island Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route or Proposed Orange Route in the Pine Island Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Pine Island Variation Area, there are no previously recorded historic architectural or archaeological sites located within the ROW of either the Proposed Blue Route or the Proposed Orange Route, although cultural resource investigations have not yet occurred for either route. The Proposed Orange Route has a higher number of historic architectural sites in the indirect APE than does the Proposed Blue Route. Five of the seven historic architectural sites identified within the Proposed Orange Route (IC-UOG-044, IC-UOG-045, IC-UOG-046, KC-UOG-031, and KC-UOG-035) have not been evaluated for NRHP eligibility. One site,

Figure 6-52 Acres of State Mineral Leases within the Anticipated ROW in the Pine Island Variation Area



Source(s): MnDNR 2014, reference (179)

6.0 Comparative Environmental Consequences

Table 6-70 Archaeological and Historic Resources within the Pine Island Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Pine Island Variation Area | |
|------------------------------|-------------------------------------|----------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Historic Architectural Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 2 | 0 |
| | Count within 0–5,280 ft | 2 | 7 |
| Archaeological Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 1 | 0 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 feet on each side of the anticipated alignment.

IC-UOG-043, was determined to be NRHP eligible if it is moved, while IC-UOG-086 was previously determined not to be eligible for NRHP listing. For the Proposed Blue Route, the two sites, IC-CAR-009 and KC-UOG-070, were recommended as not NRHP eligible and determined not NRHP eligible, respectively.

There is currently no known potential for direct, long-term, adverse impacts on cultural resources within the direct APEs for either route within the Pine Island Variation Area, as no previously recorded cultural resources were identified, although cultural resource surveys or inventories have not, yet, occurred for either route. Indirect, long-term, adverse visual impacts on five of the previously recorded historic architectural resources within the indirect APE are likely to occur for the Proposed Orange Route if the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since the Proposed Orange Route has historic architectural sites documented within the indirect APE that have not been evaluated for NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse effect under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource. For the Proposed Blue Route, none of the architectural resources are determined or recommended NRHP-eligible.

The Proposed Blue Route and Proposed Orange Route have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for cultural

resources. These cultural resources investigations will be implemented as part of DOE's **Draft PA (Appendix V)** that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate adverse effects to cultural resources during construction and operation of the proposed Project.

Potential short-term and long-term impacts from construction, operation, maintenance, and emergency repair-related activities to cultural resources and historic properties are summarized in Section 5.3.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse effects to these resources, including TCPs, from the proposed Project.

6.3.1.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Pine Island Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Pine Island Variation Area are summarized in Table 6-71 and shown on Map 6-28. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The need to place transmission structures in floodplains and wetlands, number of waterbody/watercourse crossings, and quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Blue Route and the Proposed Orange Route in the Pine Island Variation Area.

Table 6-71 Water Resources within the Anticipated ROW in the Pine Island Variation Area

| Resource | Evaluation Parameter | Pine Island Variation Area | |
|-------------------------------|----------------------|----------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | Length (mi) | 109.8 | 105.4 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 18 | 25 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 48 | 46 |
| Impaired Waters | Number of Crossings | 1 | 1 |
| Trout Streams | Number of Crossings | 1 | 0 |
| Floodplains ⁽³⁾ | Acres within ROW | 20 | 11 |
| NWI Wetlands | Acres within ROW | 2,102 | 1,875 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); MPCA 2014, reference (119); MPCA 2014, reference (118); Minnesota Power 2014, reference (163)

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

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.
- (3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

The Proposed Blue Route and the Proposed Orange Route would each cross the Big Fork River and the Rapid River, which are both PWI watercourses. Additional PWI watercourses crossed by the Proposed Blue Route include the Baudette River, West Fork of the Baudette River, Black River, East Branch of the Black River, Deer Creek, Peppermint Creek, Pitt Grade Creek, three tributaries to the Big Fork River, three tributaries to the Black River, and two tributaries to the Rainy River. The Proposed Blue Route would also cross Deer Lake, a PWI waterbody, while the Proposed Orange Route would not cross any PWI waterbodies. Additional PWI watercourses crossed by the Proposed Orange Route include the North Branch of the Rapid River, Tamarac River, ten crossings of the Little Tamarac River, Troy Creek, Chase Brook, three tributaries to Deer Creek, and eight unnamed watercourses. Neither the Proposed Blue Route nor the Proposed Orange Route would cross PWI wetlands (Figure 6-53).

The Proposed Blue Route and the Proposed Orange Route would both require crossing non-PWI waters. The Proposed Blue Route would primarily cross ditches, while the Proposed Orange Route would cross ditches and watercourses equally (Figure 6-54).

The Proposed Blue Route and the Proposed Orange Route would each require crossing the Big Fork River, a MPCA-listed impaired water (Table 5-28), once.

The Proposed Blue Route would require one crossing of Pitt Grade Creek, a MnDNR-designated trout stream. The Proposed Orange Route would not cross any designated trout streams.

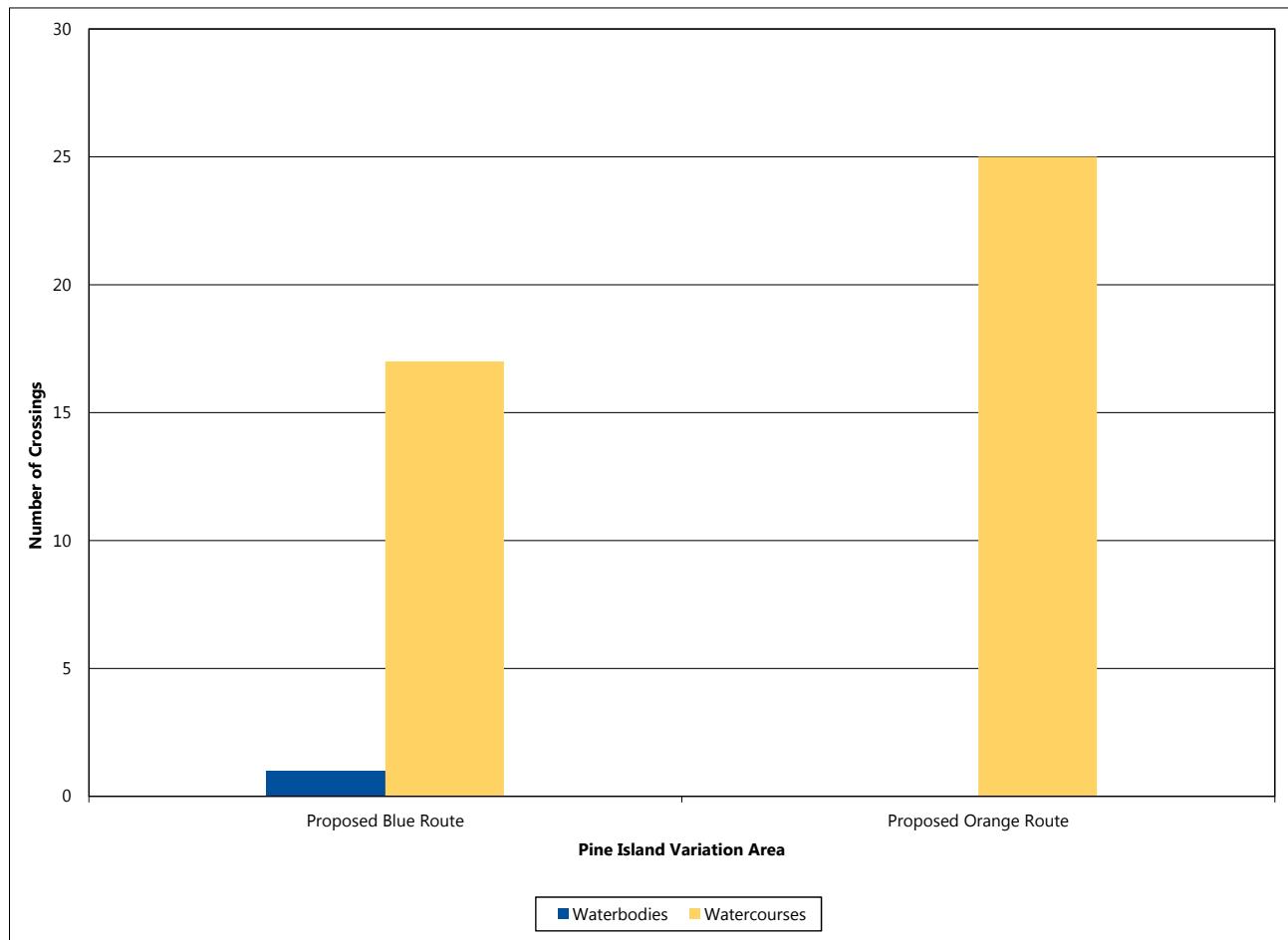
It is anticipated that PWI crossings, non-PWI water crossings, impaired waters, and trout streams are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Both the Proposed Blue Route and the Proposed Orange Route would require crossing Zone A floodplains of the Rapid River, East Branch of the Rapid River, Black River, Big Fork River, and Reilly Brook. Though both routes would cross floodplains, the crossings would be less than the average spanning length of 1,250 feet. Therefore, it would be expected they would be spanned and transmission structures would not be placed within floodplains.

Based on the NWI, the Proposed Blue Route and the Proposed Orange Route would both require conversion of forested and shrub wetland areas to herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-55, the Proposed Blue Route and the Proposed Orange Route contain similar total forested and shrub wetland acreage and would result in similar quantities of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed Blue Route and the Proposed Orange Route would require placement of fill in wetlands

6.0 Comparative Environmental Consequences

Figure 6-53 PWI Water Crossings by Type in the Pine Island Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed Blue Route and the Proposed Orange Route would both require temporary construction access through wetlands, which is also likely be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

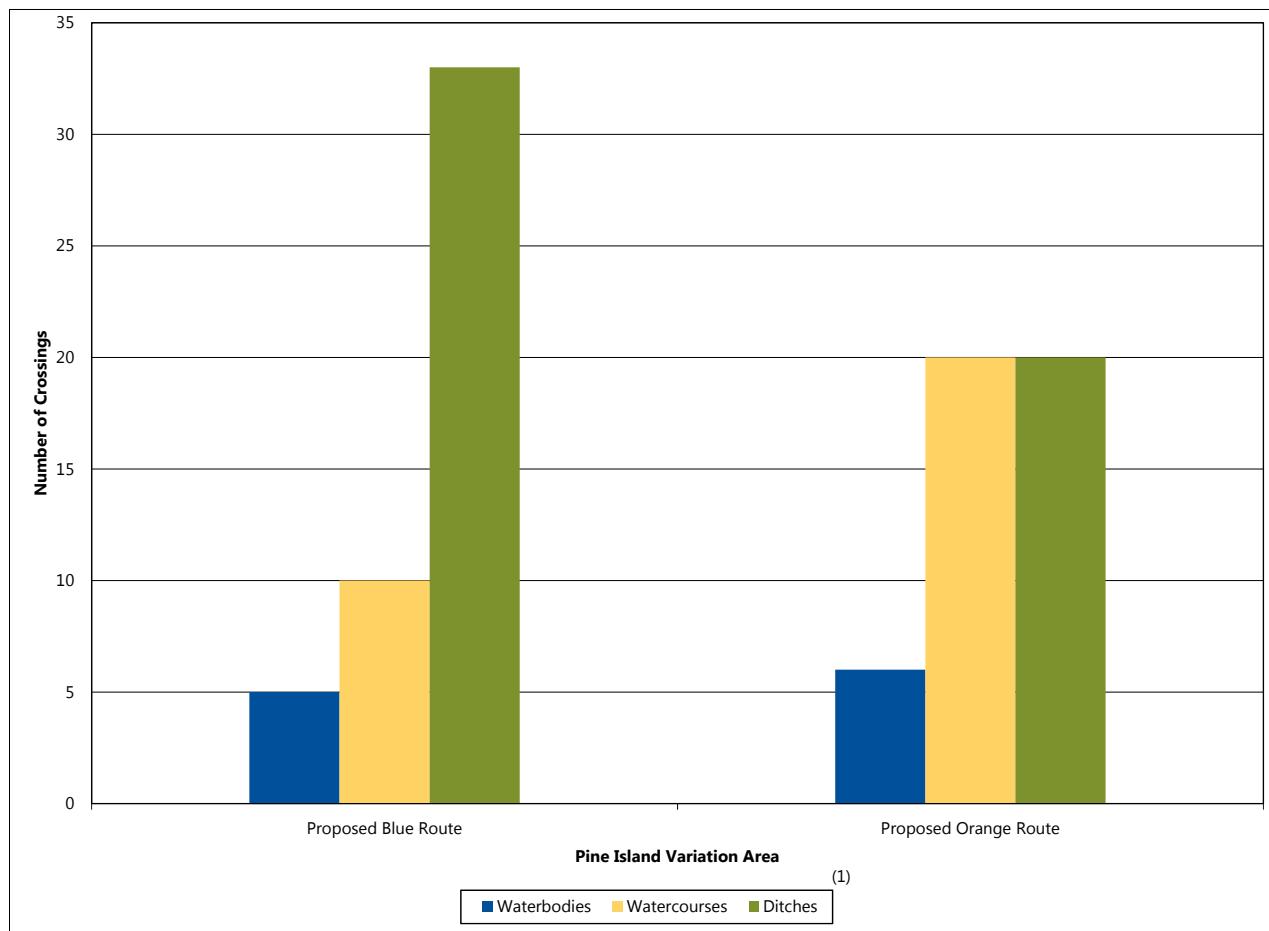
Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Pine Island Variation Area are summarized in Table 6-72 and shown on Maps 5-12 and 6-28. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

In general, loss or fragmentation of forest would be similar with the Proposed Blue Route or the Proposed Orange Route in the Pine Island Variation Area. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-72, although the Proposed Blue Route is over four miles longer than the Proposed Orange Route, both routes would pass

Figure 6-54 Non-PWI Water Crossings by Type in the Pine Island Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

through similar amounts of forested land, including state forest land (Map 6-28). The Proposed Blue Route would parallel existing transmission line corridor for more of its length relative to the Proposed Orange Route; because of this, the Proposed Blue Route may result in less impact on intact forested areas. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

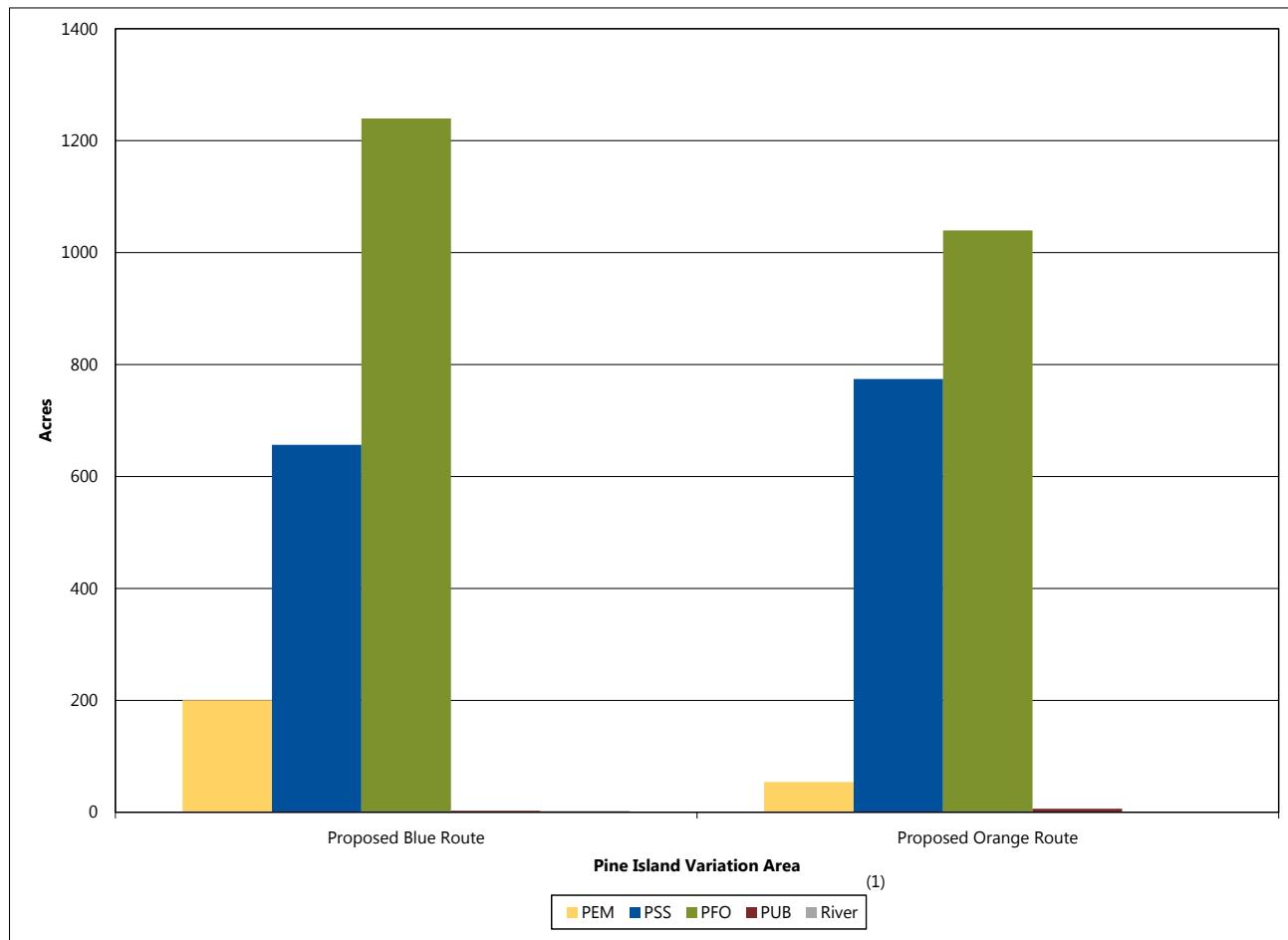
Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed

transmission line. Data related to wildlife resources in the Pine Island Variation Area are summarized in Table 6-73 and shown on Map 6-28. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Blue Route and the Proposed Orange Route in the Pine Island Variation Area include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue Route and Proposed Orange Route to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.1.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue Route and the Proposed Orange Route.

Figure 6-55 Acres of Wetland by Type within the Anticipated ROW in the Pine Island Variation Area



Source(s): USFWS 1997, reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

The Proposed Blue Route would traverse the northern portion of the Carp Swamp WMA adjacent to an existing transmission line corridor while the Proposed Orange Route would traverse a greater component of the Red Lake WMA and require creation of new corridor (Table 6-73; Map 6-28). Because of this, the Proposed Orange Route would result in more fragmentation of forested habitats in a WMA and subsequent displacement of wildlife species associated with those forest communities. A detailed description of fragmentation is found in Section 5.3.4.3, but, in general, an increase in habitat fragmentation would result in the reduction in habitat connectivity. This reduction in habitat connectivity could impact wildlife movement across the landscape and would have a greater impact on smaller species, such as turtles, and have less of an impact on larger animals, such as deer. These indirect, long-term adverse impacts are expected to be minimal because of the available contiguous habitat in the region.

While both the Proposed Blue Route and Proposed Orange Route would pass through the Big Bog Important Bird Area, the Proposed Orange Route would traverse more of this resource and would require new corridor for a greater length in the Big Bog Important Bird Area relative to the Proposed Blue Route (Table 6-73; Map 6-28). The Proposed Orange Route may result in more short-term indirect and long-term direct adverse impacts on birds and other wildlife associated with the Big Bog Important Bird Area because it would require creation of more new corridor in this area and subsequent fragmentation of habitat. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat, from forested or shrub communities to open habitats. Long-term direct impacts would be associated with the operation of the Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding

Table 6-72 Vegetation Resources within the Anticipated ROW in the Pine Island Variation Area

| Resource | Evaluation Parameter | Pine Island Variation Area | |
|--|--|----------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | Length (mi) | 109.8 | 105.4 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 39 | 23 |
| State Forest | Acres within ROW | 2,291 | 1,980 |
| Total Forested GAP Land Cover | Acres within ROW | 2,554 | 2,520 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 1,372 | 1,323 |
| North American Boreal Forest | Acres within ROW | 785 | 769 |
| Eastern North American Flooded and Swamp Forest | Acres within ROW | 366 | 358 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Table 6-73 Wildlife Resources within the Vicinity of the Pine Island Variation Area

| Resource | Evaluation Parameter | Pine Island Variation Area | |
|---|--|----------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | Length (mi) | 109.8 | 105.4 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 39 | 23 |
| Wildlife Management Areas | Acres within ROW | 49 | 274 |
| Important Bird Areas | Acres within ROW | 1,405 | 1,722 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Audubon Society 2014, reference (181); MnDNR 2006, reference (165)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

region, and the long-term direct impacts would be minimized through use of Applicant-proposed minimization measures (Section 2.13).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.3.1.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile

6.0 Comparative Environmental Consequences

Table 6-74 Rare Species Documented within One Mile of the Anticipated ROW in the Pine Island Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | Pine Island Variation Area | |
|---------------------------------------|---------------------------------|----------------|-----------------|-------------------|----------------------------|-----------------------|
| | | | | | Proposed Blue Route | Proposed Orange Route |
| <i>Botrychium ascendens</i> | Upward-lobed Moonwort | None | Endangered | Vascular Plant | X | X |
| <i>Botrychium lunaria</i> | Common Moonwort | None | Threatened | Vascular Plant | X | X |
| <i>Carex sterilis</i> | Sterile Sedge | None | Threatened | Vascular Plant | | X |
| <i>Eleocharis rostellata</i> | Beaked Spike-rush | None | Threatened | Vascular Plant | | X |
| <i>Rhynchospora capillacea</i> | Hair-like Beak-rush | None | Threatened | Vascular Plant | | X |
| <i>Asio flammeus</i> | Short-eared Owl | None | Special Concern | Bird | | X |
| <i>Botrychium pallidum</i> | Pale Moonwort | None | Special Concern | Vascular Plant | X | X |
| <i>Botrychium simplex</i> | Least Moonwort | None | Special Concern | Vascular Plant | X | X |
| <i>Carex exilis</i> | Coastal Sedge | None | Special Concern | Vascular Plant | | X |
| <i>Cladium mariscoides</i> | Twig-rush | None | Special Concern | Vascular Plant | | X |
| <i>Coturnicops noveboracensis</i> | Yellow Rail | None | Special Concern | Bird | | X |
| <i>Drosera anglica</i> | English Sundew | None | Special Concern | Vascular Plant | | X |
| <i>Juncus stygius var. americanus</i> | Bog Rush | None | Special Concern | Vascular Plant | X | |
| <i>Lasmigona compressa</i> | Creek Heelsplitter | None | Special Concern | Mussel | X | X |
| <i>Ligumia recta</i> | Black Sandshell | None | Special Concern | Mussel | X | |
| <i>Oxyethira itascae</i> | A Caddisfly | None | Special Concern | Insect | | X |
| Colonial Waterbird Nesting Area | Colonial Waterbird Nesting Site | -- | -- | Animal Assemblage | X | |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

buffer surrounding the proposed routes and variations. Data related to rare species in the Pine Island Variation Area are summarized in Table 6-74; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species differs between the Proposed Blue Route and the Proposed Orange Route in the Pine Island Variation Area. As discussed in Section 5.3.5, potential long-term impacts on rare species from

the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation, including critical habitat designated for gray wolf.

As indicated in Table 6-74, the Proposed Orange Route has more documented rare species within one mile of its ROW, including the state-endangered upward-lobed moonwort, and the state-threatened common moonwort, sterile sedge, beaked spikerush, and hair-like beakrush. Both state-threatened moonworts were also documented within one mile of the Proposed Blue Route (Table 6-74). Two colonial waterbird nesting sites have been documented within one mile of the

Proposed Blue Route; both of which are located within 1,500 feet of the anticipated alignment. There are no documented colonial waterbird nesting sites within one mile of the Proposed Orange Route. The Proposed Blue Route would likely result in more impacts to colonial waterbirds, due to the proximity of its ROW to these sites.

Both the Proposed Blue Route and the Proposed Orange Route would cross critical habitat designated for gray wolf, with the Proposed Blue Route crossing this habitat for approximately 60 miles and the Proposed Orange Route crossing it for approximately 85 miles. Both proposed routes would parallel an existing transmission line corridor for approximately 15 miles, where critical habitat designated for gray wolf has already been fragmented. The Proposed Blue Route would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross less of this resource than the Proposed Orange Route.

Many rare species documented within one mile of the Proposed Orange Route are associated with calcareous fen habitats. Due to the higher concentration of rare species documented within one mile of the Proposed Orange Route, this route would likely result in more impacts on rare species. Any indirect impacts, such as loss of habitat, to rare species from the proposed Project are not expected to be significant 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. The full extent of potential impacts from either the Proposed Blue Route or the Proposed Orange Route, however, cannot be

determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. 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. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Pine Island Variation Area are summarized in Table 6-75 and shown on Map 6-29; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Blue Route and the Proposed Orange Route in the Pine Island Variation Area is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the

Table 6-75 Rare Communities and Resources within the Vicinity of the Pine Island Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Pine Island Variation Area | |
|---|--|----------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | Length (mi) | 109.8 | 105.4 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 39 | 23 |
| Scientific and Natural Areas | Acres within 0–1,500 ft | 100 | 50 |
| MBS Sites of Biodiversity Significance ⁽⁴⁾ | Acres within ROW | 1,514 | 1,639 |
| Ecologically Important Lowland Conifers | Acres within ROW | 29 | 5 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167); MnDNR 2014, reference (185)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (4) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-29 and in Table 6-75, SNAs are adjacent to both proposed routes. Approximately 100 acres of the Myrtle Lake Peatland SNA is located within 1,500 feet of the anticipated alignment for the Proposed Blue Route and approximately 50 acres of the Red Lake Peatland SNA is located within 1,500 feet of the anticipated alignment for the Proposed Orange Route (Table 6-75; Map 6-29). However, the Proposed Blue Route would follow an existing transmission line corridor adjacent to the Myrtle Lake Peatland SNA, while the Proposed Orange Route would require creation of new corridor adjacent to the Red Lake Peatland SNA (Map 6-29). As discussed in Section 5.3.5, SNAs typically contain native plant communities that may harbor rare plants or animals; creation of new corridor adjacent to this area could result in impacts on rare species associated with the SNA.

Both the Proposed Blue Route and the Proposed Orange Route pass through large areas of MBS Sites of Biodiversity Significance; however, the Proposed Orange route would pass through more acres (Table 6-75; Map 6-29). The Proposed Orange Route could potentially result in more impacts on MBS Sites of Biodiversity Significance and the rare communities and species associated with them.

The Proposed Blue Route would pass through more MnDNR Ecologically Important Lowland Conifer stands; however many of these stands are located adjacent to the Myrtle Lake Peatland SNA, where the Proposed Blue Route would run parallel to an existing transmission line corridor.

One of the calcareous fens documented in the Central Section is located within one mile of the Proposed Orange Route (Map 6-29). This fen is associated with one of the Lost River Peatland SNA units, which is located over one half mile from the Proposed Orange Route (Map 6-29). The Proposed Orange Route would not cross the SNA WPA (described in Section 5.3.5) that is associated with this fen, nor is the WPA present within the ROW (Map 6-29). The Proposed Orange Route is also located approximately two miles from another fen centroid point, which is associated with another Lost River Peatland SNA unit (Map 6-29). The WPA associated with this SNA would be crossed by the Proposed Orange Route. Impacts to SNA WPAs and associated impacts to calcareous fen hydrology are discussed under Water Resources in Section 6.3.1.4.

The rare communities and resources listed in Table 6-75 and detailed above show that the Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. 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.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.1.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-30 shows areas where the Proposed Blue Route and the Proposed Orange Route would parallel corridors with existing transportation, transmission line, or other linear features in the Pine Island Variation Area.

Table 6-76 identifies the percentage of total transmission line length that the Proposed Blue Route or the Proposed Orange Route parallel an existing corridor or linear feature in the Pine Island Variation Area.

The Proposed Blue Route would parallel an existing transmission line corridor for less than half of the length (Figure 6-56). The Proposed Orange Route would parallel an existing transmission line for less than one quarter of the length. The proposed routes both would parallel existing corridors (i.e., road/trail, field line, and other) for less than 10 percent of their lengths.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize,

Table 6-76 Corridor Sharing in the Pine Island Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Pine Island Variation Area | |
|--|--|----------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS) | Percent of Total Length ⁽²⁾ | 39 | 23 |
| Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line) | Percent of Total Length ⁽²⁾ | 1 | 0 |
| Field Line (other linear features, but not transmission lines or road/trails, may be present within the field line corridor; i.e., PLSS) | Percent of Total Length ⁽²⁾ | 1 | 1 |
| PLSS Only | Percent of Total Length ⁽²⁾ | 7 | 4 |
| None | Percent of Total Length ⁽²⁾ | 53 | 72 |

Source(s): USDA et al., 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al. 2014, reference (174); MnDNR et al. 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al. 2009, reference (177)

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

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified and other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

or mitigate impacts on corridor sharing from the proposed Project.

6.3.1.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-77 summarizes the costs associated with constructing the Proposed Blue Route and the Proposed Orange Route in the Pine Island Variation Area. As indicated in Table 6-77, the Proposed Blue Route would cost more to construct relative to the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$169,000 to \$176,000 annually for these alternatives in the Pine Island Variation Area.

6.3.2 Beltrami South Central Variation Area

The Beltrami South Central Variation Area encompasses two route alternatives: the Proposed Orange Route and the Beltrami South Central Variation. This section provides a comparison of

the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Beltrami South Central Variation Area, depending on the route or variation considered.

6.3.2.1 Human Settlement

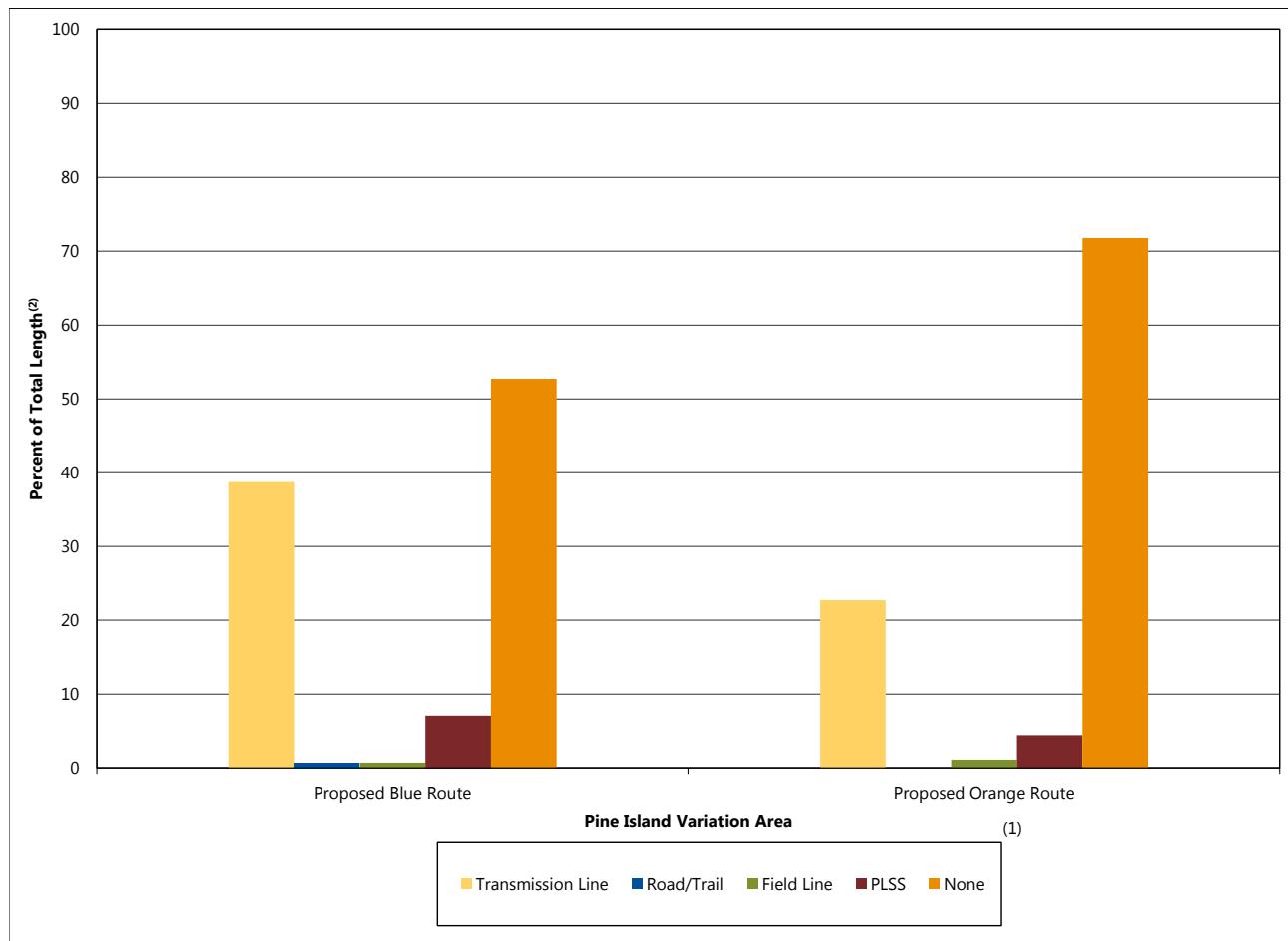
This section describes the aesthetic resources and zoning and land use compatibility within the Beltrami South Central Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Beltrami South Central Variation Area are summarized in Table 6-78 and shown on Maps 6-31, 6-32, 6-33, and 6-35.

As indicated in Table 6-78 for the Beltrami South Central Variation Area, the Proposed Orange Route and Beltrami South Central Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including one

Figure 6-56 Corridor Sharing in the Pine Island Variation Area



Source(s): USDA et al. 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al. 2014, reference (174); MnDNR et al. 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al. 2009, reference (177)

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

- (1) Transmission Line (other linear features may be present within the transmission line corridor, i.e., Road, Trail, Field Line, PLSS); Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor, i.e., PLSS, Field Line); Field Line (other linear features, but not transmission lines or road/trails, may be present within the field line corridor, i.e., PLSS).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

snowmobile trail and two state forests (Maps 6-33 and 6-35). Neither the proposed route nor variations would be located within 1,500 feet of any residences or within one mile of any historic architectural sites, which would also have high visual sensitivity.

The Beltrami South Central Variation is slightly longer (1.7 miles) than the Proposed Orange Route (1.2 miles; Table 6-78). Also, the Proposed Orange Route parallels an existing large 500 kV transmission line for its entire length, whereas the Beltrami South Central Variation does not parallel an existing transmission line. By paralleling an existing 500 kV transmission line of similar design and being slightly shorter in length, the Proposed Orange Route would produce substantially less contrast than the Beltrami South Central Variation. For these reasons, the Proposed Orange Route would result in less

aesthetic impact than the Beltrami South Central Variation.

Because the Proposed Orange Route is short in length, parallels an existing transmission line of similar size and design for its full length, and affects no residences and very few other sensitive visual resources (two state forests and one snowmobile trail), potential aesthetic impacts of the Proposed Orange Route are expected to be minimal. Although the Beltrami South Central Variation does not parallel an existing large transmission line, it is short in length and affects no residences and very few other sensitive visual resources (two state forests and one snowmobile trail). For these reasons, potential aesthetic impacts of the Beltrami South Central Variation are also expected to be minimal.

Table 6-77 Construction Costs in the Pine Island Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|----------------|-----------------------|---------------|-------------------------|-------------|
| Pine Island | Proposed Blue Route | \$118,876,237 | \$1,082,662 | 109.8 |
| | Proposed Orange Route | \$113,672,041 | \$1,078,482 | 105.4 |

Source(s): Minnesota Power 2015, reference (9); Minnesota Power 2015, reference (186)

Table 6-78 Aesthetic Resources within the ROI in the Beltrami South Central Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Beltrami South Central Variation Area | |
|---|--|---------------------------------------|----------------------------------|
| | | Proposed Orange Route | Beltrami South Central Variation |
| Transmission Line | Length (mi) | 1.2 | 1.7 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 100 | 0 |
| State Forests | Count within 0–1,500 ft | 2 | 2 |
| Snowmobile Trails | Count within 0–1,500 ft | 1 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148), MnDNR 2010 reference (150)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

Land Uses

Table 6-79 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Route and Beltrami South Central Variation in the Beltrami South Central Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the Beltrami South Central Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Routes are shown on Map 6-31.

The Proposed Orange Route and Beltrami South Central Variation are both primarily located in forested and/or swamp land. The Beltrami South Central variation would impact more acres of

forested and/or swamp land compared to the Proposed Orange Route (Table 6-79). The Proposed Orange Route would parallel an existing corridor for more of its length compared to the Beltrami South Central Variation (see Section 6.3.1.6); therefore, the incompatibility with adjacent land uses would be minimal in some sections of the Proposed Orange Route and Beltrami South Central variation.

Land Ownership and Management

Table 6-80 shows that the Beltrami South Central Variation would also impact more acres of state forest and state fee land compared to the Proposed Orange Route. No impacts to county lands or state conservation easements would occur under the Proposed Orange Route or Beltrami South Central Variation. The Proposed Orange Route would impact 16 acres of USFWS Interest Lands, with a crossing length of 3,493 feet, while the Beltrami South Central Variation would not impact this land ownership category (Map 6-31).

The Proposed Orange Route would parallel an existing corridor for its entire length, while the Beltrami South Central Variation would not parallel an existing corridor (see Section 6.3.2.6). Therefore, the Proposed Orange Route would be expected to have less incompatibility with existing land uses

6.0 Comparative Environmental Consequences

Table 6-79 Land Uses within the ROI in the Beltrami South Central Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Beltrami South Central Variation Area | |
|--|------------------------|-------------------------------------|---------------------------------------|----------------------------------|
| | | | Proposed Orange Route | Beltrami South Central Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 605 | 785 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 7 | 6 |
| | Agricultural | Acres within 0–1,500 ft | 0 | 0 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 598 | 779 |
| | Other | Acres within 0–1,500 ft | 0 | 0 |

Source(s): USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.

(2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-80 Land Ownership and Management within the Anticipated ROW in the Beltrami South Central Variation Area

| Resource | Type | Evaluation Parameter | Beltrami South Central Variation Area | |
|---|---|----------------------|---------------------------------------|----------------------------------|
| | | | Proposed Orange Route | Beltrami South Central Variation |
| Total Lands | -- | Acres within ROW | 30 | 43 |
| State Forests | -- | Acres within ROW | 30 | 43 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 30 | 43 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 14 | 43 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 0 | 0 |
| | Trust Fund | Acres within ROW | 0 | 0 |
| | Federal - State Lease | Acres within ROW | 16 | 0 |
| USFWS Interest Lands | -- | Acres within ROW | 16 | 0 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 0 | 0 |

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); USFWS 2014, reference (178)

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.

(2) Acreage for private lands was calculated as the difference between total lands and public lands.

compared to the Beltrami South Central Variation (Figure 6-57).

Impacts to land use from the proposed Project in the Beltrami South Central Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Orange Route and Beltrami South Central Variation would both 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. The length of the Proposed Orange

Route or Beltrami South Central Variation that would parallel an existing corridor is also important. The Proposed Orange Route avoids a greater amount of state forest and state fee lands than the Beltrami South Central Variation thereby avoiding long-term changes to land use and the Proposed Orange Route would also parallel an existing corridor compared to the Beltrami South Central Variation which does not parallel an existing corridor.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed

measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.2.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Beltrami South Central Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Beltrami South Central Variation Area are summarized in Table 6-81.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-81 shows the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the

Proposed Orange Route and Beltrami South Central Variation in the ROI.

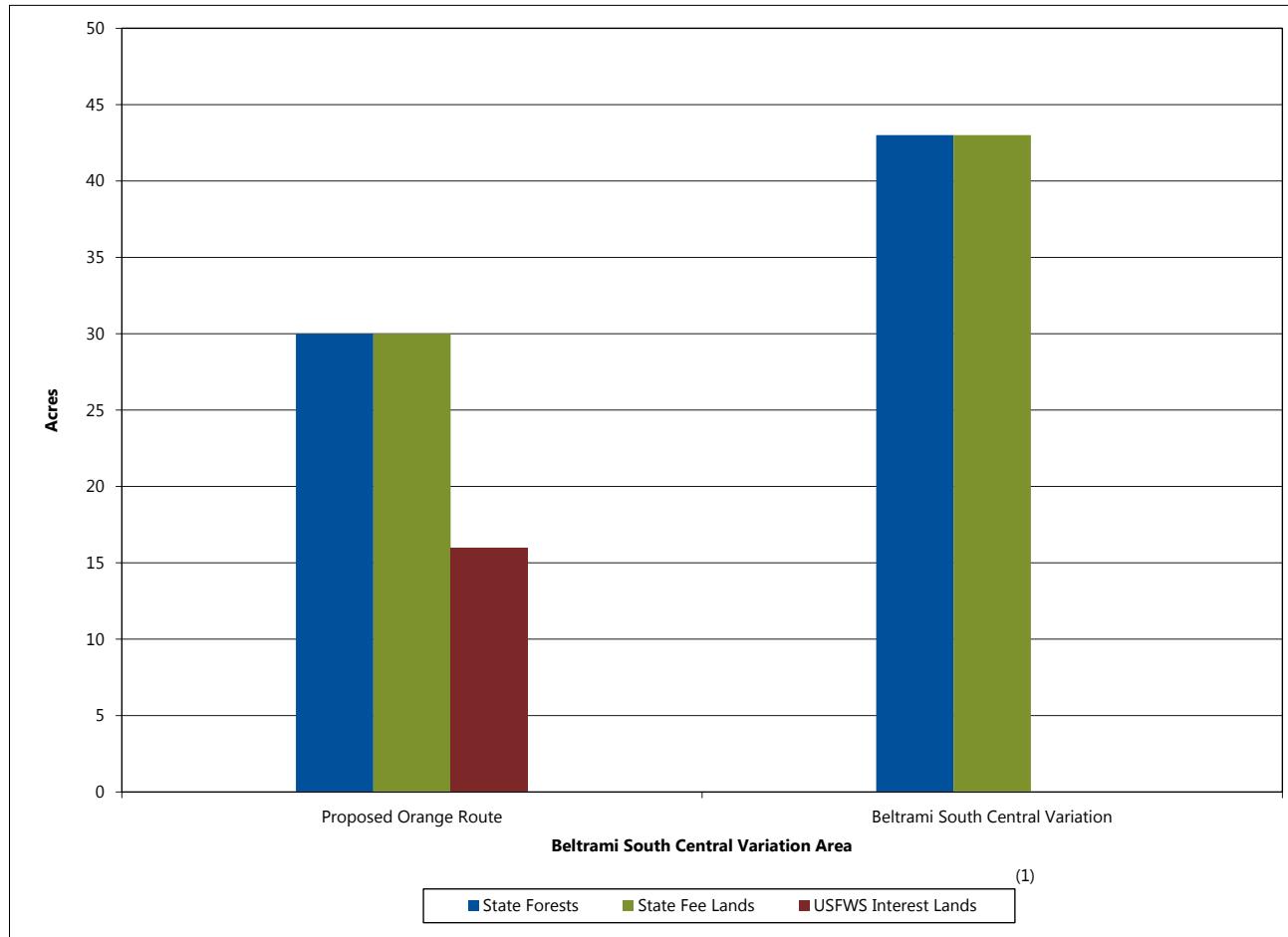
No prime farmland or farmland of statewide importance has been identified for the Proposed Orange Route or the Beltrami South Central Variation in the Beltrami South Central Variation Area.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line.

Table 6-81 identifies the acreage of state forest land that would be impacted in the ROI of the Proposed Orange Route and Beltrami South Central Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Orange Route or the Beltrami South Central Variation in the Beltrami South Central Variation Area.

Figure 6-57 Public Land Ownership/Management within the ROI in the Beltrami South Central Variation Area



Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); USFWS 2014, reference (178)

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.

Table 6-81 Land-Based Economy Resources within the Anticipated ROW in the Beltrami South Central Variation Area

| Resource | Type | Evaluation Parameter | Beltrami South Central Variation Area | |
|---|----------------------------------|--|---------------------------------------|----------------------------------|
| | | | Proposed Orange Route | Beltrami South Central Variation |
| Transmission Line | -- | Length (mi) | 1.2 | 1.7 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 100 | 0 |
| Farmland | Not Farmland | Acres within ROW | 30 | 43 |
| | Prime Farmland if Drained | Acres within ROW | 0 | 0 |
| | Farmland of Statewide Importance | Acres within ROW | 0 | 0 |
| | All Areas are Prime Farmland | Acres within ROW | 0 | 0 |
| State Forest | -- | Acres within ROW | 30 | 43 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR 2003, reference (148)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

The Beltrami South Central Variation, which has the longer length, would pass through more acres of state forest lands - the Beltrami State Forest (Figure 6-58, Map 6-33). The Proposed Orange Route, which parallels an existing transmission line for its entire length, would be expected to result in fewer impacts on timber activities in the Beltrami Island State Forest.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the

transmission line. There are no active or expired/terminated state mineral leases, records of current mineral mining, or known aggregate resources that would be impacted by the Proposed Orange Route or Beltrami South Central Variation within the Beltrami South Central Variation Area.

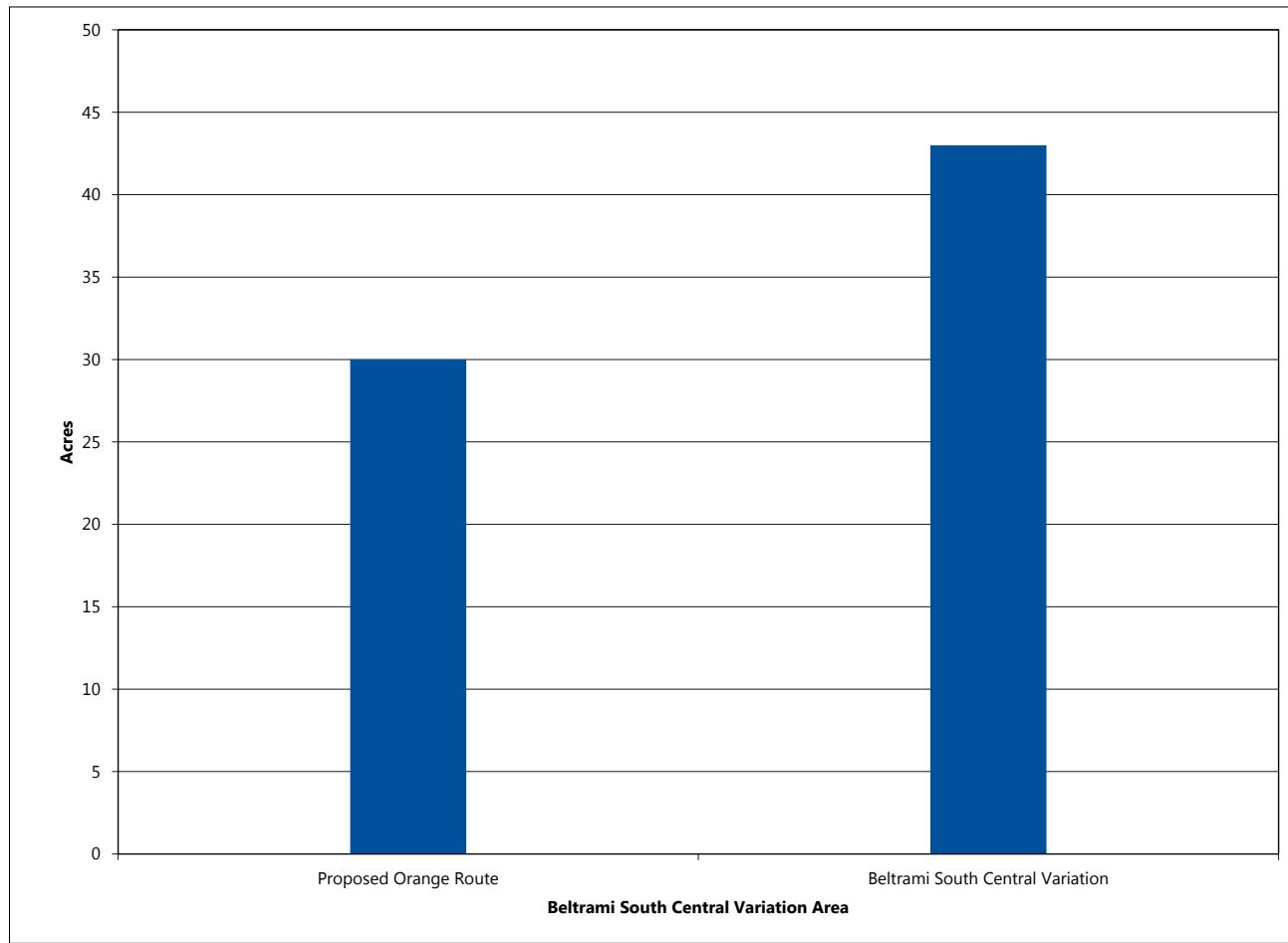
As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. However, such impacts are not expected from the proposed Project because such activities do not exist nor are planned in this area.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.2.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic resources includes the ROW of the proposed transmission line; however, potential indirect impacts to historic resources are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural properties.

Figure 6-58 Acres of State Forest Land within the Anticipated ROW in the Beltrami South Central Variation Area



Source(s): MnDNR 2003, reference (148)

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

No previously recorded archaeological sites or historic architectural resources are present within the Beltrami South Central Variation Area (Map 6-32). Additionally, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Orange Route or Beltrami South Central Variation in the Beltrami South Central Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

The Proposed Route and Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required to comply with federal and/or state regulations for cultural resources. These cultural resources investigations

will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate adverse effects to historic properties as a result of construction and operation of the proposed Project.

Potential adverse effects from construction, operation, maintenance, and emergency repair-related short-term and long-term to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse effects to these resources, including TCPs, from the proposed Project.

6.3.2.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Beltrami South Central Variation Area and the potential impacts from the proposed Project.

Table 6-82 Water Resources within the Anticipated ROW in the Beltrami South Central Variation Area

| Resource | Evaluation Parameter | Beltrami South Central Variation Area | |
|-------------------|----------------------|---------------------------------------|----------------------------------|
| | | Proposed Orange Route | Beltrami South Central Variation |
| Transmission Line | Length (mi) | 1.2 | 1.7 |
| NWI Wetlands | Acres within ROW | 30 | 43 |

Sources: USFWS 1997, reference (157); Minnesota Power 2014, reference (144)

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

K UHffFYgci fWg

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Beltrami South Central Variation Area are summarized in Table 6-82 and shown on Map 6-33. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The need to place transmission structures in wetlands and quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Orange Route and the Beltrami South Central Variation. Neither the Proposed Orange Route nor the Beltrami South Central Variation ROWs contain PWIs, non-PWI waters, trout streams, impaired waters, or floodplains.

Based on the NWI, the Proposed Orange Route and the Beltrami South Central Variation would both require conversion of forested shrub and wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-59, the Beltrami South Central Variation contains more combined forested and shrub wetlands compared to the Proposed Orange Route and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed Orange Route and the Beltrami South Central Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are expected to be

minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed Orange Route and the Beltrami South Central Variation would both require temporary construction access through wetlands, which is also likely be minimal due to the short-term nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

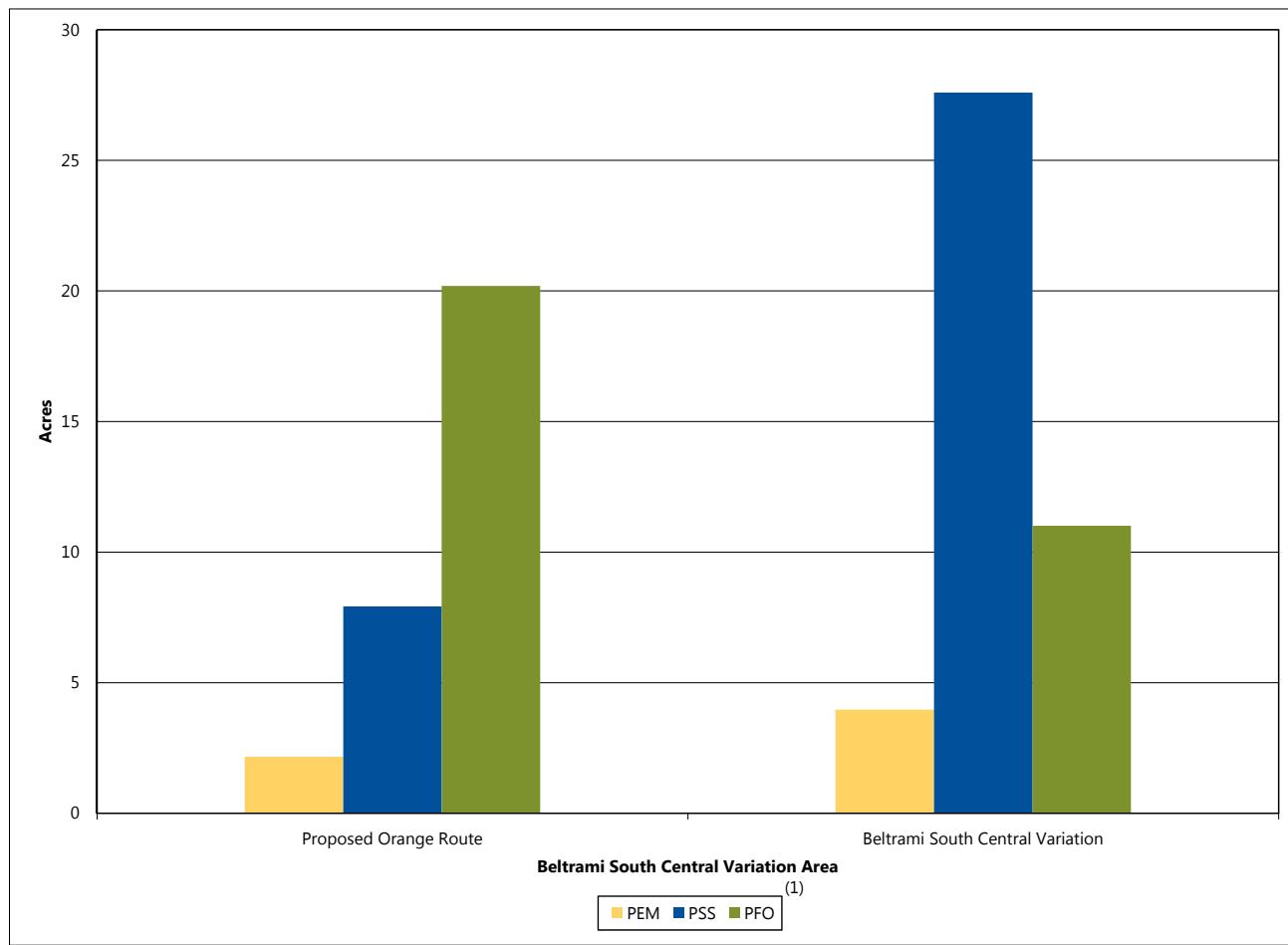
Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Beltrami South Central Variation Area are summarized in Table 6-83 and shown on Maps 5-12 and 6-33. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ between the Proposed Orange Route and Beltrami South Central Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-83 and Figure 6-60, the Beltrami South Central Variation would pass through slightly more forested land, including state forest, relative to the Proposed Orange Route, therefore resulting in more permanent removal of forest vegetation. In addition, the Proposed Orange Route would parallel existing transmission line corridor for its entire length, while the Beltrami South Central

Figure 6-59 Acres of Wetland by Type within the Anticipated ROW in the Beltrami South Central Variation Area



Source(s): USFWS 1997, reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO).

Table 6-83 Vegetation Resources within the Anticipated ROW in the Beltrami South Central Variation Area

| Resource | Evaluation Parameter | Beltrami South Central Variation Area | |
|--|--|---------------------------------------|----------------------------------|
| | | Proposed Orange Route | Beltrami South Central Variation |
| Transmission Line | Length (mi) | 1.2 | 1.7 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 0 |
| State Forest | Acres within ROW | 30 | 43 |
| Total Forested GAP Land Cover | Acres within ROW | 30 | 43 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | |
| North American Boreal Flooded & Swamp Forest | Acres within ROW | 24 | 32 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

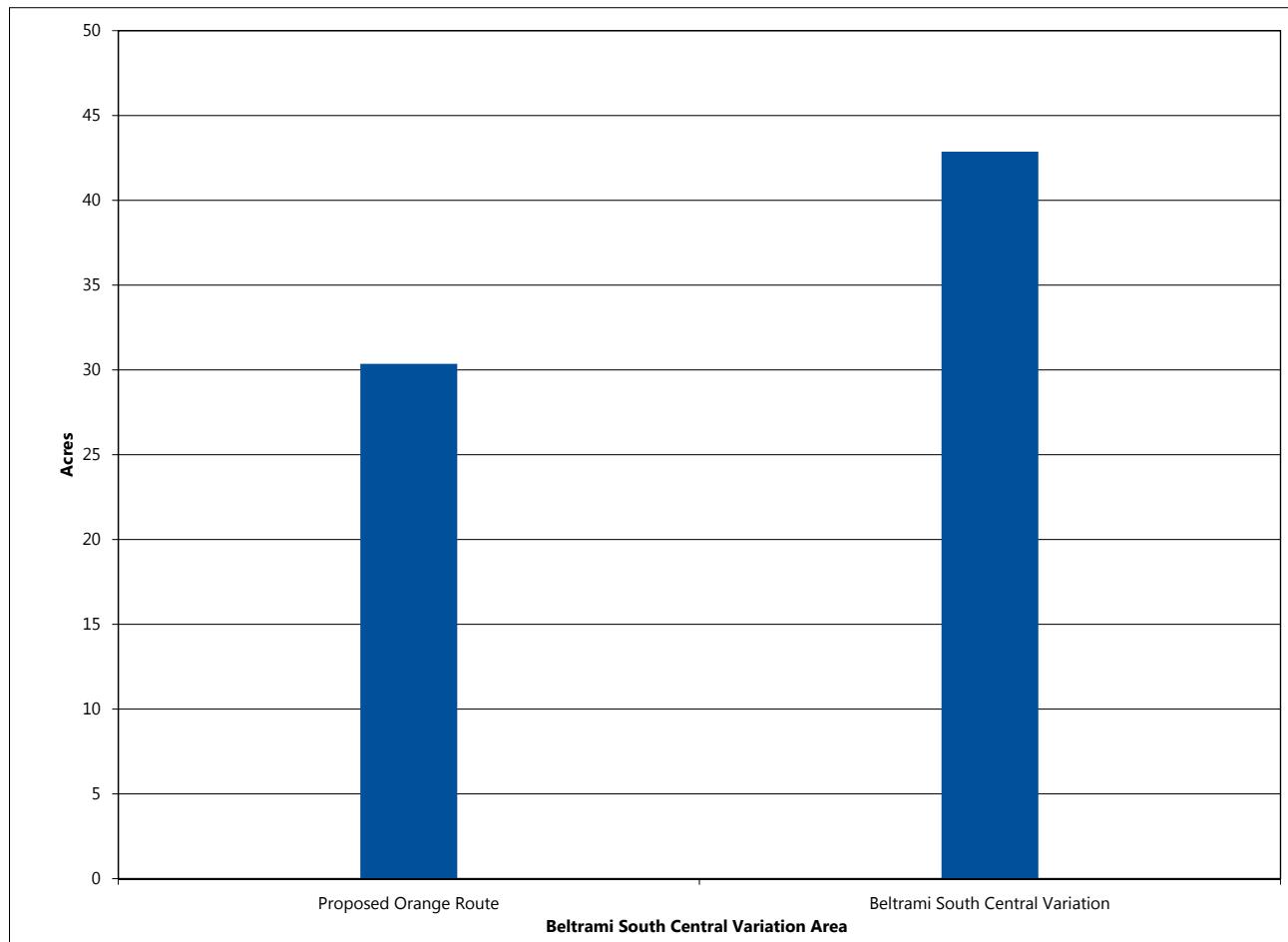
Note(s): Totals may not sum due to rounding

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

(3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Figure 6-60 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Beltrami South Central Variation Area



Source(s): USGS 2001, reference (151)

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

Variation would require creation of new corridor for its entire length (Table 6-83). Because of this, the Beltrami South Central Variation would result in more fragmentation of intact forest in areas where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Beltrami South Central Variation Area are summarized in Table 6-84 and shown on Map 6-33. Additional, more detailed data related to wildlife

resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Orange Route and Beltrami South Central Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Orange Route and Beltrami South Central Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.2.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Orange Route and Beltrami South Central Variation.

Both the Proposed Orange Route and the Beltrami South Central Variation would pass through the Big Bog Important Bird Area (Table 6-84; Map 6-33). However, the Beltrami South Central Variation

Table 6-84 Wildlife Resources within the Vicinity of the Beltrami South Central Variation Area

| Resource | Evaluation Parameter | Beltrami South Central Variation Area | |
|---|--|---------------------------------------|----------------------------------|
| | | Proposed Orange Route | Beltrami South Central Variation |
| Transmission Line | Length (mi) | 1.2 | 1.7 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 0 |
| Important Bird Areas | Acres within ROW | 30 | 43 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Audubon Society 2014, reference (181)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

would traverse a greater portion of the Big Bog Important Bird Area and require the creation of new transmission line corridor for its entire length, while the Proposed Orange Route would parallel an existing transmission line corridor for its entire length (Table 6-84; Map 6-33). Creation of a new corridor in the Big Bog Important Bird Area would likely result in both short-term and long-term direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The 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).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.3.2.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features,

such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Beltrami South Central Variation Area are summarized in Table 6-85; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species is similar between the Proposed Orange Route and Beltrami South Central Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

As indicated in Table 6-85, four rare moonwort species have been documented within one mile of both the Proposed Orange Route and Beltrami South Central Variation. Although the Beltrami South Central Variation would require the creation of new corridor, while the Proposed Orange Route would parallel an existing transmission line corridor, species in this genus prefer disturbed habitats, including ROWs. Because of this, impacts on these rare species would likely be similar with either the Proposed Orange Route or Beltrami South Central Variation. However, the full extent of potential impacts from either the Proposed Orange Route or Beltrami South Central Variation cannot be determined without

Table 6-85 Rare Species Documented within One Mile of the Anticipated ROW in the Beltrami South Central Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | Beltrami South Central Variation Area | |
|--------------------------------|-----------------------|----------------|-----------------|----------------|---------------------------------------|----------------------------------|
| | | | | | Proposed Orange Route | Beltrami South Central Variation |
| <i>Botrychium ascendens</i> | Upward-lobed Moonwort | None | Endangered | Vascular Plant | X | X |
| <i>Botrychium lunaria</i> | Common Moonwort | None | Threatened | Vascular Plant | X | X |
| <i>Botrychium pallidum</i> | Pale Moonwort | None | Special Concern | Vascular Plant | X | X |
| <i>Botrychium simplex</i> | Least Moonwort | None | Special Concern | Vascular Plant | X | X |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along 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. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Beltrami South Central Variation Area are summarized in Table 6-86 and shown on Map 6-34; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Orange Route and Beltrami South Central Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated in Table 6-86 and on Map 6-34, the Proposed Orange Route would pass through fewer acres of MBS Sites of Biodiversity Significance relative to the Beltrami South Central Variation. In addition, the Proposed Orange Route would parallel existing transmission line corridor for its entire length, while the Beltrami South Central Variation would require creation of new corridor for its entire length (Table 6-86; Map 6-34). Because of this, the Beltrami South Central Variation would result in more fragmentation of intact forest in areas where forest vegetation is present.

The rare communities and resources listed in Table 6-86 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. 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.

Table 6-86 Rare Communities and Resources within the Vicinity of the Beltrami South Central Variation Area

| Resource | Evaluation Parameter | Beltrami South Central Variation Area | |
|---|--|---------------------------------------|----------------------------------|
| | | Proposed Orange Route | Beltrami South Central Variation |
| Transmission Line | Length (mi) | 1.2 | 1.7 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 0 |
| MBS Sites of Biodiversity Significance ⁽³⁾ | Acres within ROW | 30 | 43 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.2.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-35 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Beltrami South Central Variation Area.

Table 6-87 identifies the percentage of total transmission line length that the Proposed Orange Route and Beltrami South Central Variation parallel

an existing corridor or linear feature in the Beltrami South Central Variation Area.

The Proposed Orange Route would parallel existing transmission line for the entire length (Table 6-87). The Beltrami South Central Variation would not follow any existing corridors.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.3.2.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-88 summarizes the costs associated with constructing

Table 6-87 Corridor Sharing in the Beltrami South Central Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Beltrami South Central Variation Area | |
|---|--|---------------------------------------|----------------------------------|
| | | Proposed Orange Route | Beltrami South Central Variation |
| Transmission Line (other linear features may be present within the transmission line corridor, i.e., road, trail, field line, PLSS) | Percent of Total Length ⁽²⁾ | 100 | 0 |
| None | Percent of Total Length ⁽²⁾ | 0 | 100 |

Source(s): USDA et al. 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al. 2014, reference (174); MnDNR et al. 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al. 2009, reference (177)

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

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-88 Construction Costs in the Beltrami South Central Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|------------------------|----------------------------------|--------------|-------------------------|-------------|
| Beltrami South Central | Proposed Orange Route | \$1,214,573 | \$995,551 | 1.2 |
| | Beltrami South Central Variation | \$3,440,123 | \$1,977,082 | 1.7 |

Source(s): Minnesota Power 2015, reference (9)

the Proposed Orange Route and Beltrami South Central Variation in the Beltrami South Central Variation Area. As indicated in Table 6-88, the Beltrami South Central Variation would be more expensive to construct, relative to the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$2,000 to \$2,700 annually for these alternatives in the Beltrami South Central Variation Area.

6.3.3 Beltrami South Variation Area

The Beltrami South Variation Area encompasses two route alternatives: the Proposed Orange Route and the Beltrami South Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Beltrami South Variation Area, depending on the route or variation considered.

6.3.3.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Beltrami South Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Beltrami South Variation Area are summarized in Table 6-89 and shown on Maps 6-31, 6-32, 6-33, and 6-35.

As indicated in Table 6-89 for the Beltrami South Variation Area, both the Proposed Orange Route and Beltrami South Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, consisting of one state forest. Neither the Proposed Orange Route nor the Beltrami South Variation would be located within 1,500 feet of any residences or within one mile of any historic architectural sites, which would also have high visual sensitivity.

The Beltrami South Variation is slightly longer (7.5 miles) than the Proposed Orange Route (5.6 miles; Table 6-89). Also, the Proposed Orange Route parallels an existing large 500 kV transmission line for its entire length, whereas the Beltrami South Variation does not parallel an existing transmission

Table 6-89 Aesthetic Resources within the ROI in the Beltrami South Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Beltrami South Variation Area | |
|---|--|-------------------------------|--------------------------|
| | | Proposed Orange Route | Beltrami South Variation |
| Transmission Line | Length (mi) | 5.6 | 7.5 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 100 | 0 |
| State Forests | Count within 0–1,500 ft | 1 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

line. By paralleling an existing 500 kV transmission line of similar design and being slightly shorter in length, the Proposed Orange Route would produce substantially less contrast than the Beltrami South Variation. For these reasons, the Proposed Orange Route would result in less aesthetic impact than the Beltrami South Variation in the Beltrami South Variation Area.

Because the Proposed Orange Route is short in length, parallels an existing transmission line of similar size and design for its full length, and affects no residences and very few other sensitive visual resources (one state forest), potential aesthetic impacts of the Proposed Orange Route are expected to be minimal. Although the Beltrami South Variation does not parallel an existing large transmission line, it is also short in length and affects no residences and very few other sensitive visual resources (one state forest).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

Land Uses

Table 6-90 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Orange Route and Variation in the Beltrami South Variation Area. Generally, the percentage of each land use is

representative of what is present within the ROW. The various land uses present in the variation area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Orange Route and Beltrami South Variation are shown on Map 6-31.

The Proposed Orange Route and Beltrami South Variation are both primarily located in forested and/or swamp land. The Beltrami South Variation would impact more acres of forested and/or swamp land compared to the Proposed Orange Route (Table 6-90). A small amount of developed or disturbed land would be impacted by both the Proposed Orange Route and the Beltrami South Variation.

Land Ownership and Management

Table 6-91 shows that Beltrami South Variation would impact a greater amount of state forest and state fee land compared to the Proposed Orange Route. No impacts to county lands, or state conservation easements would occur under the Proposed Orange Route or Beltrami South Variation.

The Proposed Orange Route would parallel an existing corridor for its entire length, while the Beltrami South Variation would not parallel an existing corridor (see Section 6.3.3.6). Therefore, the Proposed Orange Route would be expected to have less incompatibility with surrounding land uses compared to the Beltrami South Variation.

The Proposed Orange Route would parallel an existing corridor for its entire length, while the Beltrami South Variation would not parallel an existing corridor (see Section 6.3.3.6). Therefore, the Proposed Orange Route would be expected to have less incompatibility with surrounding land

Table 6-90 Land Uses within the ROI in the Beltrami South Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Beltrami South Variation Area | |
|---|------------------------|-------------------------------------|-------------------------------|--------------------------|
| | | | Proposed Orange Route | Beltrami South Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 2,196 | 2,897 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 11 | 10 |
| | Agricultural | Acres within 0–1,500 ft | 0 | 0 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 2,185 | 2,887 |
| | Other | Acres within 0–1,500 ft | 0 | 0 |

Source(s): USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.

(2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

6.0 Comparative Environmental Consequences

Table 6-91 Land Ownership/Management within the Anticipated ROW in the Beltrami South Variation Area

| Resource | Type | Evaluation Parameter | Beltrami South Variation Area | |
|--|---|----------------------|-------------------------------|--------------------------|
| | | | Proposed Orange Route | Beltrami South Variation |
| Total Lands | -- | Acres within ROW | 136 | 183 |
| State Forests | -- | Acres within ROW | 136 | 183 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 136 | 181 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 136 | 181 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 0 | 0 |
| | Trust Fund | Acres within ROW | 0 | 0 |
| | Federal - State Lease | Acres within ROW | 0 | 0 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 0 | 2 |

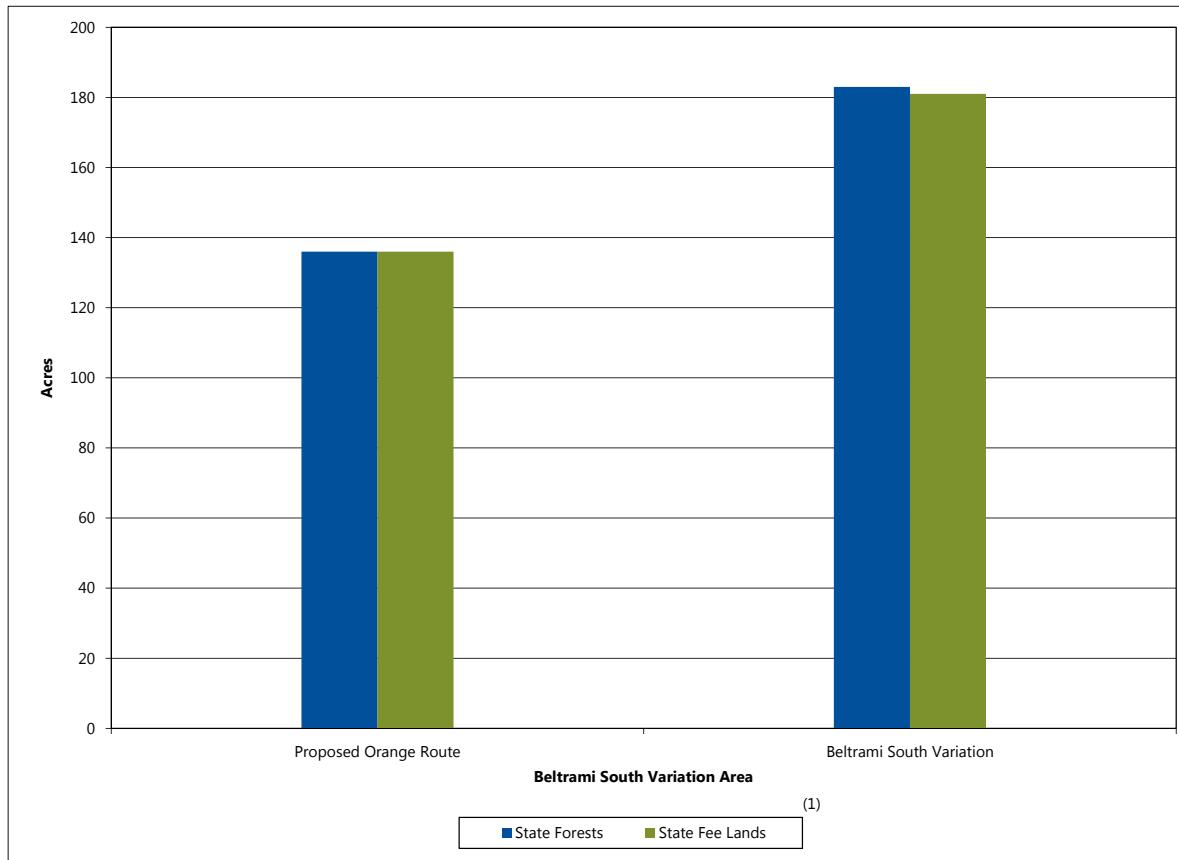
Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152)

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.

(2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-61 Public Land Ownership/Management within the ROI in the Beltrami South Variation Area⁽¹⁾



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.

uses compared to the Beltrami South Variation (Figure 6-61).

Impacts to land use from the proposed Project in the Beltrami South Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Orange Route and Beltrami South Variation would both 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. The length of the route that would parallel an existing corridor is also important. The Proposed Orange Route avoids a greater amount of state forest and state fee lands than the Beltrami South Variation, thereby avoiding long-term changes to land use.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.3.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Beltrami South Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based

economy resources in the Beltrami South Variation Area are summarized in Table 6-92.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-92 shows the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Orange Route and Beltrami South Variations in the ROI.

No prime farmland or farmland of statewide importance has been identified for the Proposed Orange Route or the Beltrami South Variation in the Beltrami South Variation Area.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-92 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Orange Route and the Beltrami South Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Orange Route or the Beltrami South Variation in the Beltrami South Variation Area.

The Beltrami South Variation, which has a longer length, would pass through the most acres of

Table 6-92 Land-Based Economy Resources within the Anticipated ROW in the Beltrami South Variation Area

| Resource | Type | Evaluation Parameter | Beltrami South Variation Area | |
|---|----------------------------------|--|-------------------------------|--------------------------|
| | | | Proposed Orange Route | Beltrami South Variation |
| Transmission Line | -- | Length (mi) | 5.6 | 7.5 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 100 | 0 |
| Farmland | Not Farmland | Acres within ROW | 136 | 183 |
| | Prime Farmland if Drained | Acres within ROW | 0 | 0 |
| | Farmland of Statewide Importance | Acres within ROW | 0 | 0 |
| | All Areas Are Prime Farmland | Acres within ROW | 0 | 0 |
| State Forest | -- | Acres within ROW | 136 | 183 |
| State Mineral Leases (active and/or terminated/expired) | -- | Acres within ROW | 58 | 287 |

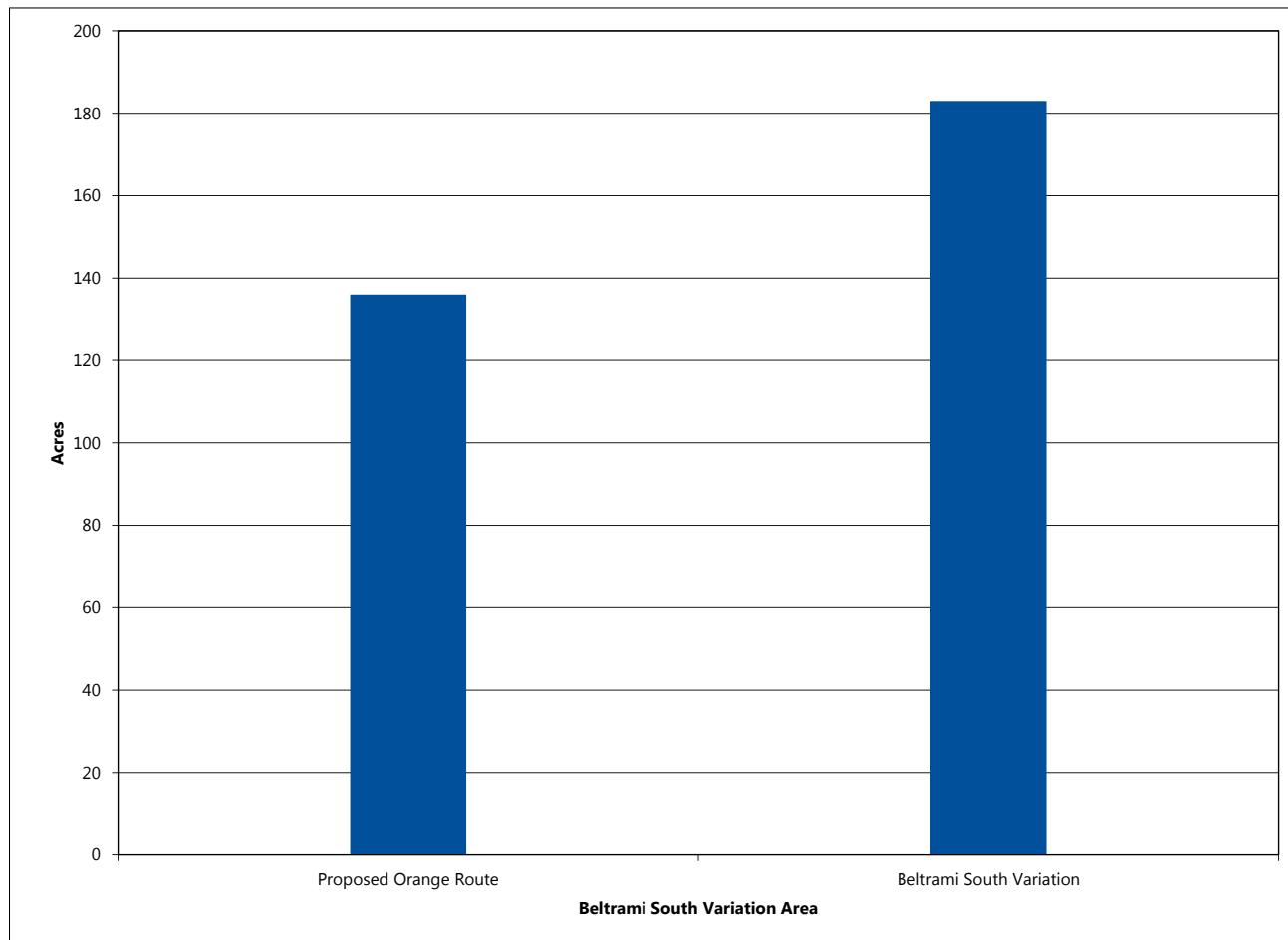
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-62 Acres of State Forest Land within the Anticipated ROW in the Beltrami South Variation Area



Source(s): MnDNR 2003, reference (148)

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

state forest lands—the Beltrami Island State Forest (Figure 6-62, Map 5-33). The Beltrami South Proposed Route, which has a shorter length, would be expected to result in fewer impacts on timber activities in the Beltrami Island State Forest.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-

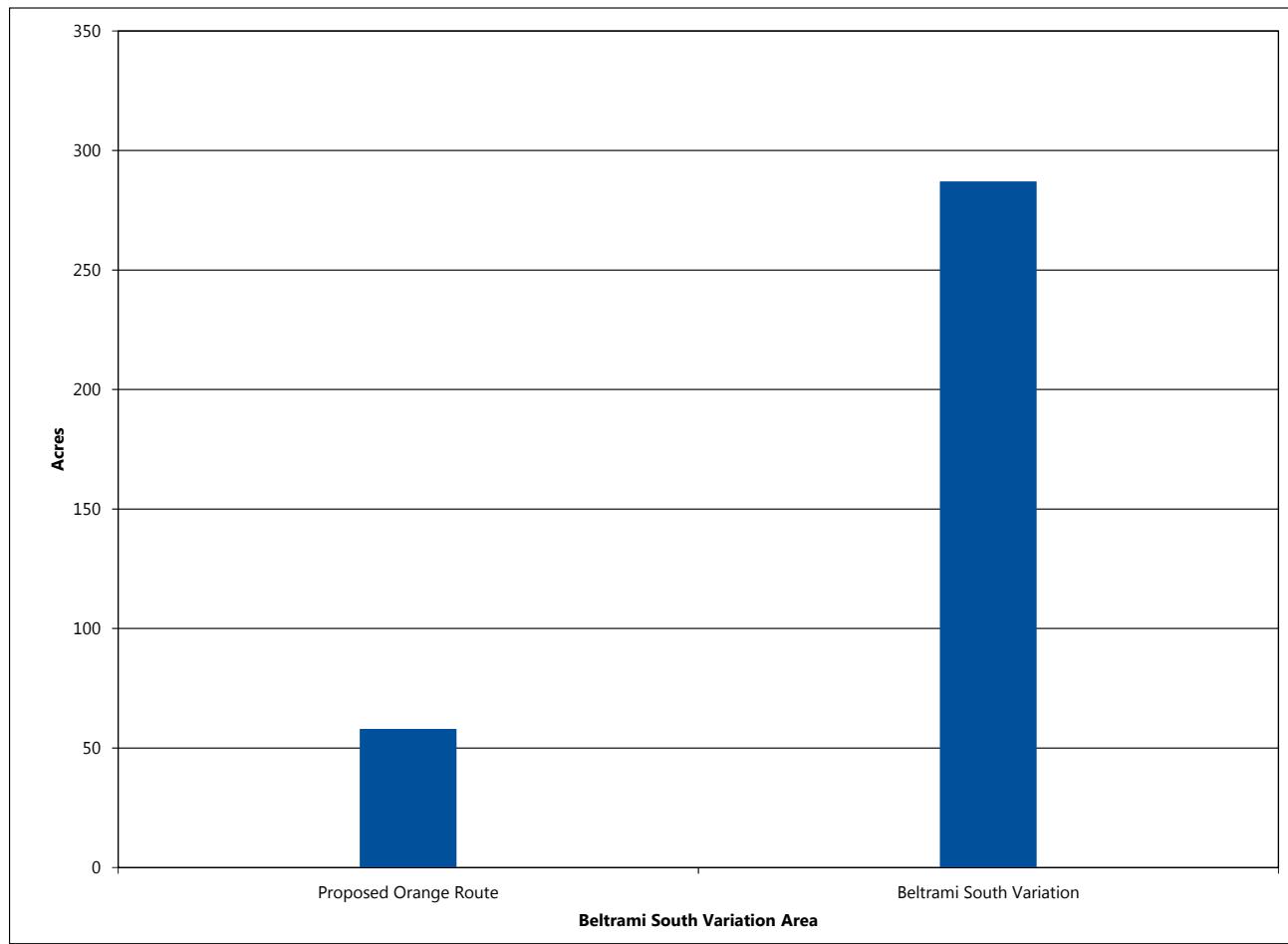
proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-92, Figure 6-63, and Map 6-31 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the Beltrami South Variation Area. There are no **active mineral leases**, known aggregate resources or records of current mineral mining in the ROI of either the Proposed Orange Route or Beltrami South Variation.

Both the Proposed Orange Route and the Beltrami South Variation would traverse mining lands with terminated/expired state mineral leases (Table 6-92, Figure 6-63, and Map 6-31). However, the Proposed Orange Route would pass through fewer acres and would do so adjacent to an existing transmission line corridor (Map 6-31). Because the Beltrami

Figure 6-63 Acres of State Mineral Leases within the Anticipated ROW in the Beltrami South Variation Area



Source(s): MnDNR 2014, reference (179)

South Variation would pass through more acres of mining lands with state leases and would require a new corridor, it would have a greater potential to interfere with future mining activities in this area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.3.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential

indirect effects to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites.

No previously recorded archaeological sites or historic architectural resources are present within the Beltrami South Variation Area (Map 6-32). Additionally, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Orange Route and Beltrami South Variation in the Beltrami South Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

The Proposed Route and Variation have not been surveyed for cultural resources. As a result, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of

cultural resource investigations conducted in compliance with federal and/or state regulations for cultural resources. These cultural resources investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the direct and indirect APEs for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse effects on historic architectural properties as a result of construction and operation of the proposed Project.

Potential short-term and long-term adverse impacts from construction, operation, maintenance, and emergency repair-related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse effects to these resources, including TCPs, from the proposed Project.

6.3.3.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Beltrami South Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Beltrami South Variation Area are summarized in Table 6-93 and shown on Map 6-33. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The need to place transmission structures in wetlands and quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Orange Route and Beltrami South Variation. Neither the Proposed Orange Route nor the Beltrami South Variation ROWs contain PWIs, non-PWI waters, trout streams, impaired waters, or floodplains.

Based on the NWI, the Proposed Orange Route and the Beltrami South Variation would both require conversion of forested shrub and wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-64, the Beltrami South Variation contains more combined forested and shrub wetlands compared to the Proposed Orange Route and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed Orange Route and the Beltrami South Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed Orange Route and the Beltrami South Variation would both require temporary construction access through wetlands, which is also likely to be minimal due to the short-term nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

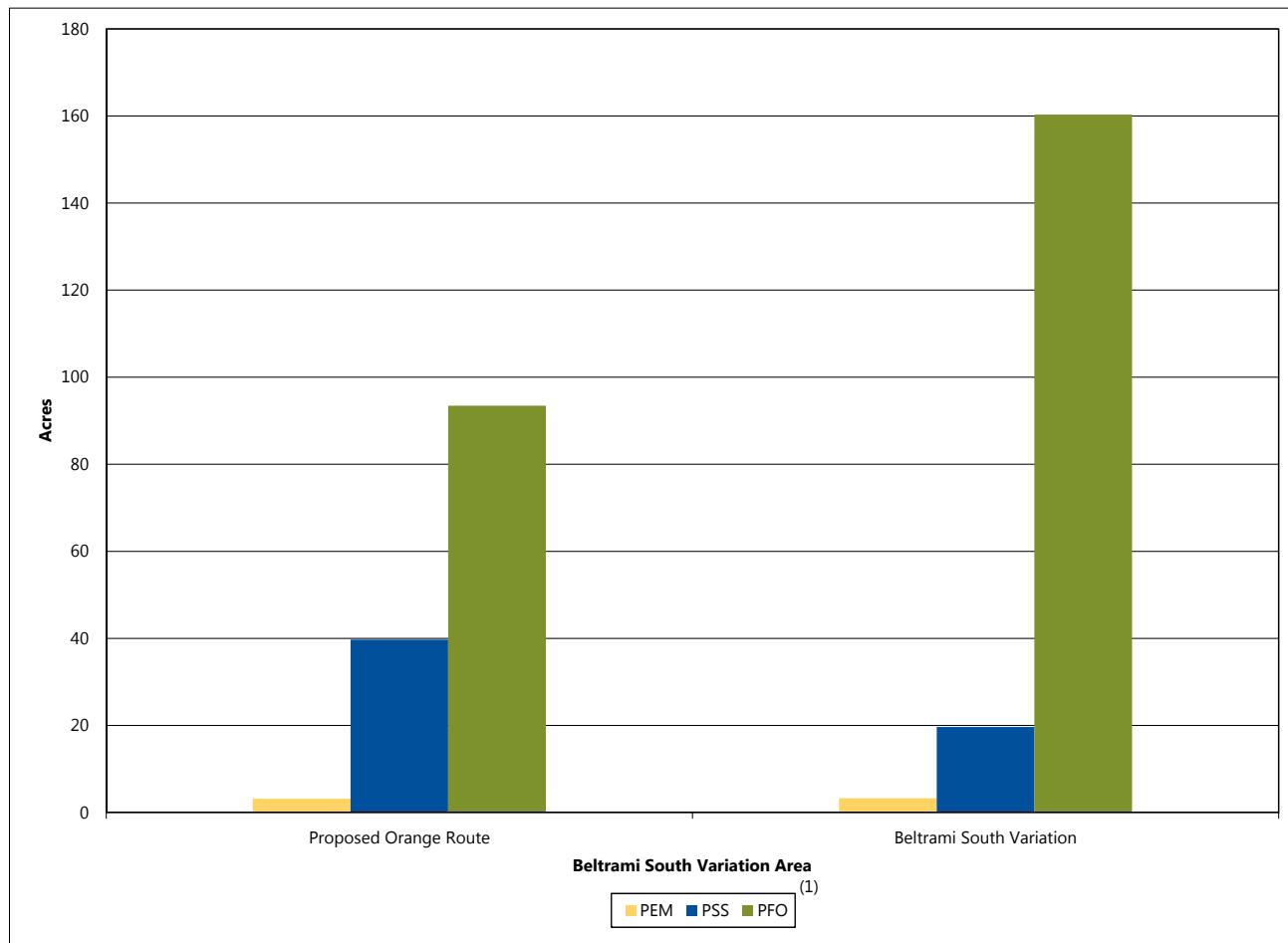
Table 6-93 Water Resources within the Anticipated ROW in the Beltrami South Variation Area

| Resource | Evaluation Parameter | Beltrami South Variation Area | |
|-------------------|----------------------|-------------------------------|--------------------------|
| | | Proposed Orange Route | Beltrami South Variation |
| Transmission Line | Length (mi) | 5.6 | 7.5 |
| NWI Wetlands | Acres within ROW | 136 | 183 |

Sources: USFWS 1997, reference (157); Minnesota Power 2014, reference (144)

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

Figure 6-64 Acres of Wetland by Type within the Anticipated ROW in the Beltrami South Variation Area



Source(s): USFWS 1997, reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO).

Table 6-94 Vegetation Resources within the Anticipated ROW in the Beltrami South Variation Area

| Resource | Evaluation Parameter | Beltrami South Variation Area | |
|--|--|-------------------------------|--------------------------|
| | | Proposed Orange Route | Beltrami South Variation |
| Transmission Line | Length (mi) | 5.6 | 7.5 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 0 |
| State Forest | Acres within ROW | 136 | 183 |
| Total Forested GAP Land Cover | Acres within ROW | 135 | 183 |
| GAP Land Cover - Dominant Types ⁽³⁾ | | | |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 114 | 139 |
| North American Boreal Forest | Acres within ROW | 16 | 35 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

(3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Beltrami South Variation Area are summarized in Table 6-94 and shown on Maps 5-12 and 6-33. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ across the Proposed Orange Route and Beltrami South Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-94 and Figure 6-65, the Beltrami South Variation would pass through more forested land, including state forest, relative to the Proposed Orange Route, therefore resulting in more permanent removal of forested vegetation. In addition, the Proposed Orange Route would parallel existing transmission line corridor for its entire length, while the Beltrami South Variation would require creation of new corridor for its entire length (Table 6-94). Because of this, the Beltrami South Variation would result in more fragmentation of intact forest in areas where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Beltrami South Variation Area are summarized in Table 6-95 and shown on Map 6-33. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Orange Route and Beltrami South Variation include loss and

fragmentation of natural and managed wildlife habitat and proximity of the Proposed Orange Route and Beltrami South Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor and/or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.3.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Orange Route and Beltrami South Variation.

Both the Proposed Orange Route and the Beltrami South Variation would pass through the Big Bog Important Bird Area (Table 6-95; Map 6-33). However, the Beltrami South Variation would traverse a greater portion of the Big Bog Important Bird Area and require the creation of new transmission line corridor for its entire length, while the Proposed Orange Route would parallel an existing transmission line corridor for its entire length (Table 6-95). Creation of a new corridor in the Big Bog Important Bird Area would likely result in both short-term and long-term direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result injury or death caused by avian collisions and electrocutions, discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region (Map 6-33), and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13).

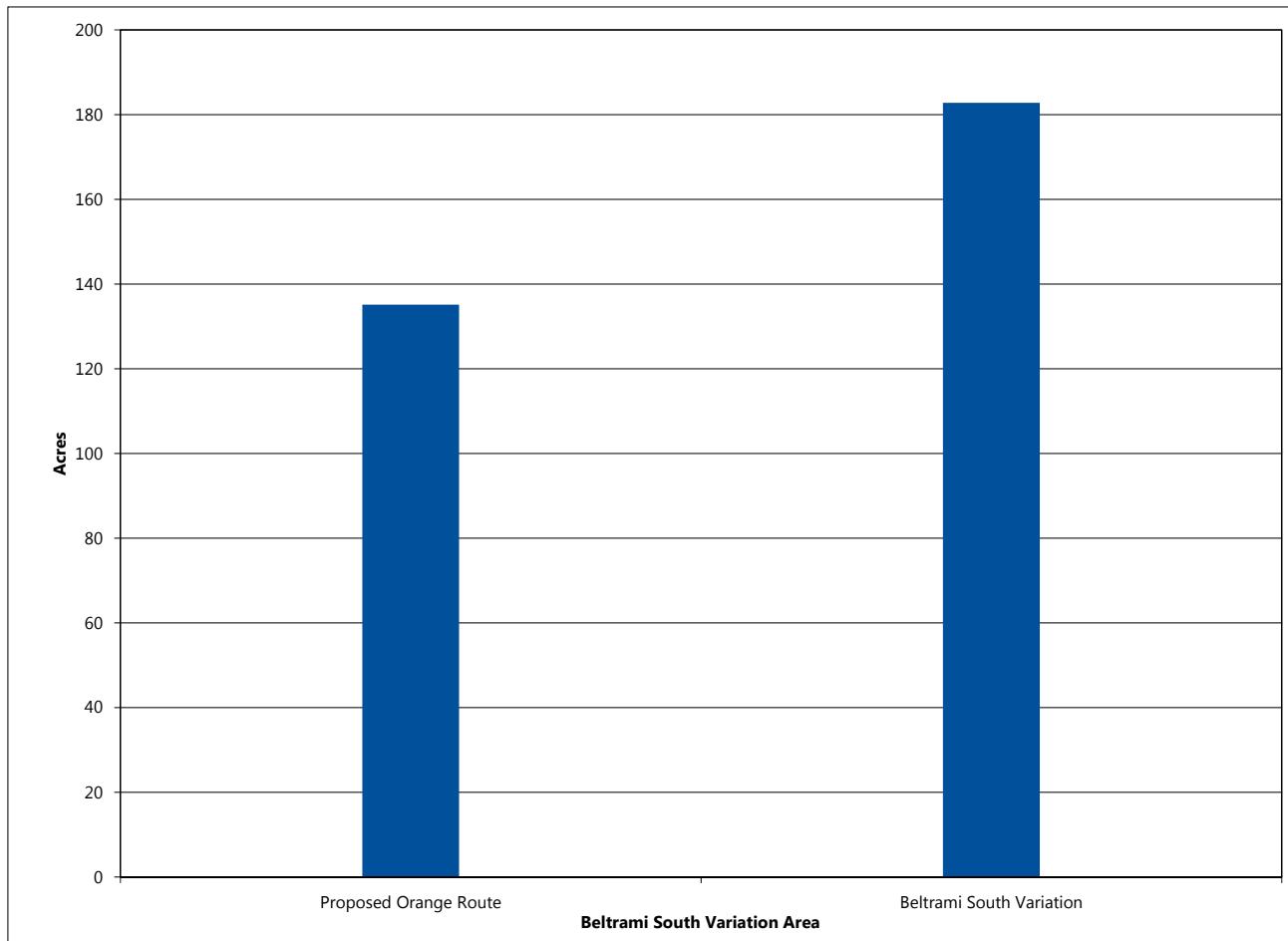
Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.3.3.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered,

Figure 6-65 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Beltrami South Variation Area



Source(s): USGS 2001, reference (151)

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

Table 6-95 Wildlife Resources within the Vicinity of the Beltrami South Variation Area

| Resource | Evaluation Parameter | Beltrami South Variation Area | |
|---|--|-------------------------------|--------------------------|
| | | Proposed Orange Route | Beltrami South Variation |
| Transmission Line | Length (mi) | 5.6 | 7.5 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 0 |
| Important Bird Areas | Acres within ROW | 136 | 183 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Audubon Society 2014, reference (181)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Beltrami South Variation Area are summarized in Table 6-96; additional data on rare species, such as the

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Table 6-96 Rare Species Documented within One Mile of the Anticipated ROW in the Beltrami South Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | Beltrami South Variation Area | |
|--------------------------------|---------------------------|----------------|-----------------|----------------|-------------------------------|--------------------------|
| | | | | | Proposed Orange Route | Beltrami South Variation |
| <i>Botrychium pallidum</i> | Pale Moonwort | None | Special Concern | Vascular Plant | | X |
| <i>Botrychium simplex</i> | Least Moonwort | None | Special Concern | Vascular Plant | X | X |
| <i>Cypripedium arietinum</i> | Ram's head lady's slipper | None | Special Concern | Vascular Plant | | X |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

In general, proximity of state endangered, threatened, or special concern species is similar between the Proposed Orange Route and Beltrami South Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation, including critical habitat designated for gray wolf.

As indicated in Table 6-96, the ram's head lady's slipper and two rare moonwort species have been documented within one mile of the Beltrami South Variation; one of the *Botrychium* (moonwort) species was also documented within one mile of the Proposed Orange Route. Although the Beltrami South Variation would require the creation of new corridor, while the Proposed Orange Route would parallel an existing transmission line corridor, species in this genus prefer disturbed habitats, including ROWs. Because of this impacts on these rare species would likely be similar with either the Proposed Orange Route or Beltrami South Variation. **It is possible that the Beltrami South Variation may have more impacts on the ram's head lady's slipper.** The full extent of potential impacts from either the Proposed Orange Route or Beltrami South Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Both the Proposed Orange Route and the Beltrami South Variation would cross critical habitat

designated for gray wolf. The Proposed Orange Route would cross this habitat for approximately one mile and would parallel an existing transmission line corridor, while the Beltrami South Variation would cross this habitat for approximately 3 miles and would require the establishment of a new transmission line corridor. The Proposed Orange Route would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross less of this resource and would do so in an area where critical habitat designated for gray wolf has already been fragmented.

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. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Beltrami South Central Variation Area are summarized in Table 6-97 and shown on Map 6-34;

Table 6-97 Rare Communities and Resources within the Vicinity of the Beltrami South Variation Area

| Resource | Evaluation Parameter | Beltrami South Variation Area | |
|---|--|-------------------------------|--------------------------|
| | | Proposed Orange Route | Beltrami South Variation |
| Transmission Line | Length (mi) | 5.6 | 7.5 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 100 | 0 |
| MBS Sites of Biodiversity Significance ⁽³⁾ | Acres within ROW | 120 | 161 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

(3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Orange Route and Beltrami South Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated in Table 6-97 and on Map 6-34, the Proposed Orange Route would pass through fewer acres of MBS Sites of Biodiversity Significance relative to the Beltrami South Variation. In addition, the Proposed Orange Route would parallel existing transmission line corridor for its entire length, while the Beltrami South Variation would require creation of new corridor for its entire length (Table 6-97; Map 6-34). Because of this, the Beltrami South Variation would result in more fragmentation of intact forest in areas where forest vegetation is present.

The rare communities and resources listed in Table 6-97 and detailed above show that the

proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. 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.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.3.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property.

Table 6-98 Corridor Sharing in the Beltrami South Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Beltrami South Variation Area | |
|---|--|-------------------------------|--------------------------|
| | | Proposed Orange Route | Beltrami South Variation |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS) | Percent of Total Length ⁽²⁾ | 100 | 0 |
| None | Percent of Total Length ⁽²⁾ | 0 | 100 |

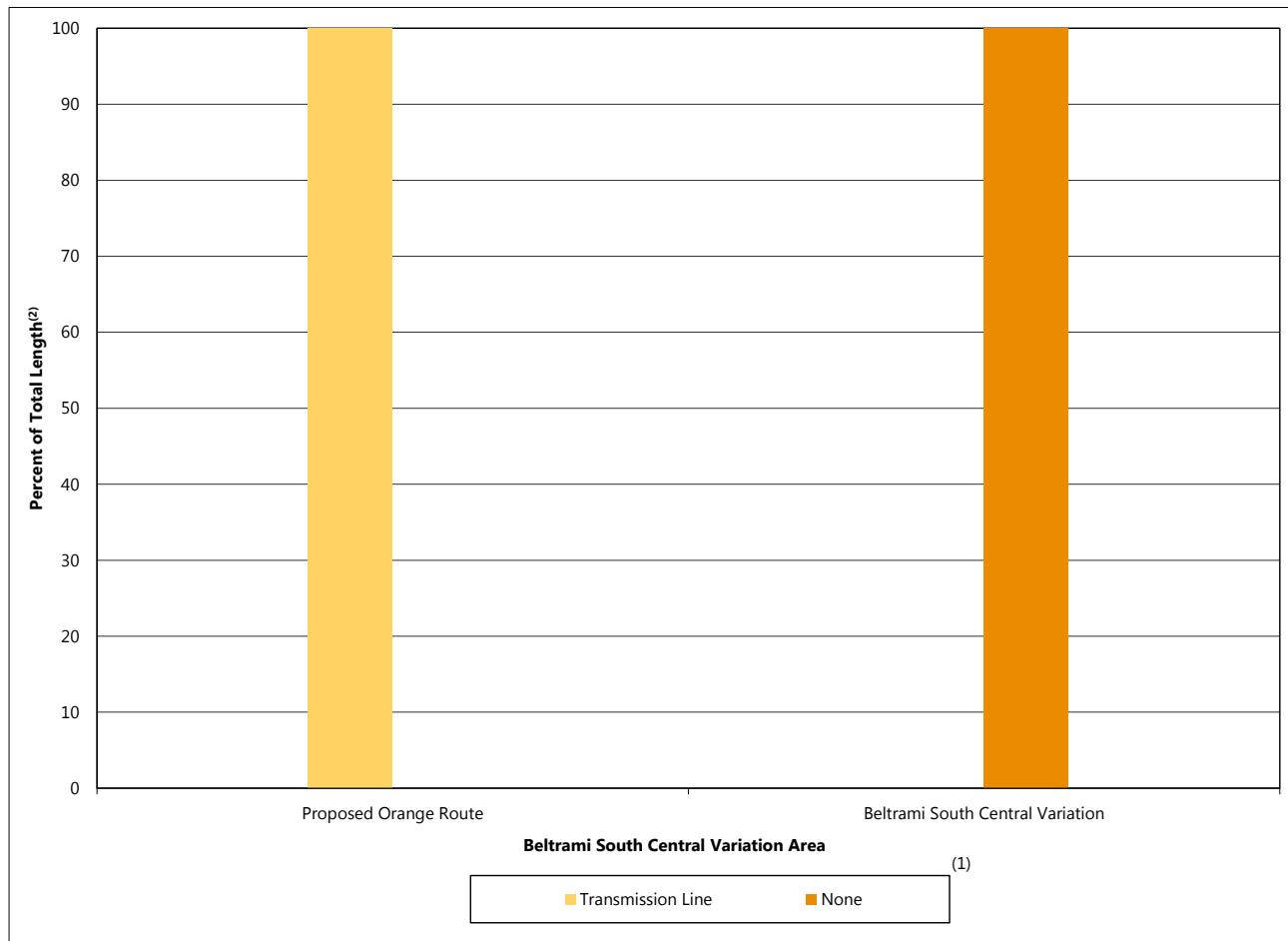
Source(s): USDA et al. 2013, reference (170); MN DOC 2014, reference (145); MnDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al. 2014, reference (174); MnDNR et al. 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al. 2009, reference (177)

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

(1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-66 Corridor Sharing in the Beltrami South Variation Area



Source(s): USDA et al. 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al. 2014, reference (174); MnDNR et al. 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al. 2009, reference (177)

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

(1) Transmission line (other linear features may be present within the transmission corridor; i.e., road, trail, field line, PLSS).

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-35 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Beltrami South Variation Area.

Table 6-98 identifies the percentage of total transmission line length that the Proposed Orange Route and Beltrami South Variation parallel an existing corridor or linear feature in the Beltrami South Variation Area.

The Proposed Orange Route would parallel existing transmission line corridor for the entire length (Figure 6-66). The Beltrami South Variation would not follow any existing corridors.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.3.3.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-99 summarizes the costs associated with constructing the Proposed Orange Route and Beltrami South Variation in the Beltrami South Central Variation Area. As indicated in Table 6-99, the Beltrami South

Variation would cost almost three times more to construct than the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$9,000 to \$12,000 annually for these alternatives in the Beltrami South Variation Area.

6.3.4 North Black River Variation Area

The North Black River Variation Area encompasses two route alternatives: the Proposed Blue Route and the North Black River Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the North Black River Variation Area, depending on the route or variation considered.

6.3.4.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the North Black River Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the North Black River Variation Area are summarized in Table 6-100 and shown on Maps 6-36, 6-37, 6-38, and 6-40.

As indicated in Table 6-100 for the North Black River Variation Area, the Proposed Blue Route and North Black River Variation would cross or be located

Table 6-99 Construction Costs in the Beltrami South Variation Area

| Variation Area | Variation Names in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|----------------|----------------------------|--------------|-------------------------|-------------|
| Beltrami South | Proposed Orange Route | \$5,805,518 | \$1,038,554 | 5.6 |
| | Beltrami South Variation | \$9,925,396 | \$1,318,114 | 7.5 |

Source(s): Minnesota Power 2015, reference (9)

Table 6-100 Aesthetic Resources within the ROI in the North Black River Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | North Black River Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Blue Route | North Black River Variation |
| Transmission Line | Length (mi) | 8.4 | 9.2 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 0 | 100 |
| Residences | Count within 0–500 ft | 0 | 3 |
| | Count within 0–1,000 ft | 0 | 4 |
| | Count within 0–1,500 ft | 1 | 5 |
| State Forests | Count within 0–1,500 ft | 1 | 1 |
| Snowmobile Trails | Count within 0–1,500 ft | 2 | 2 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); MnDNR 2003, reference (148), MnDNR 2010 reference (150)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

(2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

6.0 Comparative Environmental Consequences

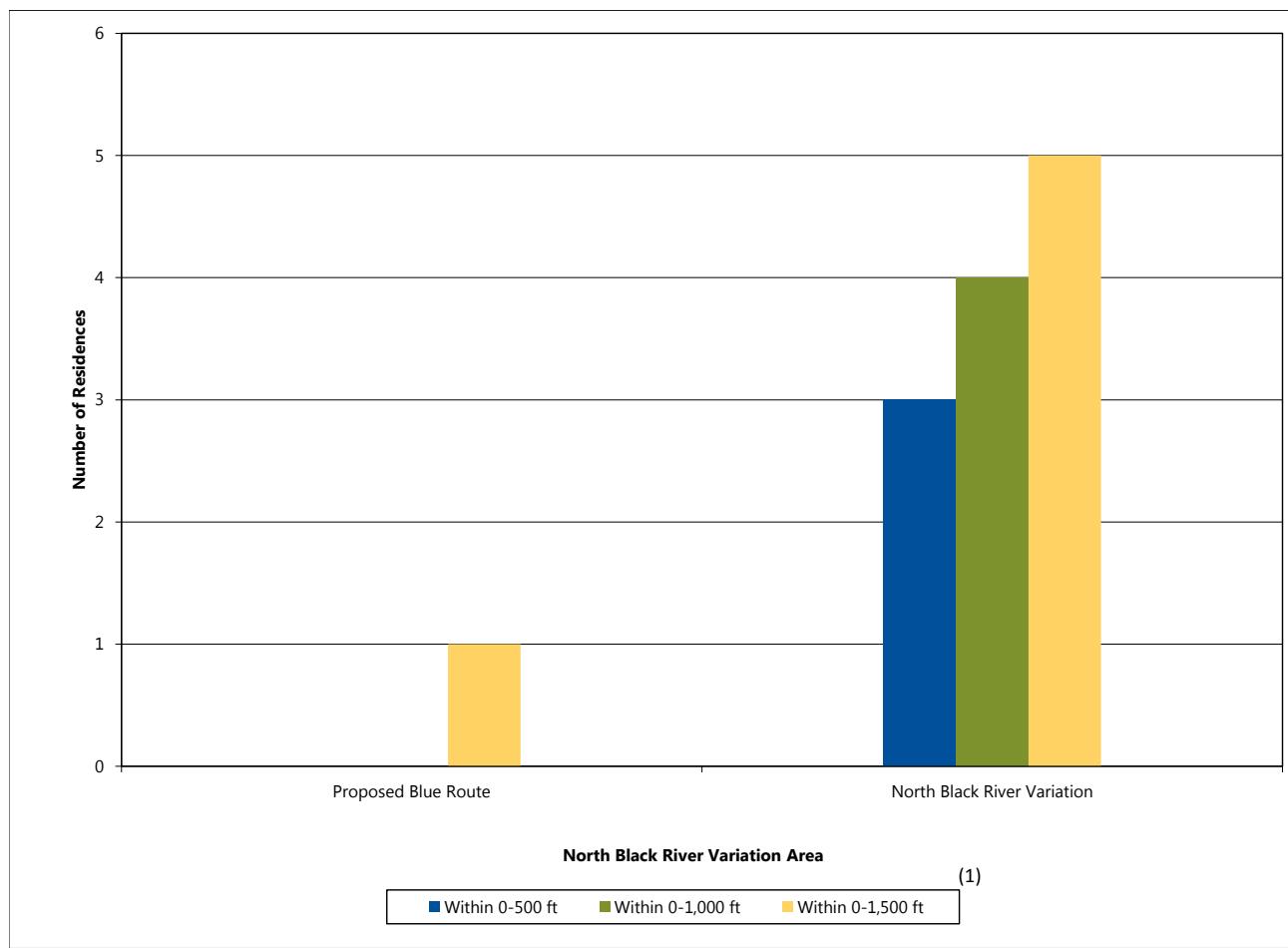
within 1,500 feet of aesthetic resources with high visual sensitivity, including two snowmobile trails and one state forest (Map 6-38 and Map 6-40). None of the alternatives would be located within one mile of any historic architectural sites, which would also have high visual sensitivity. In addition, the Proposed Blue Route and North Black River Variation would be located within 1,500 feet of one or more residences, which also have high visual sensitivity (Figure 6-67). The North Black River Variation would affect more residences within 1,500 feet of it (five) than the Proposed Blue Route (one; Table 6-100).

The North Black River Variation is slightly longer (9.2 miles) than the Proposed Blue Route (8.4 miles). However, the North Black River Variation parallels an existing large 230 kV transmission line for its entire length, whereas the Proposed Blue Route does not parallel an existing transmission line. By paralleling an existing large transmission line, the North Black River Variation would produce substantially less

contrast than the Proposed Blue Route. Although the North Black River Variation would be slightly longer and affect several more residences (5) than the Proposed Blue Route (1), the North Black River Variation would produce substantially less contrast due to paralleling an existing large transmission line for its entire length. For these reasons, the North Black River Variation would result in less aesthetic impact than the Proposed Blue Route in the North Black River Variation Area.

Because the North Black River Variation is relatively short in length, parallels an existing transmission line of similar size and design for its full length, and affects few residences and other sensitive visual resources (one state forest and two snowmobile trails), aesthetic impacts of the North Black River Variation are expected to be minimal. Although the Proposed Blue Route does not parallel an existing large transmission line, it is short in length (8.4 miles) and affects few residences (one) and other

Figure 6-67 Residences within the ROI in the North Black River Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

sensitive visual resources (one state forest and two snowmobile trails).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

Land Uses

Table 6-101 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue Route and North Black River Variation in the North Black River Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the variation area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Blue Route and Variation are shown on Map 6-36.

The Proposed Blue Route and North Black River Variation ROI are both primarily composed of

Table 6-101 Land Uses within the ROI in the North Black River Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | North Black River Variation Area | |
|---|------------------------|-------------------------------------|----------------------------------|-----------------------------|
| | | | Proposed Blue Route | North Black River Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 3,210 | 3,495 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 20 | 125 |
| | Agricultural | Acres within 0–1,500 ft | 0 | 69 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 3,190 | 3,296 |
| | Other | Acres within 0–1,500 ft | 0 | 5 |

Source(s): USGS 2001, reference (151)

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

- (1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-102 Land Ownership/Management within the Anticipated ROW in the North Black River Variation Area

| Resource | Type | Evaluation Parameter | North Black River Variation Area | |
|--|---|----------------------|----------------------------------|-----------------------------|
| | | | Proposed Blue Route | North Black River Variation |
| Total Lands | -- | Acres within ROW | 204 | 223 |
| State Forests | -- | Acres within ROW | 188 | 156 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 184 | 158 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 158 | 133 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 26 | 25 |
| | Trust Fund | Acres within ROW | 0 | 0 |
| | Federal - State Lease | Acres within ROW | 0 | 0 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 20 | 65 |

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.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

forested and/or swamp land (Table 6-101). The Variation ROI is composed of a greater amount of forested and/or swamp land developed or disturbed, and agricultural land cover compared to the Proposed Blue Route.

Land Ownership and Management

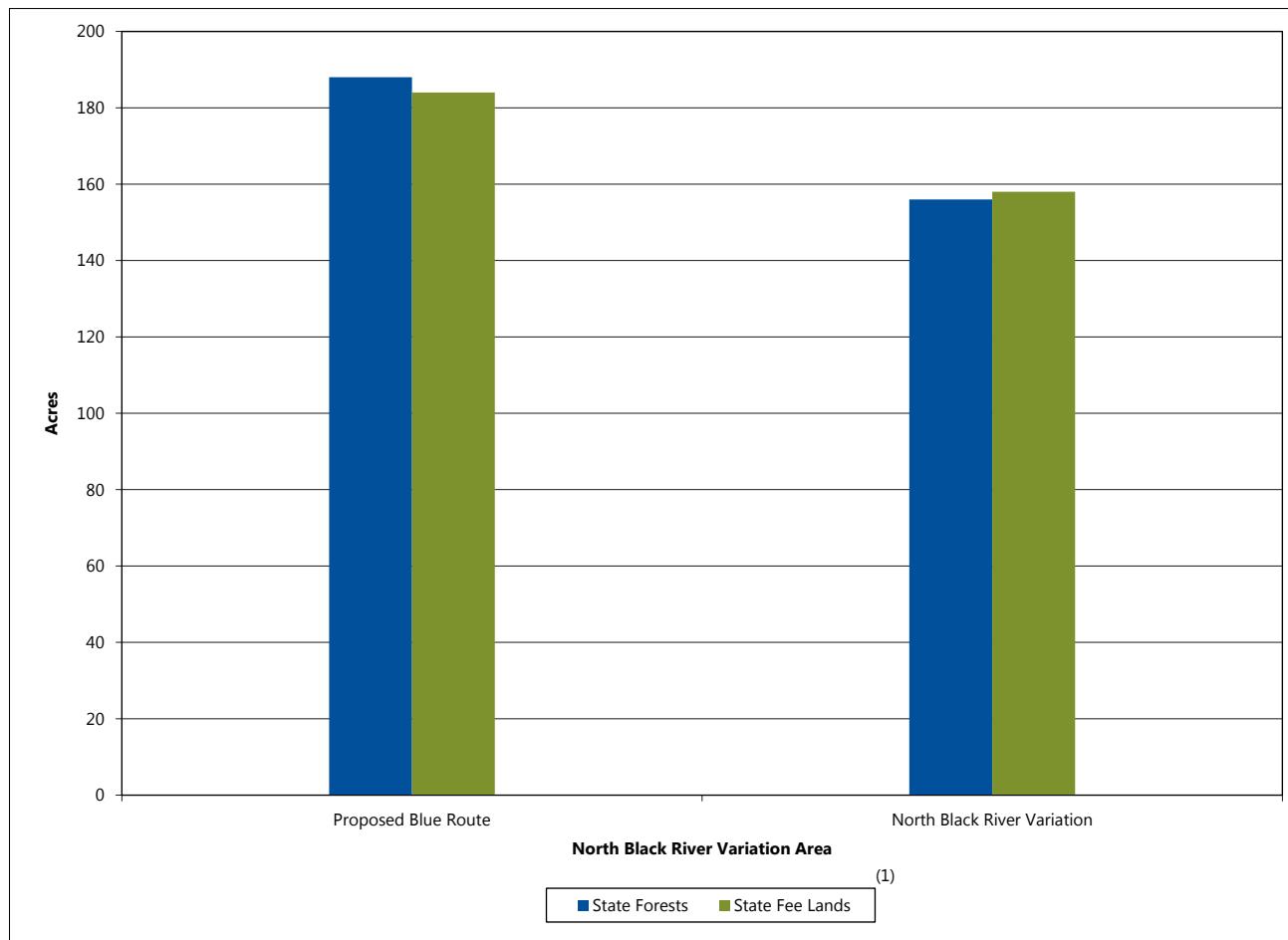
Table 6-102 shows that the Proposed Blue Route would include a slightly greater amount of state forest and state fee land compared to the North Black River Variation. No impacts to county lands, state conservation easements or USFWS Interest Lands would occur under the Proposed Blue Project or the North Black River Variation.

The North Black River Variation would parallel an existing corridor for its entire length, while the Proposed Blue Route would not parallel an existing corridor (see Section 6.3.4.6). Therefore, the North Black River Variation would be expected to have

less incompatibility with surrounding land uses compared to the Proposed Blue Route (Figure 6-68).

Impacts to land use from the Proposed Blue Route in the North Black River Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route and North Black River Variation would both 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. The length of the route that would parallel an existing corridor is also important. The North Black River Variation avoids a greater amount of state forest and state fee lands than the Proposed Blue Route thereby avoiding long-term changes to land use and the North Black River Variation would also parallel an

Figure 6-68 Public Land Ownership/Management within the ROI in the North Black River Variation Area



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.

existing corridor compared to the Proposed Blue Route which does not parallel an existing corridor.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.4.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the North Black River Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the North Black River Variation Area are summarized in Table 6-103.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-103 shows the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route and North Black River Variations in the ROI.

The North Black River Variation, which has the longer length, would pass through more acres of farmland, including prime farmland if drained (Figure 6-69). The Proposed Blue Route and North Black River Variation would each impact less than 30 acres of farmland of statewide importance. Because the North Black River Variation would parallel an existing transmission line for its entire length, it would be expected to have fewer impacts on farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Table 6-103 Land-Based Economy Resources within the Anticipated ROW in the North Black River Variation Area

| Resource | Type | Evaluation Parameter | North Black River Variation Area | |
|---|----------------------------------|--|----------------------------------|-----------------------------|
| | | | Proposed Blue Route | North Black River Variation |
| Transmission Line | -- | Length (mi) | 8.4 | 9.2 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 0 | 100 |
| Farmland | Not Farmland | Acres within ROW | 163 | 159 |
| | Prime Farmland if Drained | Acres within ROW | 12 | 50 |
| | Farmland of Statewide Importance | Acres within ROW | 29 | 14 |
| | All Areas are Prime Farmland | Acres within ROW | 0 | 0 |
| State Forest | -- | Acres within ROW | 188 | 156 |
| State Mineral Leases (active and/or terminated/expired) | -- | Acres within ROW | 405 | 362 |

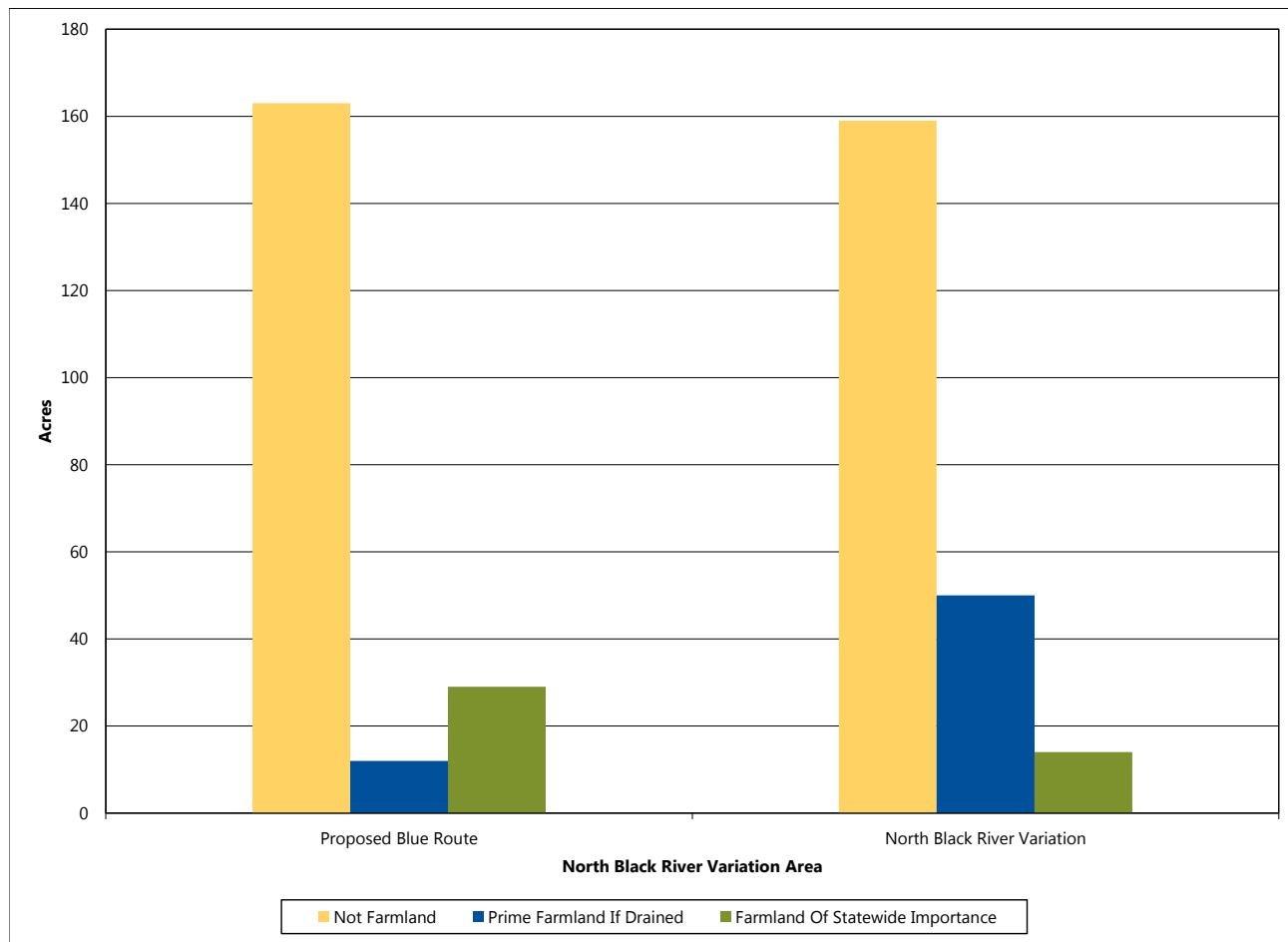
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-69 Acres of Farmland by Type within the Anticipated ROW in the North Black River Variation Area



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

Source(s): USDA NRCS 2014, reference (154)

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-103 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Blue Route and the North Black River Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue Route or the North Black River Variation in the North Black River Variation Area.

The Proposed Blue Route would pass through more acres of state forest lands - the Pine Island State Forest (Figure 6-70, Map 6-38). The North Black River Variation would have the least impact on the Pine Island State Forest as it would cross fewer acres of forest lands.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and

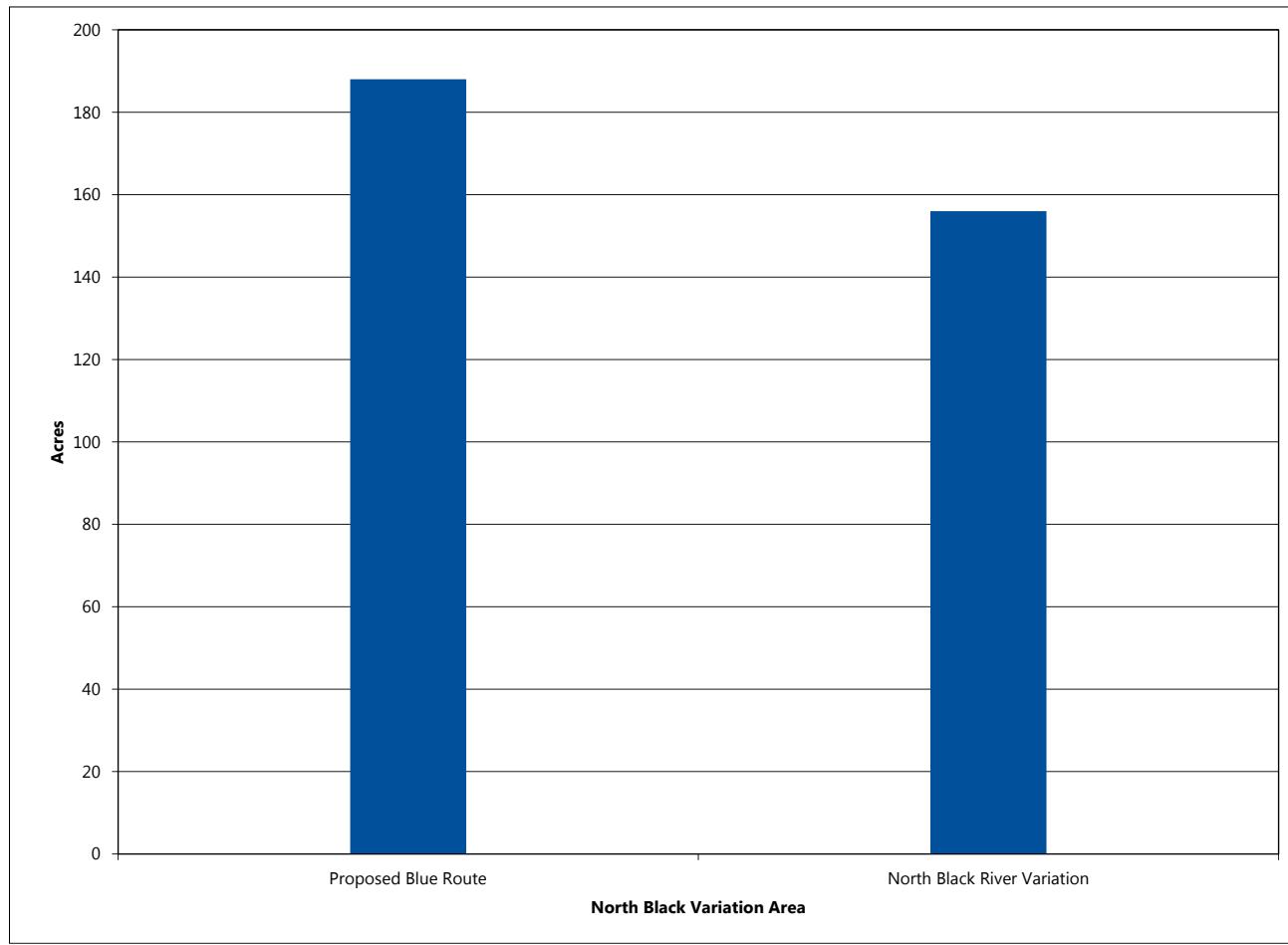
emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-103, Figure 6-71, and Map 6-36 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the

Figure 6-70 Acres of State Forest Land within the Anticipated ROW in the North Black River Variation Area



Source(s): MnDNR 2003, reference (148)

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

North Black River Variation Area. There are no **active mineral leases** or known aggregate resources in the ROI of either the Proposed Blue Route or the North Black River Variation.

Both the Proposed Blue Route and the North Black River Variation would traverse several acres of mining lands with terminated/expired state mineral leases (Table 6-103, Figure 6-71, and Map 6-36), with the Proposed Blue Route passing through more acres than the North Black River Variation. In addition, in comments provided by the MnDNR during scoping, MnDNR identified an area of recent and historic metallic occurrence, leasing, and exploration in northwestern Koochiching County (Map 6-36), as indicated by the high density of mineral exploration boreholes immediately south of where the Proposed Blue Route splits from the existing 230 kV transmission line. The MnDNR provided comments during the scoping process suggesting that the North Black River Variation would be less likely to impede future exploration for metallic mineral resources.

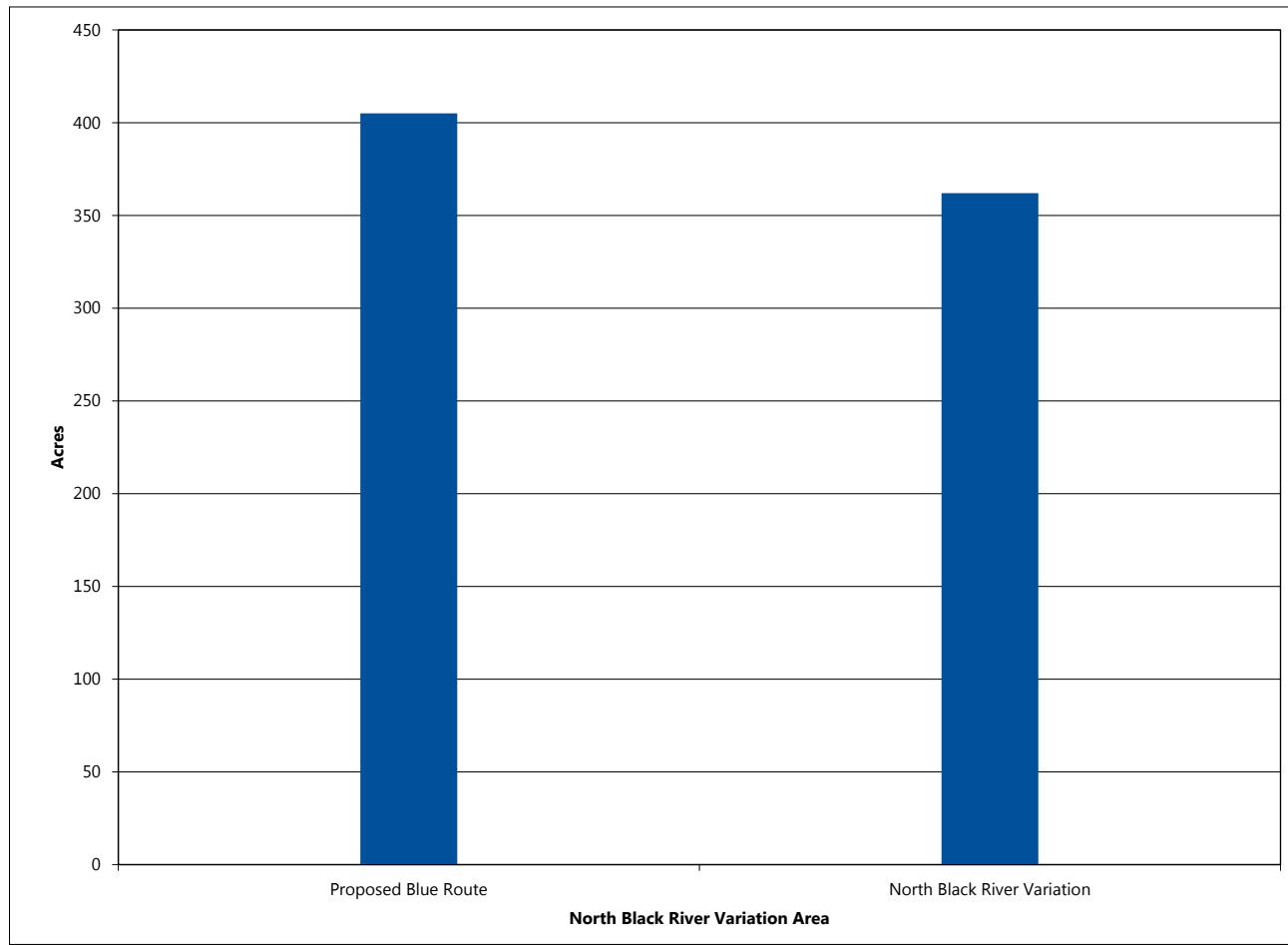
As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. However, since the North Black River Variation would parallel an existing transmission line, it could reduce the geophysical mineral resource detection risk for this area.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.4.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the

Figure 6-71 Acres of State Mineral Leases within the Anticipated ROW in the North Black River Variation Area



Source(s): MnDNR 2014, reference (179)

proposed transmission line; however, potential indirect effects to historic architectural resources are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural properties.

No previously recorded archaeological sites or historic architectural resources are present within the North Black River Variation Area (Map 6-37). Additionally, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route and North Black River Variation in the North Black River Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Potential direct or indirect, long-term, adverse impacts to archaeological and historic resources

are not expected to be significant. However, since the Proposed Route and Variation have not been surveyed for cultural resources, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resource investigations conducted in compliance with federal and/or state regulations for cultural resources. These cultural resource investigations would be implemented as part of the DOE's Draft PA (Appendix V) that would establish a process to identify cultural resources within the direct and indirect APEs for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse effects on historic architectural properties as a result of implementation of the proposed Project.

Potential short-term and long-term adverse impacts from construction, operation, maintenance, and emergency repair-related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13

summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.3.4.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the North Black River Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the North Black River Variation Area are summarized in Table 6-104 and shown on Map 6-38. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The need to place transmission structures in wetlands, type of water crossings, and quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Blue Route and North Black River Variation. Neither the Proposed Blue Route nor the North Black River Variation ROWs contain PWIs, trout streams, impaired waters, or floodplains.

The Proposed Blue Route and the North Black River Variation would each require four non-PWI water crossings. The Proposed Blue Route would cross an unnamed waterbody, a watercourse, and ditches, while the North Black River Variation would just cross ditches and watercourses (Figure 6-72).

It is anticipated that the non-PWI water crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Based on the NWI, the Proposed Blue Route and the North Black River Variation would both require

conversion of forested shrub and wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-73, the Proposed Blue Route contains more combined forested and shrub wetlands compared to the North Black River Variation and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed Blue Route and the North Black River Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed Blue Route and the North Black River Variation would both require temporary construction access through wetlands, which is also likely to be minimal due to the short-term nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Table 6-104 Water Resources within the Anticipated ROW in the North Black River Variation Area

| Resource | Evaluation Parameter | North Black River Variation Area | |
|-------------------------------|----------------------|----------------------------------|-----------------------------|
| | | Proposed Blue Route | North Black River Variation |
| Transmission Line | Length (mi) | 8.4 | 9.2 |
| Non-PWI Waters ⁽¹⁾ | Number of Crossings | 4 | 4 |
| NWI Wetlands | Acres within ROW | 193 | 198 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

Vegetation

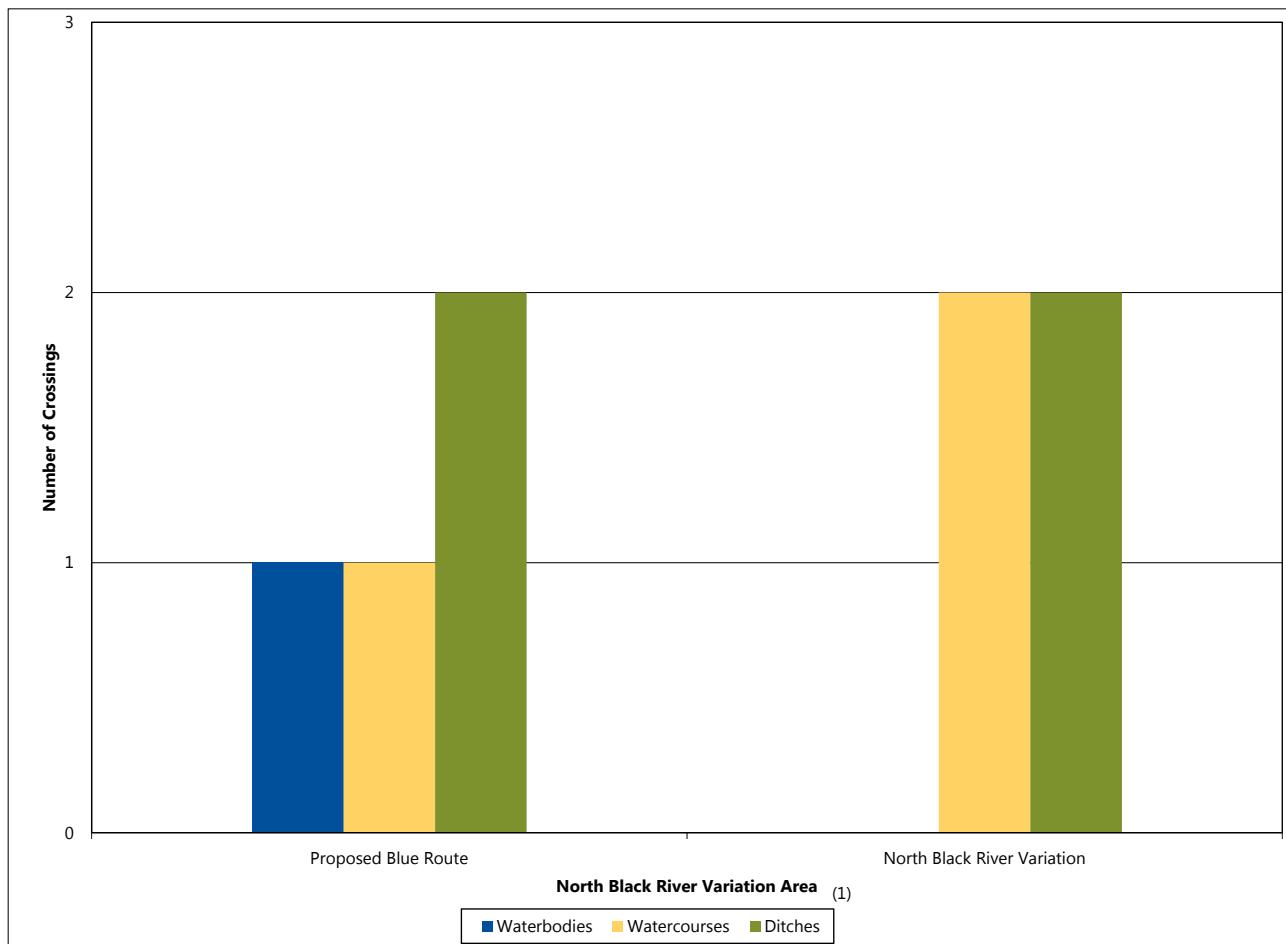
In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the North Black River Variation Area are summarized in Table 6-105 and shown on Maps 5-12 and 6-38. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ between the Proposed Blue Route and North Black River Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated Table 6-105, the Proposed Blue Route and North Black River Variation would pass through similar amounts of forested land, including state forest. However, the North Black River Variation would parallel existing transmission line corridor for its entire length, while the Proposed Blue Route would require creation of new corridor for its entire length (Table 6-105). Because of this, the Proposed Blue Route would result in more fragmentation of intact forest in areas where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Figure 6-72 Non-PWI Water Crossings by Type in the North Black River Variation Area

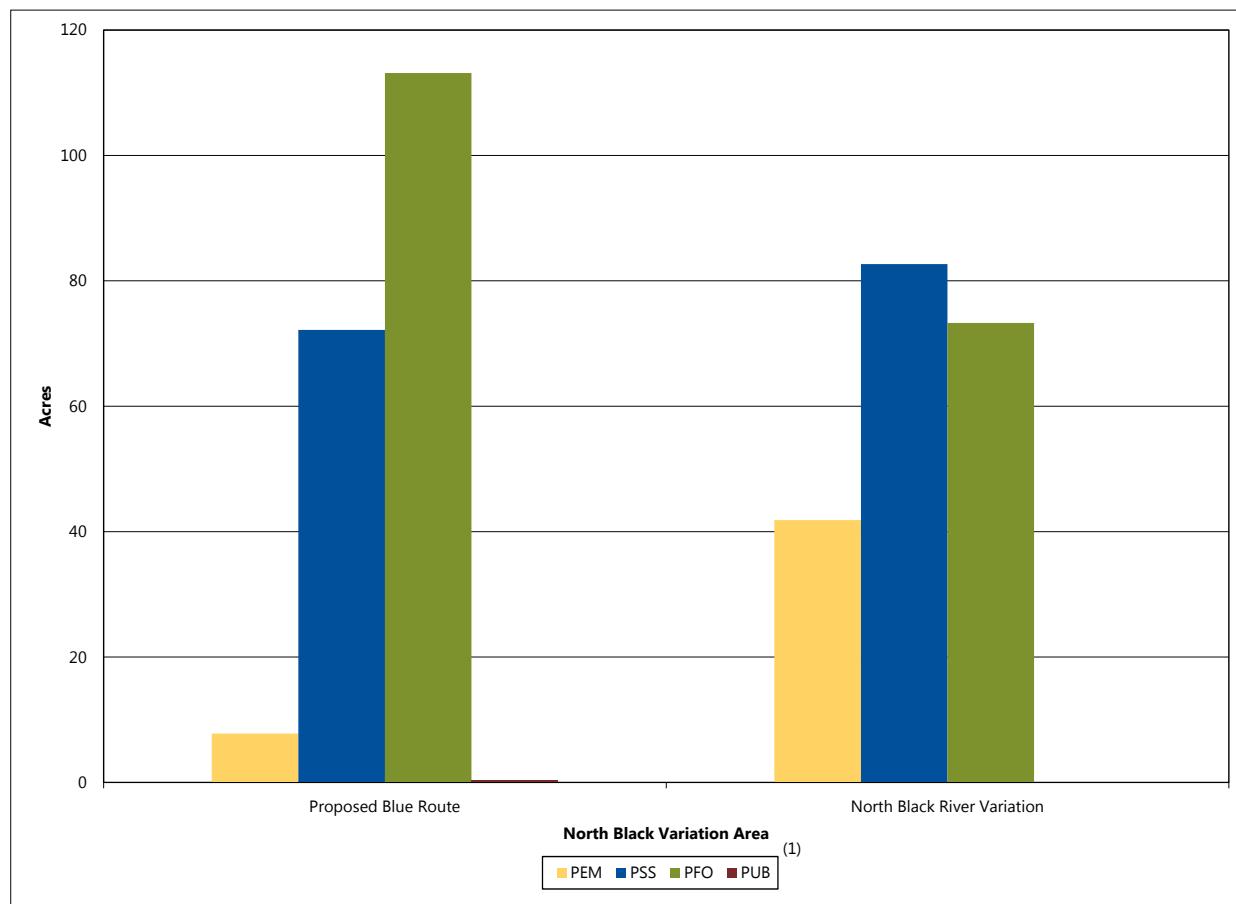


Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

Figure 6-73 Acres of Wetland by Type within the Anticipated ROW in the North Black River Variation Area



Source(s): USFWS 1997, reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

Table 6-105 Vegetation Resources within the Anticipated ROW in the North Black River Variation Area

| Resource | Evaluation Parameter | North Black River Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Blue Route | North Black River Variation |
| Transmission Line | Length (mi) | 8.4 | 9.2 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 100 |
| State Forest | Acres within ROW | 188 | 156 |
| Total Forested GAP Land Cover | Acres within ROW | 204 | 197 |
| GAP Land Cover - Dominant Types ⁽³⁾ | | | |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 144 | 114 |
| North American Boreal Forest | Acres within ROW | 47 | 49 |
| Eastern North American Flooded and Swamp Forest | Acres within ROW | 12 | 29 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Table 6-106 Wildlife Resources within the Vicinity of the North Black River Variation Area

| Resource | Evaluation Parameter | North Black River Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Blue Route | North Black River Variation |
| Transmission Line | Length (mi) | 8.4 | 9.2 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 100 |
| Important Bird Areas | Acres within ROW | 191 | 214 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Audubon Society 2014, reference (181)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the North Black River Variation Area are summarized in Table 6-106 and shown on Map 6-38. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Blue Route and North Black River Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue Route and North Black River Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.4.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue Route and North Black River Variation.

Both the Proposed Blue Route and the North Black River Variation would pass through the Big Bog Important Bird Area (Table 6-106; Map 6-38). While the North Black River Variation traverses through a slightly greater portion of the Big Bog Important Bird Area, it would parallel an existing transmission line corridor for its entire length (Table 6-106; Map 6-38). In contrast, the Proposed Blue Route would require the creation of new transmission line corridor for its entire length (Table 6-106; Map 6-38). Creation of a new corridor in the Big Bog Important Bird Area would likely result in both short-term and long-term direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds'

habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The 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).

The North Black River Variation is adjacent to a Grassland Bird Conservation Area core area (Map 6-38); however, there are two existing transmission lines and a road between the North Black River Variation and the Grassland Bird Conservation Area core area. Although the North Black River Variation could result in impacts to birds associated with the Grassland Bird Conservation Area such as loss of habitat, it is likely that additional impacts would be limited given the infrastructure already present in this location.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.3.4.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features,

such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation. No state- or federally listed species have been documented within one mile of the Proposed Blue Route or North Black River Variation. However, the full extent of impacts from either the Proposed Blue Route or North Black River Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along 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. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the North Black River Variation Area are summarized in Table 6-107 and shown on Map 6-39; additional, more detailed data on rare communities and resources is provided in Appendix E.

Loss or conversion of native vegetation is the primary impact on rare communities and resources that would differ between the Proposed Blue Route and North Black River Variation. As discussed in Section 5.3.5, permanent removal of vegetation would occur at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated in Table 6-107 and shown on Map 6-39, the Proposed Blue Route would pass through more acres of MBS Sites of Biodiversity Significance relative to the North Black River Variation. In addition, although the North Black River Variation is longer, it would parallel existing transmission line corridor for its entire length, while the Proposed Blue Route would require creation of new corridor for its entire length (Table 6-107; Map 6-39). Because of this, the Proposed Blue Route would result in more fragmentation of intact forest in areas where forest vegetation is present.

Table 6-107 Rare Communities and Resources within the Vicinity of the North Black River Variation Area

| Resource | Evaluation Parameter | North Black River Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Blue Route | North Black River Variation |
| Transmission Line | Length (mi) | 8.4 | 9.2 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 100 |
| MBS Sites of Biodiversity Significance ⁽³⁾ | Acres within ROW | 165 | 109 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

6.0 Comparative Environmental Consequences

The rare communities and resources listed in Table 6-107 and detailed above show that the proposed Project may result in direct, long-term, regional localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.4.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-40 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the North Black River Variation Area.

Table 6-108 identifies the percentage of total transmission line length that the Proposed Blue Route and North Black River Variation parallel an existing corridor or linear feature in the North Black River Variation Area.

The North Black River Variation would parallel existing transmission line corridors for the entire length (Table 6-108). The Proposed Blue Route would not follow any existing corridors.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.3.4.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-109 summarizes the costs associated with constructing the Proposed Blue Route and North Black River Variation in the North Black River Variation Area. As indicated in Table 6-109, the Proposed Blue Route would cost more to construct than the North Black River Variation.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$13,000 to \$15,000 annually for these alternatives in the North Black River Variation Area.

6.3.5 C2 Segment Option Variation Area

The C2 Segment Option Variation Area encompasses two route alternatives: the Proposed Blue Route and the C2 Segment Option Variation. This section provides a comparison of the potential

Table 6-108 Corridor Sharing in the North Black River Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | North Black River Variation Area | |
|--|--|----------------------------------|-----------------------------|
| | | Proposed Blue Route | North Black River Variation |
| Transmission Line (other linear features may be present within the transmission corridor; i.e., road, trail, field line, PLSS) | Percent of Total Length ⁽²⁾ | 0 | 100 |
| None | Percent of Total Length ⁽²⁾ | 100 | 0 |

Source(s): USDA et al. 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al. 2014, reference (174); MnDNR et al. 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al. 2009, reference (177)

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

(1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the C2 Segment Option Variation Area, depending on the route or variation considered. **The C2 Variation has the greatest potential to minimize impacts to the Nature Conservancy's Black River portfolio site compared to the Proposed Blue Route.**

6.3.5.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the C2 Segment Option Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive

viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the C2 Variation Area are summarized in Table 6-110 and shown on Maps 6-41, 6-42, 6-43, and 6-45.

As indicated in Table 6-110 for the C2 Segment Option Variation Area, the Proposed Blue Route and C2 Segment Option Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including snowmobile trails, a water trail, a state trail, and several state forests. The Proposed Blue Route would cross two snowmobile trails, one water trail, one state trail, and two state forests (Maps 6-43 and 6-45). The C2 Segment Option Variation would cross one snowmobile trail, one water trail, one state trail, and three state forests (Maps 6-43 and 6-45). In total, the two alternatives would affect the same number

Table 6-109 Construction Costs in the North Black River Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|-------------------|-----------------------------|--------------|-------------------------|-------------|
| North Black River | Proposed Blue Route | \$9,893,560 | \$1,179,209 | 8.4 |
| | North Black River Variation | \$10,552,560 | \$1,147,017 | 9.2 |

Source(s): Minnesota Power 2015, reference (9)

Table 6-110 Aesthetic Resources within the ROI in the C2 Segment Option Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | C2 Segment Option Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Blue Route | C2 Segment Option Variation |
| Transmission Line | Length (mi) | 32.8 | 46.0 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 0 | 81 |
| Residences | Count within 0–500 ft | 0 | 4 |
| | Count within 0–1,000 ft | 0 | 14 |
| | Count within 0–1,500 ft | 0 | 29 |
| State Trails | Count within 0–1,500 ft | 1 | 1 |
| State Forests | Count within 0–1,500 ft | 2 | 3 |
| Snowmobile Trails | Count within 0–1,500 ft | 2 | 1 |
| State Water Trails | Count within 0–1,500 ft | 1 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146), MnDNR 2003, reference (182); MnDNR 2003, reference (148), MnDNR 2010 reference (150); MnDNR 2010, reference (183)

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

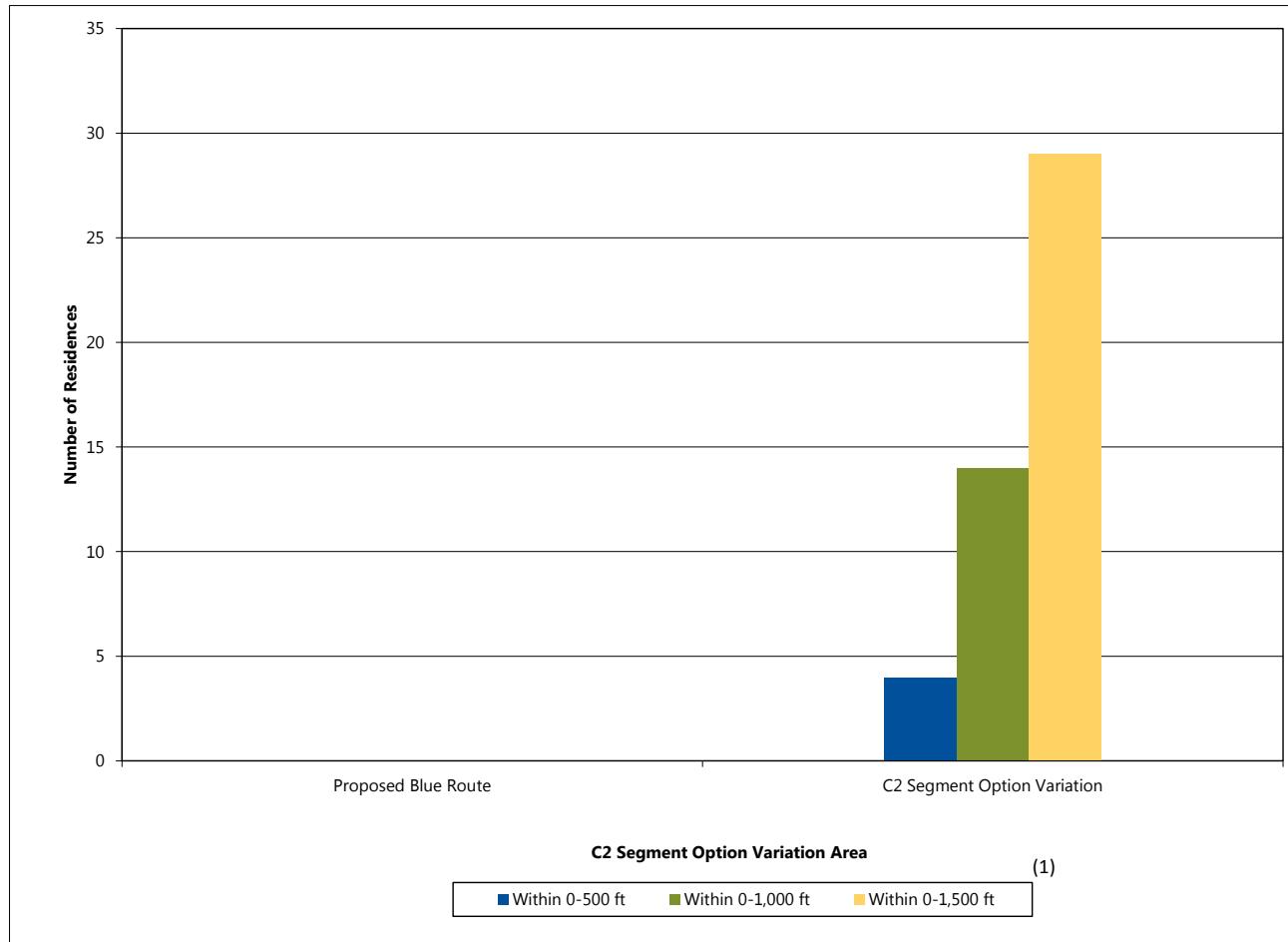
- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

of aesthetic resources. Neither alternative would be located within one mile of any historic architectural sites, which would also have high visual sensitivity. The C2 Segment Option Variation would affect substantially more residences within 1,500 feet of the anticipated alignment (29) than the Proposed Blue Route (0; Table 6-110; Figure 6-74), including 14 of the residences that would be within 1,000 feet of the anticipated alignment and four **residences** that would be within 500 feet.

The C2 Segment Option Variation is longer (46.0 miles) than the Proposed Blue Route (32.8 miles; Table 6-110). However, the C2 Segment Option Variation parallels an existing 230 kV transmission line for most of its length (81 percent), whereas the Proposed Blue Route does not parallel an existing transmission line. By paralleling the existing 230 kV transmission line, the C2 Segment Option Variation would produce substantially less contrast than the Proposed Blue Route.

Although the C2 Segment Option Variation would be longer and produce substantially less contrast than the Proposed Blue Route, it would affect substantially more residences within 1,500 feet of the anticipated alignment (29). However, by paralleling the existing 230 kV transmission line already visible from many of the residences, it is likely that the addition of a second high voltage transmission line adjacent to the existing line would result in only an incremental increase in contrast for viewers of the new transmission line in conjunction with the existing transmission line. The incremental increase in contrast would be slightly greater where the new transmission line is located between the existing transmission line and residences and slightly less where the new transmission line is located on the opposite side of the existing transmission line from residences. For these reasons, it is likely that despite being longer and affecting substantially more residences, the C2 Segment Option Variation would result in less new aesthetic impact than the

Figure 6-74 Residences within the ROI in the C2 Segment Option Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

Proposed Blue Route in the C2 Segment Option Variation Area.

Although the Proposed Blue Route is long and does not parallel an existing large transmission line, it affects no residences and few other sensitive visual resources (one state trail, two state forest, two snowmobile trails, and one state water trail).

Although the C2 Segment Option Variation is also long and parallels an existing large transmission line of similar size and design for a large portion of its length (81 percent), it is located within 1,500 feet of 29 residences and several other sensitive visual resources (one state trail, two state forest, two snowmobile trails, and one state water trail). For these reasons, aesthetic impacts of the C2 Segment Option Variation are potentially significant.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

Land Uses

Table 6-111 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue Route and C2 Segment Option Variation. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in

the C2 Segment Option Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Blue Route and C2 Segment Option Variation are shown on Map 6-41.

The Proposed Blue Route and C2 Segment Option Variation ROI are both primarily composed of forested and/or swamp land (Table 6-111). The C2 Segment Option Variation ROI contains a greater amount of forested/swamp land, developed or disturbed, and agricultural land compared to the Proposed Blue Route.

Land Ownership and Management

Table 6-112 shows that the Proposed Blue Route ROW would contain more state forest land and state fee land than the C2 Segment Option Variation. No impacts to state conservation easements or USFWS Interest Lands would occur under the Proposed Blue Route or C2 Segment Option Variation. The C2 Segment Option Variation would impact 14 acres of county land, while the Proposed Blue Route would not impact this land ownership category.

The C2 Segment Option Variation would parallel an existing corridor for 89 percent of its length, while the Proposed Blue Route would not parallel an existing corridor, but would parallel a field line for a small percentage of its length (see Section 6.3.5.6). Therefore, the C2 Segment Option Variation would be expected to have less incompatibility with surrounding land uses compared to the Proposed Blue Route (Figure 6-75).

Impacts to land use from the proposed Project in the C2 Segment Option Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route and C2 Segment Option Variation would both result in a long-term change in

Table 6-111 Land Uses within the ROI in the C2 Segment Option Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | C2 Segment Option Variation Area | |
|---|------------------------|-------------------------------------|----------------------------------|-----------------------------|
| | | | Proposed Blue Route | C2 Segment Option Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 12,103 | 16,872 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 94 | 504 |
| | Agricultural | Acres within 0–1,500 ft | 0 | 167 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 11,922 | 16,121 |
| | Other | Acres within 0–1,500 ft | 87 | 80 |

Source(s): USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.

(2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

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Table 6-112 Land Ownership and Management within the Anticipated ROW in the C2 Segment Option Variation Area

| Resource | Type | Evaluation Parameter | C2 Segment Option Variation Area | |
|--|---|----------------------|----------------------------------|-----------------------------|
| | | | Proposed Blue Route | C2 Segment Option Variation |
| Total Lands | -- | Acres within ROW | 797 | 1,116 |
| State Forests | -- | Acres within ROW | 797 | 274 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 731 | 640 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 68 | 43 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 99 | 230 |
| | Trust Fund | Acres within ROW | 565 | 367 |
| | Federal - State Lease | Acres within ROW | 0 | 0 |
| County Lands | -- | Acres within ROW | 0 | 14 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 66 | 462 |

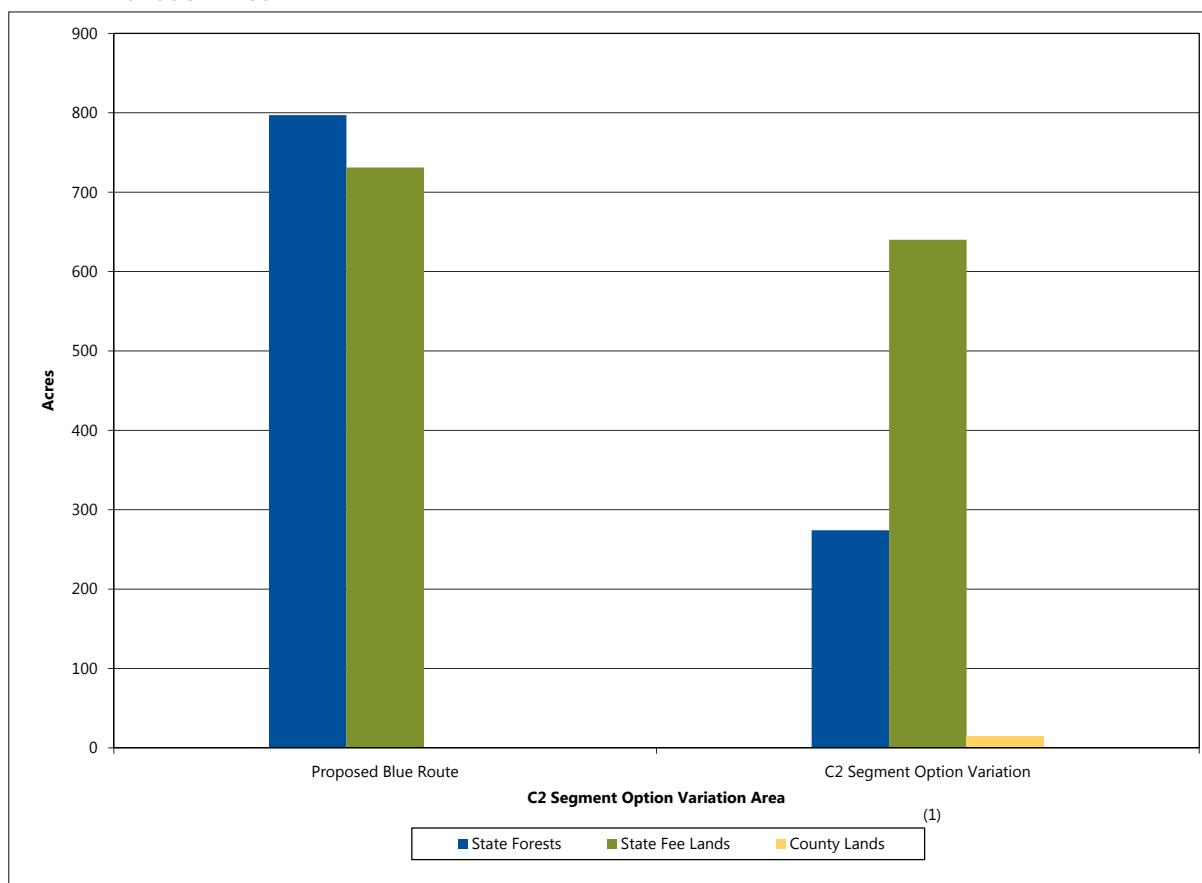
Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); Itasca County 2014, reference (153)

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.

(2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-75 Public Land Ownership/Management within the ROI in the Segment C2 Segment Option Variation Area



Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152), Itasca County 2014, reference (153)

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.

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. The length of the Proposed Blue Route or C2 Segment Option Variation that would parallel an existing corridor is also important. The C2 Segment Option Variation avoids a greater amount of state forest and state fee lands than the Proposed Blue Route thereby avoiding long-term changes to land use and also parallel more of an existing corridor compared to the Proposed Blue Route.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.5.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the C2 Segment Option Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the C2 Segment Option Variation Area are summarized in Table 6-113.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-113 and Figure 6-76 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route and C2 Segment Option Variation in the ROI.

The C2 Segment Option Variation would pass through more acres of farmland, including prime farmland, prime farmland if drained, and farmland of statewide importance (Figure 6-76). The Proposed Blue Route has a shorter length and would be expected to have the fewest impacts on farmland; however, the C2 Segment Option Variation would parallel an existing corridor for much of its length.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and compaction caused by equipment.

Table 6-113 Land-Based Economy Resources within the Anticipated ROW in the C2 Segment Option Variation Area

| Resource | Type | Evaluation Parameter | C2 Segment Option Variation Area | |
|---|----------------------------------|--|---|------------------------------------|
| | | | Proposed Blue Route | C2 Segment Option Variation |
| Transmission Line | -- | Length (mi) | 32.8 | 46.0 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 0 | 81 |
| Farmland | Not Farmland | Acres within ROW | 625 | 790 |
| | Prime Farmland if Drained | Acres within ROW | 92 | 124 |
| | Farmland of Statewide Importance | Acres within ROW | 78 | 177 |
| | All Areas are Prime Farmland | Acres within ROW | 2 | 25 |
| State Forest | -- | Acres within ROW | 797 | 274 |
| State Mineral Leases (active and/or terminated/expired) | -- | Acres within ROW | 16 | 67 |

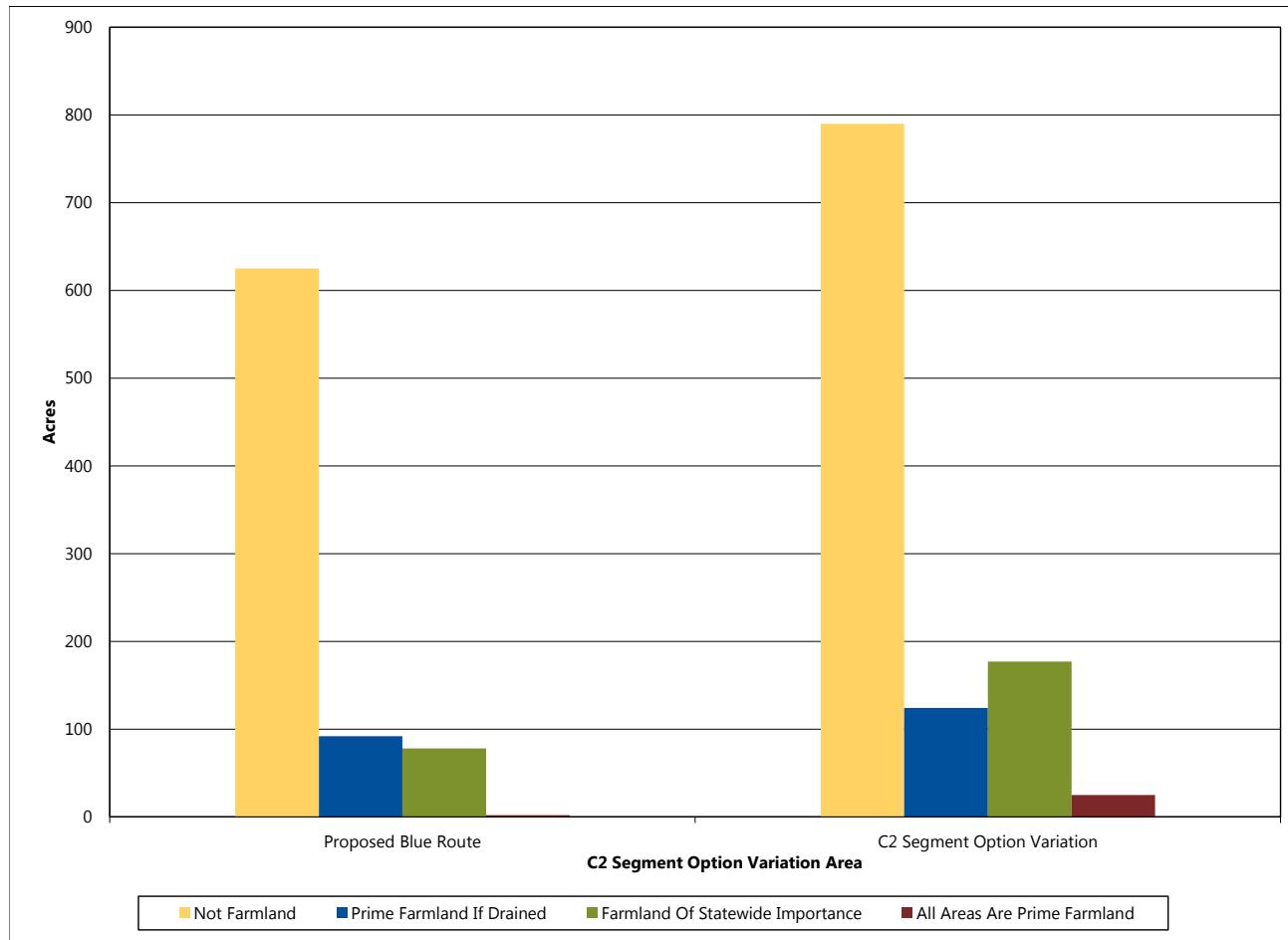
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-76 Acres of Farmland by Type within the Anticipated ROW in the C2 Segment Option Variation Area



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

Source(s): USDA NRCS 2014, reference (154)

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

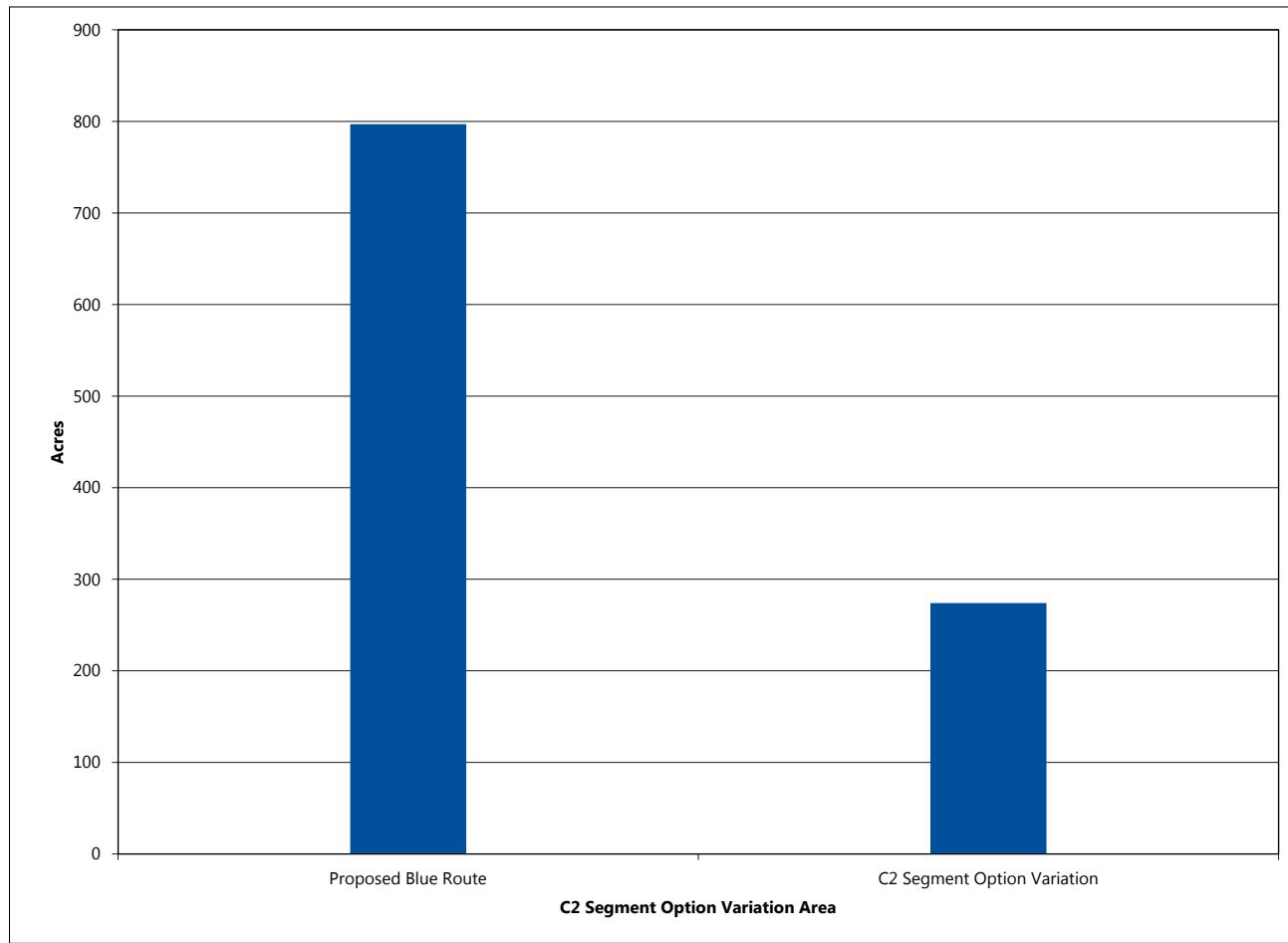
As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-113 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Blue Route and the C2 Segment Option Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue Route or the C2 Segment Option Variation in the C2 Segment Option Variation Area.

As indicated in Table 6-113 and Figure 6-77, the Proposed Blue Route would pass through more acres of state forest lands. The State Forests

located in this variation area include the Smokey Bear, Koochiching, and Pine Island State Forests (Map 6-43). The C2 Segment Option Variation would be expected to have less of an impact on timber activities in State Forests because a large portion of the C2 Segment Option Variation is outside of the Pine Island and Koochiching State Forest boundaries.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Figure 6-77 Acres of State Forest Land within the Anticipated ROW in the C2 Segment Option Variation Area



Source(s): MnDNR 2003, reference (148)

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

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

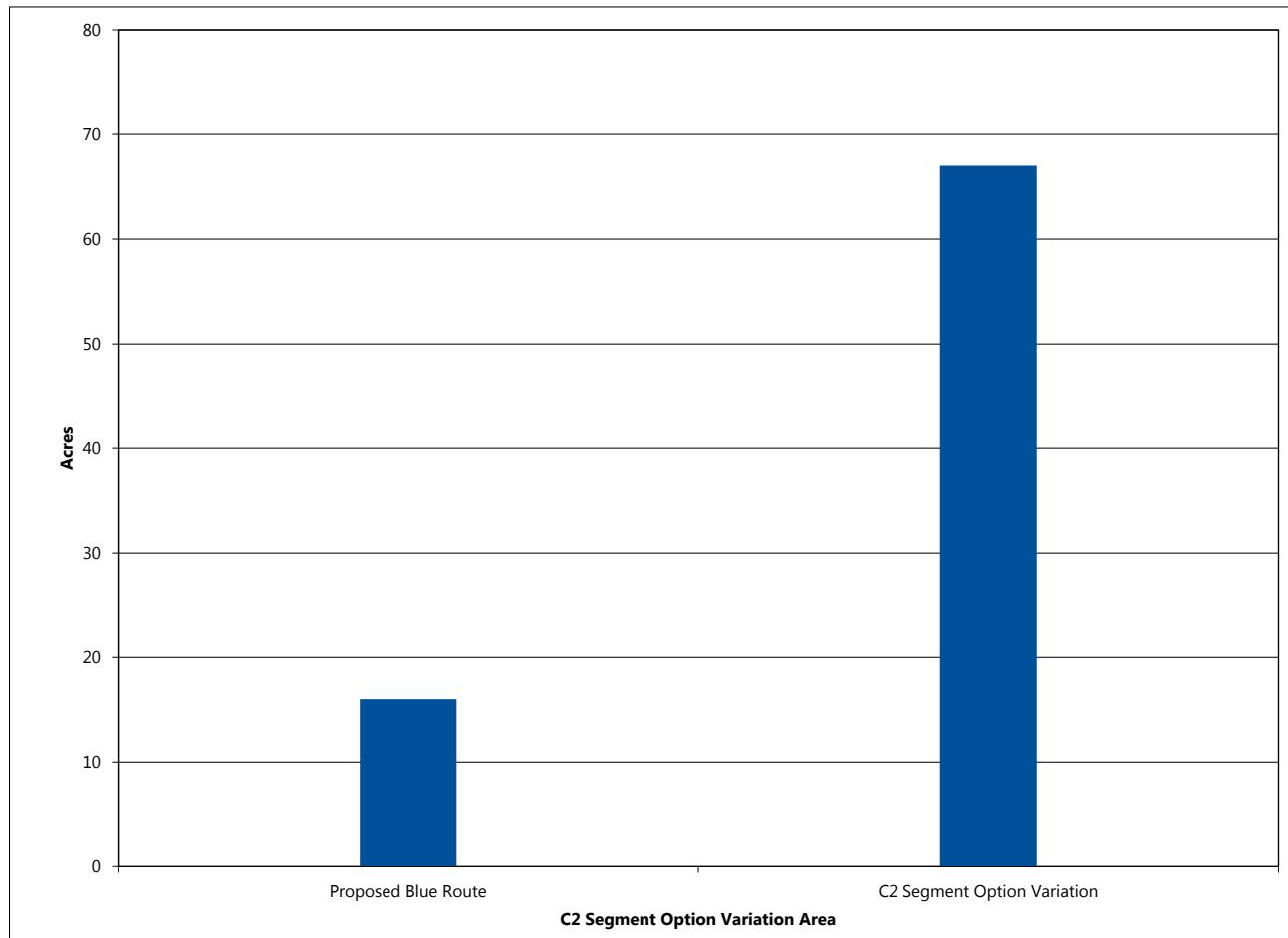
As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-113, Figure 6-78, and Map 6-41 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the C2 Segment Option Variation Area. There are **no active mineral leases**, known aggregate resources, or current mining lands in the ROI of either the Proposed Blue Route or the C2 Segment Option Variation.

Both the Proposed Blue Route and the C2 Segment Option Variation would traverse mining lands with terminated/expired state mineral leases, with the C2 Segment Option Variation passing through more acres than the Proposed Blue Route (Table 6-113, Figure 6-78, and Map 6-41). Because the C2 Segment Option Variation would pass through more mining lands with state mineral leases, it is more likely to potentially interfere with future mining activities in this area. However, the C2 Segment Option Variation would parallel an existing transmission line corridor for much of its length, so sources of potential interference with future mining activities are already present along this route.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-

Figure 6-78 Acres of State Mineral Leases within the Anticipated ROW in the C2 Segment Option Variation Area



Source(s): MnDNR 2014, reference (179)

term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.5.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the proposed transmission line, however, potential indirect effects to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites. Table 6-114 provides a summary of the previously recorded archaeological and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Blue Route and C2 Segment Option Variation in the C2 Segment Option Variation Area.

There are no archaeological **sites** or historic architectural sites located within either the ROW of the Proposed Blue Route or C2 Segment Option Variation. Additionally, no Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route and C2 Segment Variation in the C2 Segment Option Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

There is currently no potential for direct, long-term, adverse effects on the archaeological or historic architectural sites within the C2 Segment Option Variation Area as none are identified within the ROW (direct APE), although cultural resource investigations have not yet occurred for the Proposed Route or Variation. Since there are

Table 6-114 Archaeological and Historic Resources within the C2 Segment Option Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | C2 Segment Option Variation Area | |
|------------------------------|-------------------------------------|----------------------------------|-----------------------------|
| | | Proposed Blue Route | C2 Segment Option Variation |
| Historic Architectural Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 0 |
| Archaeological Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

no historic architectural sites identified within the indirect APE from either the Proposed Blue Route or the C2 Segment Option Variation, indirect, long-term, adverse visual effects to architectural resources are not likely to occur. **As the Proposed Blue Route and C2 Segment Option Variation have not been surveyed for cultural resources, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources conducted in compliance with federal and/or state regulations for cultural resources.** These cultural resources investigations will be implemented as part of the PA proposed by DOE (**Appendix V**) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential adverse effects to cultural resources during construction and operation of the proposed Project.

Potential short-term and long-term adverse effects from construction, operation, maintenance, and emergency repair-related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse effects to these resources, including TCPs, from the proposed Project.

6.3.5.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the C2 Segment Option Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the C2 Segment Option Variation Area are summarized in Table 6-115 and shown on Map 6-43. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of waterbody/watercourse crossings, the need to place transmission structures in floodplains and wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Blue Route and the C2 Segment Option Variation.

The Proposed Blue Route and the C2 Segment Option Variation would both cross the Black River and the Big Fork River, which are PWI watercourses. The Proposed Blue Route would also cross three PWI tributaries to the Black River, and the C2 Segment Option Variation would cross one PWI tributary to the Little Fork River. As shown in Table 6-115, the Proposed Blue Route would result in the most total PWI watercourse crossings. Neither the Proposed Blue Route nor the C2 Segment Option Variation would cross PWI waterbodies or wetlands.

The Proposed Blue Route and C2 Segment Option Variation would both require crossing non-PWI waters. The Proposed Blue Route would require more crossings than the C2 Segment Option Variation, and the majority of these crossings would be ditches (Figure 6-79).

The Proposed Blue Route and the C2 Segment Option Variation would each require one crossing of the Big Fork River, which is a MPCA-listed impaired water. The

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C2 Segment Option Variation would also cross a reach of MPCA-listed impaired Black River once.

It is anticipated that PWI crossings, non-PWI water crossings, impaired waters, and trout streams are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

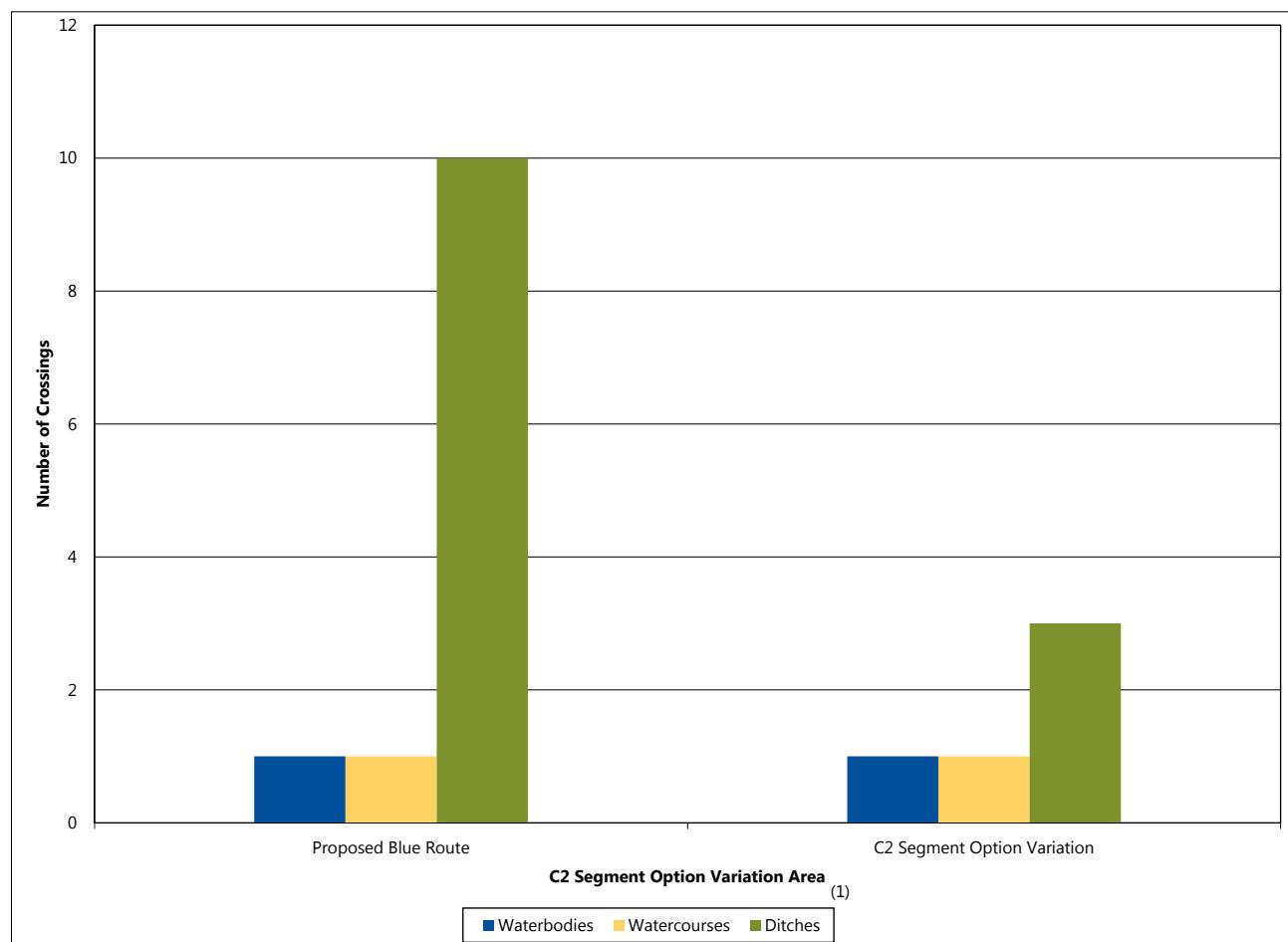
Both the Proposed Blue Route and the C2 Segment Option Variation would require construction and placement of transmission structures in Zone A floodplains of the Black River and the Big Fork River, respectively. Placement of transmission structures in these floodplains could not be avoided by spanning as floodplain crossing distances exceed the average spanning length of 1,250 feet.

Based on the NWI, the Proposed Blue Route and the C2 Segment Option Variation would both require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal

of woody vegetation in the ROW. As shown in Figure 6-80, the C2 Segment Option Variation contains more combined forested and shrub wetlands compared to the Proposed Blue Route and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts as summarized in Section 5.3.4.1. Both the Proposed Blue Route and the C2 Segment Option Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central

Figure 6-79 Non-PWI Water Crossings by Type in the C2 Segment Option Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

Table 6-115 Water Resources within the Anticipated ROW in the C2 Segment Option Variation Area

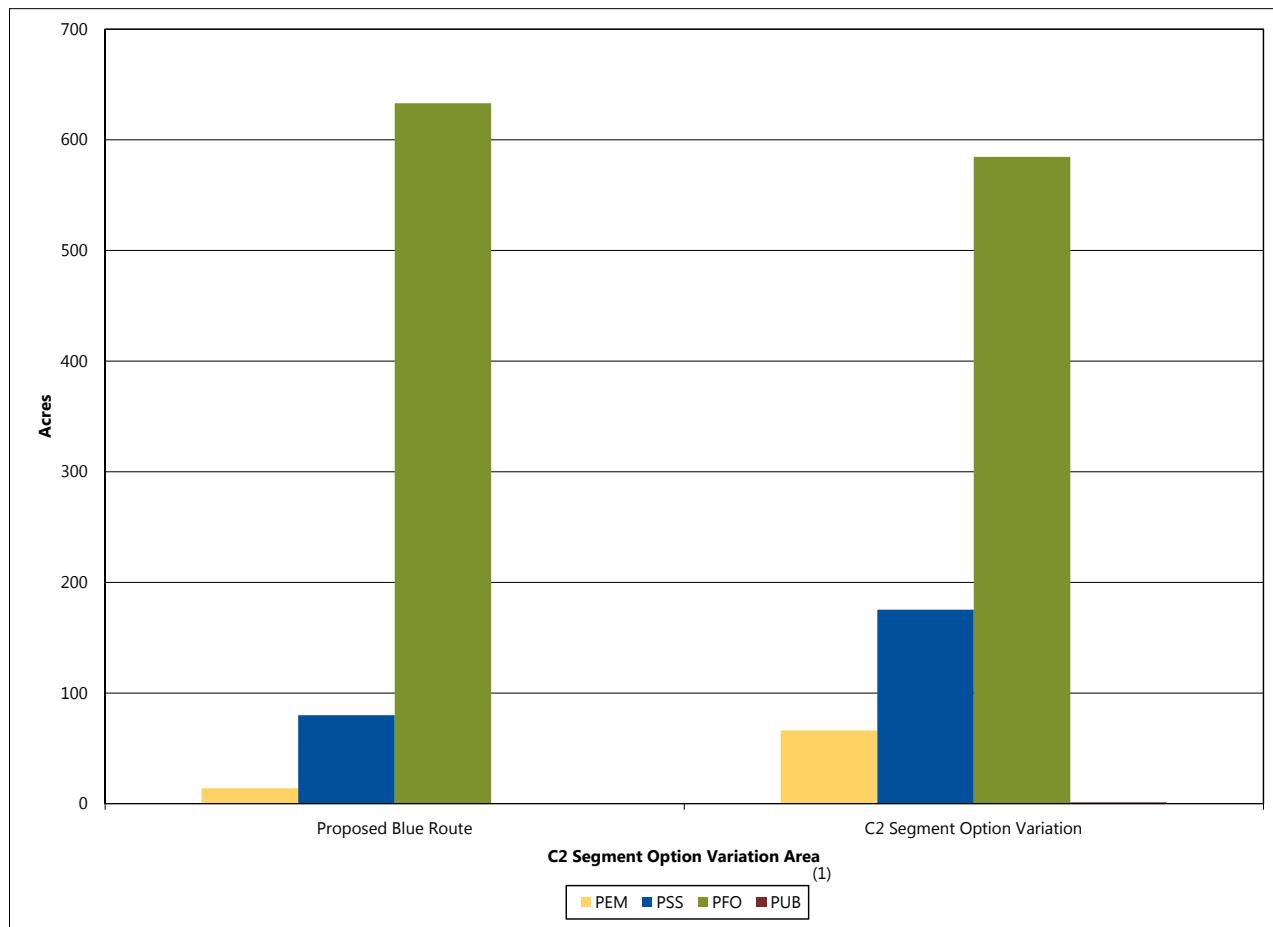
| Resource | Evaluation Parameter | C2 Segment Option Variation Area | |
|-------------------------------|----------------------|----------------------------------|-----------------------------|
| | | Proposed Blue Route | C2 Segment Option Variation |
| Transmission Line | Length (mi) | 32.8 | 46.0 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 5 | 3 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 12 | 5 |
| Impaired Waters | Number of Crossings | 1 | 2 |
| Floodplains ⁽³⁾ | Acres within ROW | 8 | 28 |
| NWI Wetlands | Acres within ROW | 728 | 829 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); MPCA 2014, reference (119); MPCA 2014, reference (118); Minnesota Power 2014, reference (163)

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

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.
- (3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

Figure 6-80 Acres of Wetland by Type within the Anticipated ROW in the C2 Segment Option Variation Area



Source(s): USFWS 1997, reference (157)

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

- (1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill, are expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed Blue Route and the C2 Segment Option Variation would both require temporary construction access through wetlands, which is also expected to be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the C2 Segment Option Variation Area are summarized in Table 6-116 and shown on Maps 5-12 and 6-43. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ between the Proposed Blue Route and C2 Segment Option Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-116 and Figure 6-81, the C2 Segment Option Variation would pass through more forested land due to its longer length; however, the Proposed Blue Route would pass through more state forest land. Despite the longer length of the C2 Segment Option Variation, it would parallel existing transmission line corridor for much of its length while the Proposed Blue Route would require creation of new corridor for its entire length (Table 6-116; Map 6-43). Because of this, the Proposed Blue Route would result in more fragmentation of intact forest in areas where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Table 6-116 Vegetation Resources within the Anticipated ROW in the C2 Segment Option Variation Area

| Resource | Evaluation Parameter | C2 Segment Option Variation Area | |
|--|--|----------------------------------|-----------------------------|
| | | Proposed Blue Route | C2 Segment Option Variation |
| Transmission Line | Length (mi) | 32.8 | 46.0 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 81 |
| State Forest | Acres within ROW | 797 | 274 |
| Total Forested GAP Land Cover | Acres within ROW | 789 | 1,080 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 484 | 728 |
| North American Boreal Forest | Acres within ROW | 248 | 162 |
| Eastern North American Flooded and Swamp Forest | Acres within ROW | 56 | 185 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

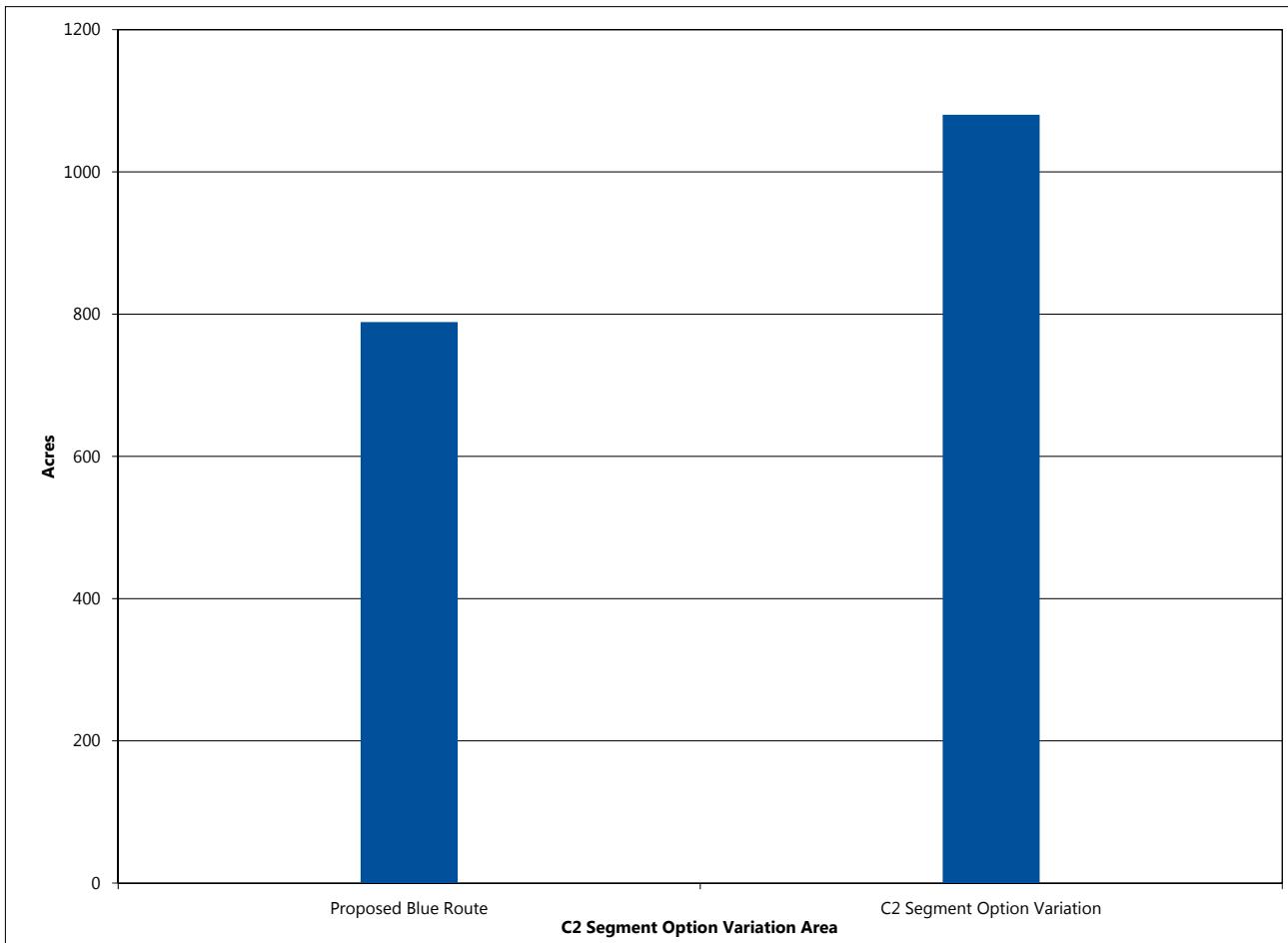
Note(s): Totals may not sum due to rounding

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

(3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Figure 6-81 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the C2 Segment Option Variation Area



Source(s): USGS 2001, reference (151)

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

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the C2 Segment Option Variation Area are summarized in Table 6-117 and shown on Map 6-43. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Blue Route and C2 Segment Option Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue Route and C2 Segment Option Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.5.4 (Vegetation)

summarizes potential impacts on forested vegetation from the Proposed Blue Route and C2 Segment Option Variation.

Both the Proposed Blue Route and the C2 Segment Option Variation would pass through the Big Bog Important Bird Area (Table 6-117; Map 6-43). While the C2 Segment Option Variation would traverse the Big Bog Important Bird Area adjacent to an existing corridor, the Proposed Blue Route would traverse a greater portion of the Big Bog Important Bird Area and would require the creation of new transmission line corridor for its entire length (Table 6-117; Map 6-43). Creation of new corridor in the Big Bog Important Bird Area would likely result in more short-term indirect and long-term direct, adverse impacts on birds and other wildlife associated with the area. The short-term indirect, impacts would be associated with construction and alteration of the birds' habitat, while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian

Table 6-117 Wildlife Resources within the Vicinity of the C2 Segment Option Variation Area

| Resource | Evaluation Parameter | C2 Segment Option Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Blue Route | C2 Segment Option Variation |
| Transmission Line | Length (mi) | 32.8 | 46.0 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 81 |
| Important Bird Areas | Acres within ROW | 469 | 406 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Audubon Society 2014, reference (181)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

collisions and electrocutions discussed in more detail in Section 5.3.4.3. The 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 (2.13).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.3.5.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the C2 Segment Option Variation Area are summarized in Table 6-118; additional data on rare species, such as the presence of MnDNR tracked species,

is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

In general, proximity of state endangered, threatened, or special concern species is similar between the Proposed Blue Route and C2 Segment Option Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation, including critical habitat designated for gray wolf.

As indicated in Table 6-118, the state-threatened ram's head lady's slipper was documented within one mile of the C2 Segment Option Variation. The remaining three rare species identified in Table 6-118 are all aquatic; because all lakes and streams would be spanned in the C2 Segment Option Variation Area and throughout the entire proposed Project, impacts to aquatic species, such as fish and mussels are not anticipated. Although the ram's head lady's slipper has not been documented within one mile of the Proposed Blue Route, there is suitable habitat (coniferous swamps and bogs and upland pine forests) for this species in the vicinity of both the Proposed Blue Route and the C2 Segment Option Variation. The C2 Segment Option Variation would parallel existing transmission line for over 80 percent of its length, while the Proposed Blue Route would require the creation of new corridor for its entire length (Table 6-119). Because of this the Proposed Blue Route could impact more rare species that are susceptible to fragmentation of intact forest habitat. However, the full extent of potential impacts from either the Proposed Blue Route or C2 Segment Option Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit.

The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Both the Proposed Blue Route and the C2 Segment Option Variation would cross critical habitat designated for gray wolf for approximately 32 miles. The Proposed Blue Route would cross this habitat along a new transmission line corridor, while the C2 Segment Option Variation would cross this habitat parallel to an existing transmission line corridor. The C2 Segment Option Variation would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross this resource in an area where critical habitat designated for gray wolf has already been fragmented.

Any indirect impacts to rare species from the proposed Project would be 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. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate

Table 6-118 Rare Species Documented within One Mile of the Anticipated ROW in the C2 Segment Option Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | C2 Segment Option Variation Area | |
|--------------------------------|------------------------------|----------------|-----------------|----------------|----------------------------------|-----------------------------|
| | | | | | Proposed Blue Route | C2 Segment Option Variation |
| <i>Cypripedium arietinum</i> | Ram's-head Lady's-slipper | None | Threatened | Vascular Plant | | X |
| <i>Acipenser fulvescens</i> | Lake Sturgeon | None | Special Concern | Fish | | X |
| <i>Lasmigona compressa</i> | Creek Heelsplitter | None | Special Concern | Mussel | X | |
| <i>Ligumia recta</i> | Black Sandshell | None | Special Concern | Mussel | X | X |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

Table 6-119 Rare Communities and Resources within the Vicinity of the C2 Segment Option Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | C2 Segment Option Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Blue Route | C2 Segment Option Variation |
| Transmission Line | Length (mi) | 32.8 | 46.0 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 0 | 81 |
| Scientific and Natural Areas | Acres within 0–1,500 ft | 0 | 155 |
| MBS Sites of Biodiversity Significance | Acres within ROW | 642 | 510 |
| Ecologically Important Lowland Conifers | Acres within ROW | 7 | 6 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (187); MBS 2015, reference (167); MnDNR 2014, reference (185)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

(3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the C2 Segment Option Variation Area are summarized in Table 6-119 and shown on Map 6-44; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Blue Route and C2 Segment Option Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-44 and in Table 6-119, the North Black River Peatland SNA is adjacent to the C2 Segment Option Variation, with approximately 155 acres of the SNA located within 1,500 feet of the anticipated alignment for the C2 Segment Option Variation. The Proposed Blue Route is over one half mile from the nearest SNA (South Black River Peatland; Map 6-44). However, while the Proposed Blue Route would require creation of new corridor for its entire length, the C2 Segment Option Variation would follow an existing transmission line corridor for most of its length, including the portion that runs adjacent to the SNA (Map 6-44).

Relative to the C2 Segment Option Variation, the Proposed Blue Route would pass through more acres of MBS Sites of Biodiversity Significance and would do so along a new transmission line corridor (Table 6-119; Map 6-44). Because of this, the Proposed Blue Route would likely result in more impacts on MBS Sites of Biodiversity Significance and the rare communities and species associated with them.

Both the Proposed Blue Route and the C2 Segment Option Variation would pass through similar amounts of the same MnDNR Ecologically Important Lowland Conifer stand; however the C2 Segment Option Variation would do so at the edge of the stand and along an existing transmission line corridor, while the Proposed Blue Route would cross through the center of the stand along a new transmission line corridor (Table 6-119; Map 6-44). Because of this, the Proposed Blue Route would likely result in more impacts to this MnDNR Ecologically Important Lowland Conifer stand.

The rare communities and resources listed in Table 6-119 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. 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.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.5.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-45 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the C2 Segment Option Variation Area.

Table 6-120 identifies the percentage of total transmission line length that the Proposed Blue Route and C2 Segment Option Variation parallel an existing corridor or linear feature in the C2 Segment Option Variation Area.

The C2 Segment Option Variation would parallel an existing transmission line corridor for over two thirds of the length (Figure 6-82). The Proposed Blue Route would follow other types of existing corridors for less than one tenth of the length.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.3.5.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-121 summarizes the costs associated with constructing the Proposed Blue Route and C2 Segment Option Variation in the C2 Segment Option Variation Area. As indicated in Table 6-121, the C2 Segment Option Variation would cost more to construct than the Proposed Blue Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$52,000 to \$74,000 annually for these alternatives in the C2 Segment Option Variation Area.

6.3.6 J2 Segment Option Variation Area

The J2 Segment Option Variation Area encompasses two route alternatives: the Proposed Orange Route and the J2 Segment Option Variation. This section provides a comparison of the potential

impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the J2 Segment Option Variation Area, depending on the route or variation considered.

6.3.6.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the J2 Segment Option Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the J2 Variation Area are summarized in Table 6-122 and shown on Maps 6-46, 6-47, 6-48, and 6-50.

As indicated in Table 6-122 for the J2 Segment Option Variation Area, the Proposed Orange Route and J2 Segment Option Variation would cross or

Table 6-120 Corridor Sharing in the C2 Segment Option Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | C2 Segment Option Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Blue Route | C2 Segment Option Variation |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS) | Percent of Total Length ⁽²⁾ | 0 | 81 |
| PLSS Only | Percent of Total Length ⁽²⁾ | 6 | 0 |
| None | Percent of Total Length ⁽²⁾ | 94 | 19 |

Source(s): USDA et al. 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al. 2014, reference (174); MnDNR et al. 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al. 2009, reference (177)

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

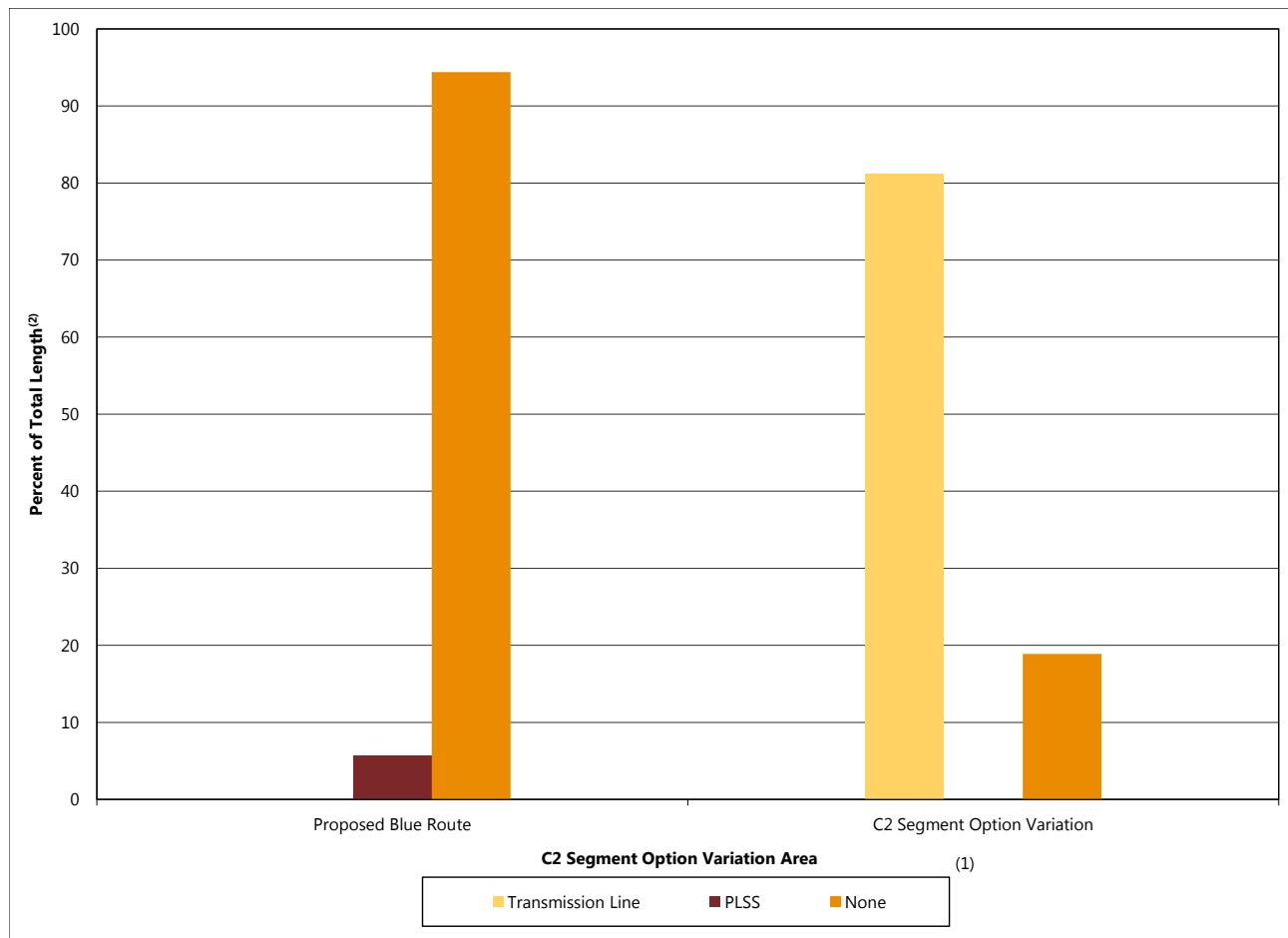
- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-121 Construction Costs in the C2 Segment Option Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|-------------------|-----------------------------|--------------|-------------------------|-------------|
| C2 Segment Option | Proposed Blue Route | \$35,769,239 | \$1,087,211 | 32.8 |
| | C2 Segment Option Variation | \$54,466,435 | \$1,184,053 | 46 |

Source(s): Minnesota Power 2015, reference (9)

Figure 6-82 Corridor Sharing in the C2 Variation Area



Source(s): USDA et al. 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al. 2014, reference (174); MnDNR et al. 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al. 2009, reference (177)

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

(1) Transmission line (other linear features may be present within the transmission corridor; i.e., road, trail, field line, PLSS).

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

be located within 1,500 feet of aesthetic resources with high visual sensitivity, including a state trail, snowmobile trails, state forests, and scenic byways (Maps 6-48 and 6-50). Also, the Proposed Orange Route and J2 Segment Option Variation would be located within one mile of several historic architectural sites (Map 6-47). In total, the Proposed Orange Route would affect fewer aesthetic resources (eight) than the J2 Segment Option Variation (16). In addition, the J2 Segment Option Variation would be located within 1,500 feet of six residences, five of which are located within 1,000 feet and one within 500 feet of the anticipated alignment; these could also have high visual sensitivity. The anticipated alignment of the Proposed Orange Route would not be within 1,500 feet of any residences (Figure 6-83).

The J2 Segment Option Variation is slightly longer (45.2 miles) than the Proposed Orange Route (42.2 miles) and neither alternative parallel an existing

large transmission line. Therefore contrast for both transmission lines would be similar.

The J2 Segment Option Variation would cross four snowmobile trails, would be located within one mile of seven historic architectural sites, and would cross two scenic byways (the Avenue of the Pines [State Route 46] and Edge of the Wilderness [State Route 38]; Map 6-47). In comparison, the Proposed Orange Route would cross two snowmobile trails and would be located within one mile of two historic architectural sites, but would not cross any scenic byways (Map 6-47).

Viewpoint 05 in Appendix N shows the existing view looking east from the Edge of the Wilderness Scenic Byway south of Effie where the J2 Segment Option Variation would cross the highway. This viewpoint also shows a simulation of what the transmission line and new corridor would look

Table 6-122 Aesthetic Resources within the ROI in the J2 Segment Option Variation area

| Resource | Evaluation Parameter ⁽¹⁾ | J2 Segment Option Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Orange Route | J2 Segment Option Variation |
| Transmission Line | Length (mi) | 42.2 | 45.2 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 0 | 0 |
| Residences | Count within 0–500 ft | 0 | 1 |
| | Count within 0–1,000 ft | 0 | 5 |
| | Count within 0–1,500 ft | 0 | 6 |
| Historic Architectural Sites | Count within 0–1,500 ft | 0 | 2 |
| | Count within 0–5,280 ft | 2 | 7 |
| State Trails | Count within 0–1,500 ft | 1 | 1 |
| State Forests | Count within 0–1,500 ft | 3 | 2 |
| State Scenic Byways | Count within 0–1,500 ft | 0 | 2 |
| Snowmobile Trails | Count within 0–1,500 ft | 2 | 4 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2003, reference (182); MnDNR 2003, reference (148) MnDOT 2013, reference (149); MnDNR 2010 reference (150)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

like at this same location. Although a substantial amount of vegetation would be cleared and tall lattice structures would be visible, the transmission line crosses perpendicular to the road and would be visible only briefly to passing motorists and others traveling on the road. Even so, the new 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.

Although the J2 Segment Option Variation crosses fewer state forests (two) than the Proposed Orange Route (three; Table 6-122), overall the J2 Segment Option Variation would affect a greater number of aesthetic resources and residences (six residences, seven historic architectural sites, one state trail, two state forests, two state scenic byways, and four snowmobile trails). While the contrast would be similar for both alternatives, the J2 Segment Option Variation would potentially affect views for more residences and aesthetic resources with high visual sensitivity (two residences, one state trail, three state forests, and two snowmobile trails). Therefore, the Proposed Orange Route would potentially result in less aesthetic impact than the J2 Segment Option Variation.

Although the Proposed Orange Route is long and does not parallel an existing large transmission line,

it affects no residences and few other sensitive visual resources (two historic architectural sites, one state trail, three state forest, no state scenic byways, and two snowmobile trails). For these reasons, potential aesthetic impacts of the Proposed Orange Route are not expected to be significant.

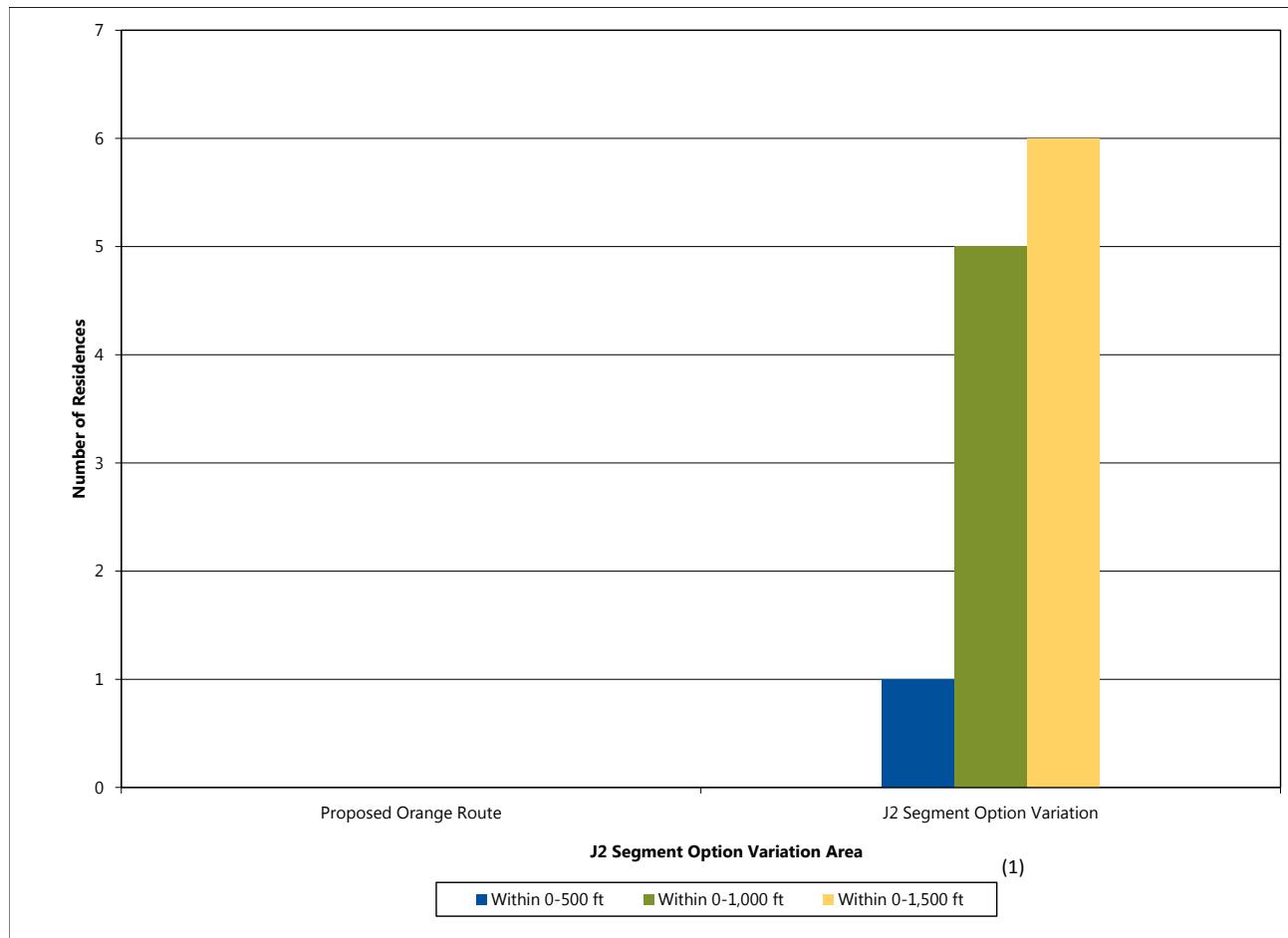
In contrast, because the J2 Segment Option Variation is long, does not parallel an existing large transmission line, and affects several residences (six) and other sensitive visual resources (seven historic architectural sites, one state trail, two state forests, two state scenic byways, and four snowmobile trails), aesthetic impacts of the J2 Segment Option Variation are potentially significant.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Figure 6-83 Residences within the ROI in the J2 Segment Option Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

Land Uses

Table 6-123 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Orange Route and J2 Segment Option Variation in the J2 Segment Option Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the J2 Segment Option Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Orange Route and J2 Segment Option Variation are shown on Map 6-46.

The Proposed Orange Route and J2 Segment Option Variation ROI are both primarily composed of forested and/or swamp land (Table 6-123).

Land Ownership and Management

As identified in Table 6-124, the Proposed Orange Route would contain more state forest land and state fee land than the J2 Segment Option Variation.

No impacts to county land or state conservation easements would occur under the Proposed Orange Route or J2 Segment Option Variation; however, the J2 Segment Option Variation would impact 28 acres of USFWS Interest Lands with a crossing length of 10,587 feet, while the Proposed Orange Route would not impact this land ownership type (Map 6-46).

Neither the Proposed Orange Route nor the J2 Segment Option Variation would parallel an existing corridor; however a small portion of each route would parallel a field line (see Section 6.3.6.6) (Figure 6-84).

Impacts to land use from the proposed Project in the J2 Segment Option Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Orange Route and J2 Segment Option Variation would both 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. The length of the alternative that would parallel an existing corridor is also important. The J2 Segment Option Variation avoids a greater amount of state forest and state fee lands than the Proposed Orange Route thereby avoiding long-term changes to land use and neither the Proposed Route nor the J2 Segment Option Variation parallel an existing corridor.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize,

or mitigate impacts on these resources from the proposed Project.

6.3.6.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the J2 Segment Option Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the J2 Segment Option Variation Area are summarized in Table 6-125.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-125 and Figure 6-85

Table 6-123 Land Uses within the ROI in the J2 Segment Option Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | J2 Segment Option Variation Area | |
|---|------------------------|-------------------------------------|----------------------------------|-----------------------------|
| | | | Proposed Orange Route | J2 Segment Option Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 15,512 | 16,589 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 145 | 355 |
| | Agricultural | Acres within 0–1,500 ft | 153 | 164 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 15,110 | 15,860 |
| | Other | Acres within 0–1,500 ft | 104 | 210 |

Source(s): USGS 2001, reference (151)

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

- (1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-124 Land Ownership/Management within the Anticipated ROW in the J2 Segment Option Variation Area

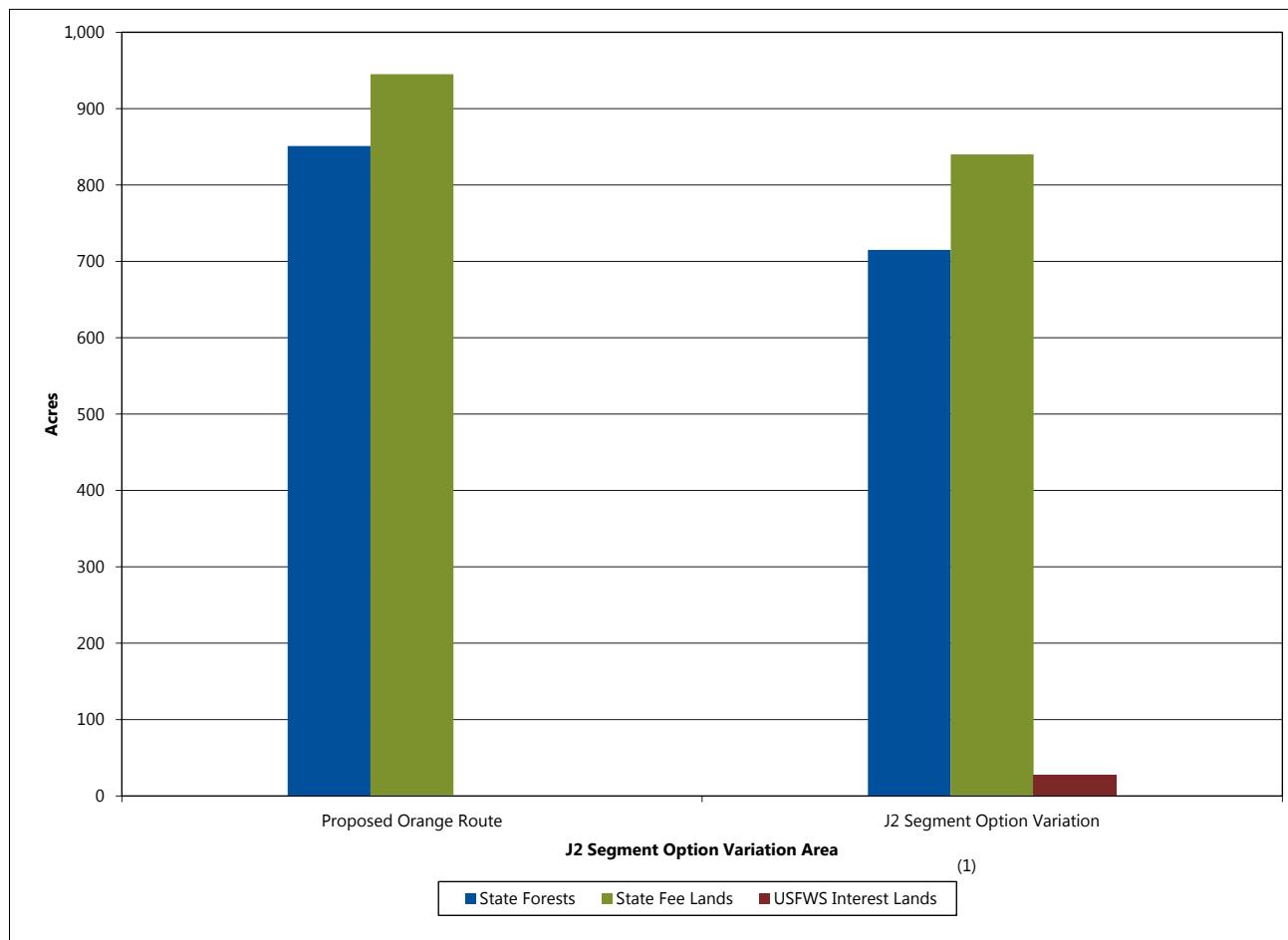
| Resource | Type | Evaluation Parameter | J2 Segment Option Variation Area | |
|--|---|----------------------|----------------------------------|-----------------------------|
| | | | Proposed Orange Route | J2 Segment Option Variation |
| Total Lands | -- | Acres within ROW | 79 | 229 |
| State Forests | -- | Acres within ROW | 851 | 715 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 945 | 840 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 0 | 0 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 522 | 528 |
| | Trust Fund | Acres within ROW | 423 | 311 |
| | Federal - State Lease | Acres within ROW | 0 | 0 |
| USFWS Interest Lands | -- | Acres within ROW | 0 | 28 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 1,024 | 1,096 |

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); USFWS 2014, reference (178)

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.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-84 Public Land Ownership/Management within the ROI in the J2 Segment Option Variation Area



Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); USFWS 2014, reference (178)

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.

show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Orange Route and J2 Segment Option Variation in the ROI.

The J2 Segment Option Variation, which has the longer transmission line route, would pass through more acres of farmland, including farmland of statewide importance and prime farmland (Figure 6-85). The Proposed Orange Route and J2 Segment Option Variation would each impact 300 or more acres of "prime farmland if drained". The Proposed Orange Route, which has the shorter length, would be expected to have the fewest impacts to farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion.

Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line.

Table 6-125 Land-Based Economy Resources within the Anticipated ROW in the J2 Segment Option Variation Area

| Resource | Type | Evaluation Parameter | J2 Segment Option Variation Area | |
|---|----------------------------------|--|----------------------------------|-----------------------------|
| | | | Proposed Orange Route | J2 Segment Option Variation |
| Transmission Line | -- | Length (mi) | 42.2 | 45.2 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 0 | 0 |
| Farmland | Not Farmland | Acres within ROW | 530 | 397 |
| | Prime Farmland if Drained | Acres within ROW | 373 | 300 |
| | Farmland of Statewide Importance | Acres within ROW | 60 | 241 |
| | All Areas are Prime Farmland | Acres within ROW | 61 | 159 |
| State Forest | -- | Acres within ROW | 851 | 715 |
| State Mineral Leases (active and/or terminated/expired) | -- | Acres within ROW | 82 | 73 |

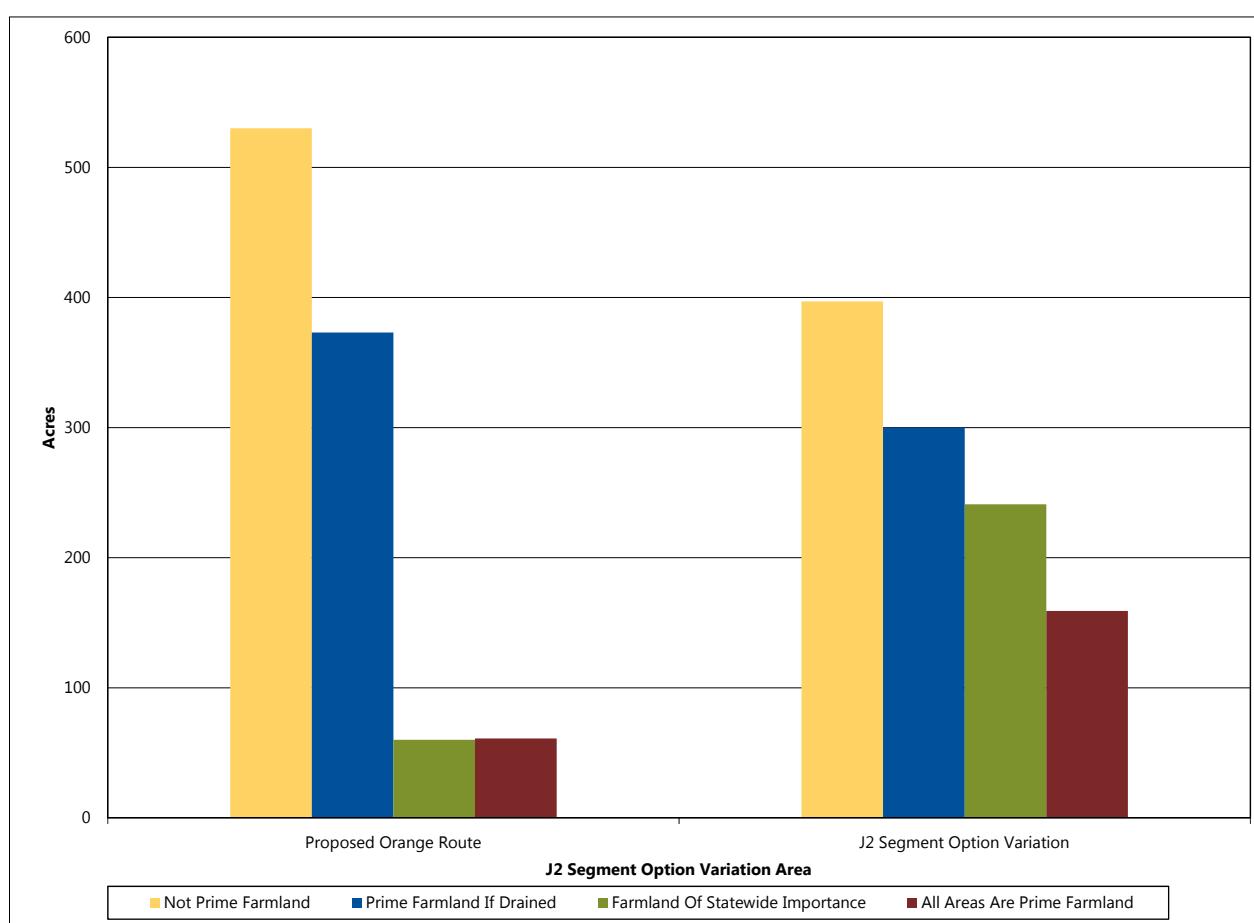
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-85 Acres of Farmland by Type within the Anticipated ROW in the J2 Segment Option Variation Area



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

Source(s): USDA NRCS 2014, reference (154)

Table 6-125 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Orange Route and the J2 Segment Option Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue Route or the J2 Segment Option Variation in the J2 Segment Option Variation Area.

The Proposed Orange Route would pass through more acres of state forest lands - Pine Island State Forest (Figure 6-86, Map 6-48). The J2 Segment Option Variation would be expected to have fewer impacts on timber activities in the Pine Island State Forest as it would cross less forest lands.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from

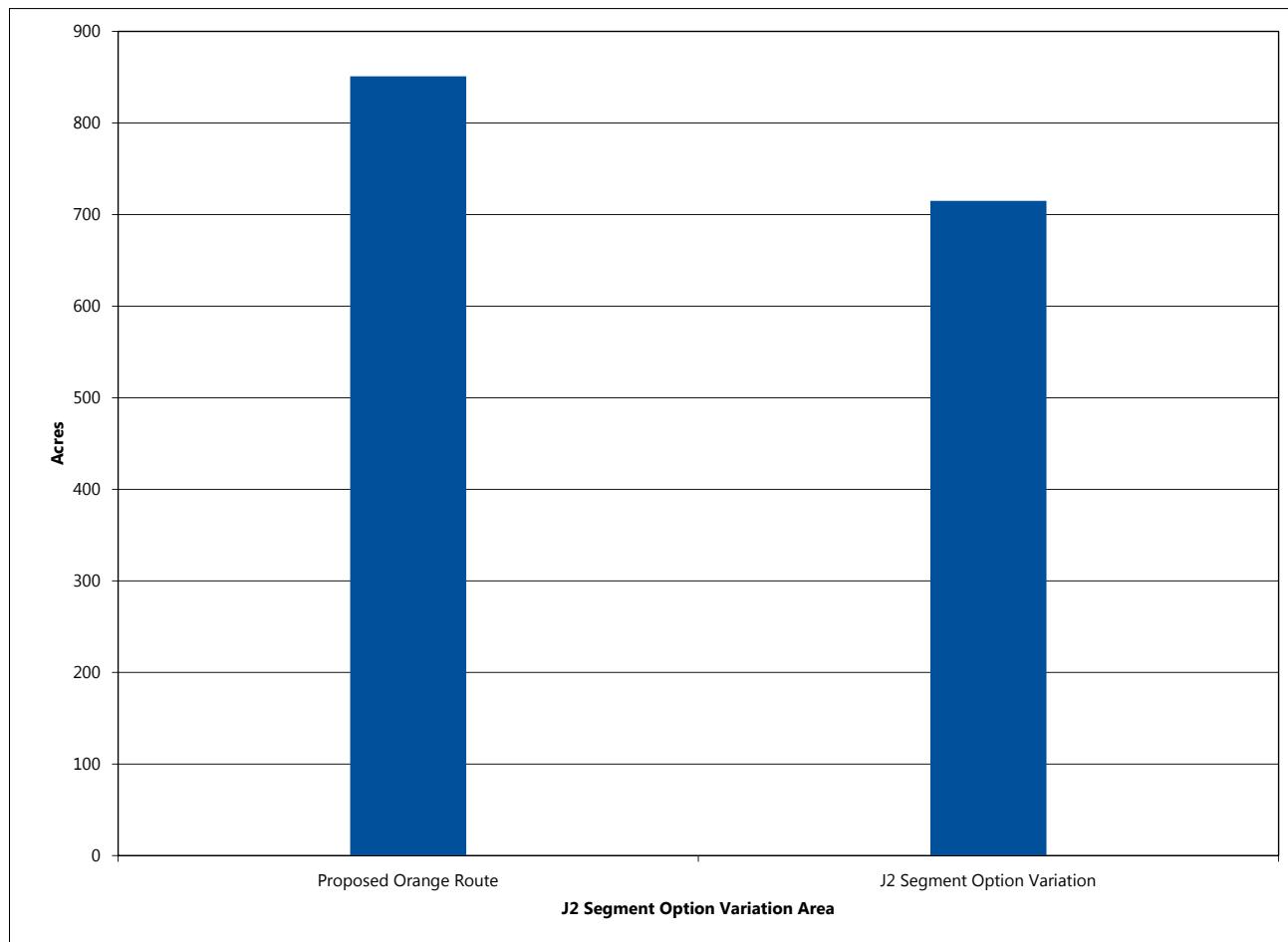
the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-125, Figure 6-87, and Map 6-46 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the J2 Segment Option Variation Area. There are no active mineral leases in the ROI of either the Proposed Orange Route or the J2 Segment Option Variation. Map 6-46 identifies the

Figure 6-86 Acres of State Forest Land within the Anticipated ROW in the J2 Segment Option Variation Area



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

Source(s): MnDNR 2003, reference (148)

state aggregate resources that may be impacted in the J2 Segment Option Variation Area.

Both the Proposed Orange Route and the J2 Segment Option Variation would traverse mining lands with terminated/expired state mineral leases, with the Proposed Orange Route passing through slightly more acres than the J2 Segment Option Variation (Table 6-125, Figure 6-87, and Map 6-46). Both the Proposed Orange Route and the J2 Segment Option Variation could potentially interfere with future mining activities in this area.

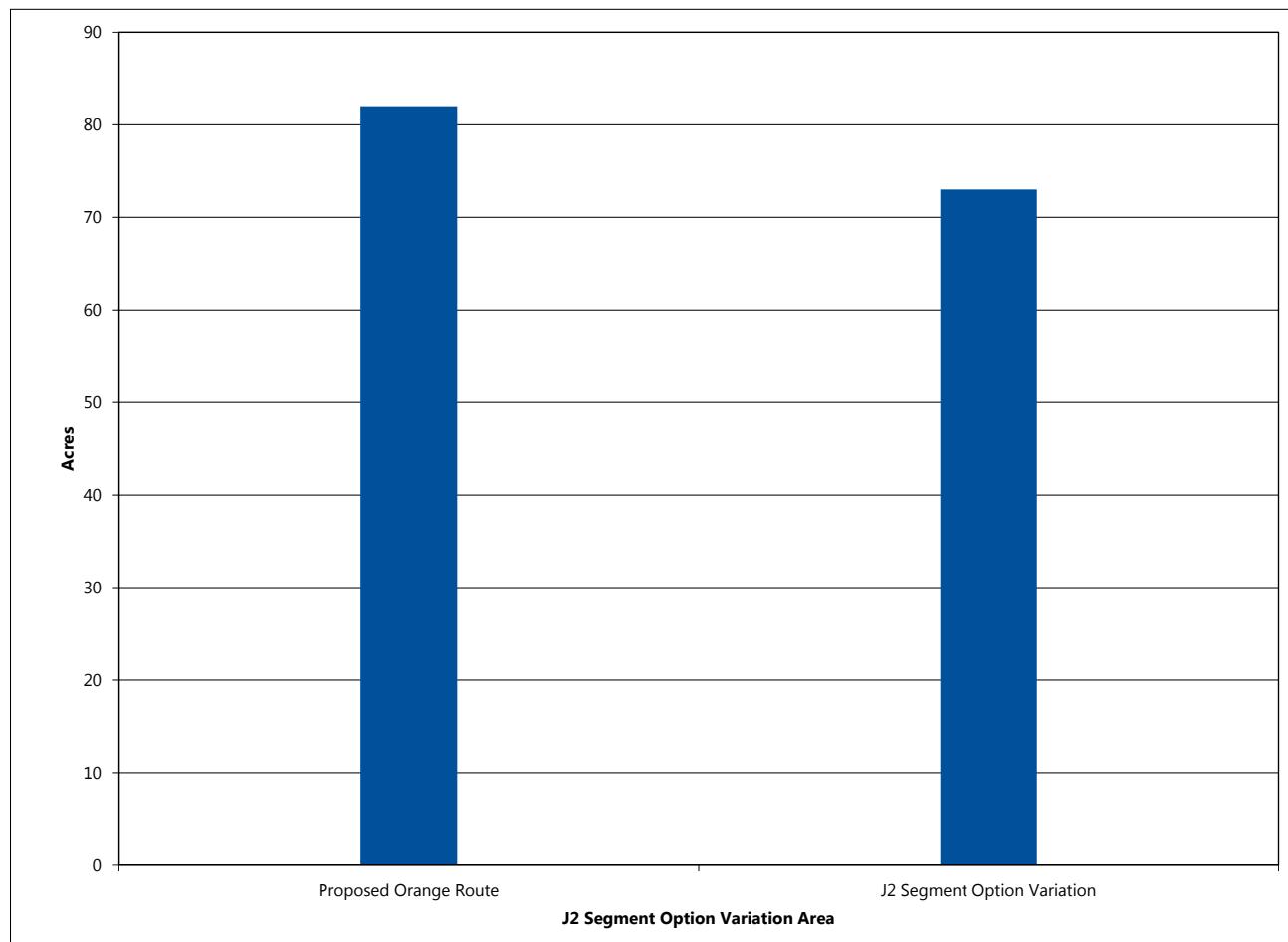
According to the Minnesota Department of Transportation Aggregate Source Information System data, aggregate resources are present within the vicinity of both the Proposed Orange Route and the J2 Segment Option Variation (Map 6-46; MnDOT 2015, reference (188)). Based on review of the aggregate resource data in conjunction with 2013 aerial photographs (described in Section 5.3.2.3), there are two aggregate resources within the ROI of **both** the Proposed Orange

Route and the J2 Segment Option Variation. Both the Proposed Orange Route and the J2 Segment Option Variation could interfere with current or future aggregate mining activities. The full extent of impacts on aggregate resources in the J2 Segment Option Variation Area, and whether micro siting of the anticipated alignment within an approved route width can avoid these impacts, cannot be determined without field surveys.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Figure 6-87 Acres of State Mineral Leases within the Anticipated ROW in the J2 Segment Option Variation Area



Source(s): MnDNR 2014, reference (179)

6.3.6.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential indirect effects to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites.

Table 6-126 provides a summary of the previously recorded archaeological sites and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Orange Route and J2 Segment Option Variation in the J2 Segment Option Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within 1,500 feet of the anticipated alignment (direct APE for cultural resources) or within the ROW (indirect APE for historic architectural resources or Native American resources) for the Proposed Orange Route and J2 Segment Option Variation in the J2 Segment Option Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the J2 Segment Option Variation Area, there are no archaeologic or historic architectural sites within the ROW of the Proposed Orange Route or J2 Segment Option Variation (Map 6-47). The J2 Segment Option Variation has a higher number of historic architectural sites than does the Proposed Orange Route. Within the J2 Segment Option

Variation, six of the seven historic architectural sites have been recommended as not NRHP eligible (IC-UOG-074, IC-UOG-075, IC-EFC-006, IC-EFC-007, IC-EFC-016, and IC-EFC-017); the one remaining site, KC-UOG-031, has not been evaluated for NRHP eligibility. The KC-UOG-031 site is also located within the indirect APE of the Proposed Orange Route, as is the KC-UOG-035 site, neither of which have been evaluated for NRHP eligibility.

There is currently no known potential for direct, long-term, adverse effects on the archaeological and historic architectural resources sites identified within the J2 Segment Option Variation Area, although cultural resource investigations have not yet occurred for the Proposed Route or Variation. **Indirect, long-term, adverse impacts on the two previously recorded historic architectural resources within the indirect APE for the proposed Orange Route and one of the seven previously recorded architectural resources within the indirect APE for the J2 Segment Option Variation are likely to occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources.** Since both the Proposed Orange Route and J2 Segment Option Variation contain historic architectural sites that have not been evaluated for NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse effect under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

The Proposed Route and Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or

Table 6-126 Archaeological and Historic Resources within the J2 Segment Option Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | J2 Segment Option Variation Area | |
|------------------------------|-------------------------------------|----------------------------------|-----------------------------|
| | | Proposed Orange Route | J2 Segment Option Variation |
| Historic Architectural Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 2 |
| | Count within 0–5,280 ft | 2 | 7 |
| Archaeological Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for cultural resources. These cultural resources investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential adverse effects to cultural resources during construction and operation of the proposed Project.

Potential short-term and long-term adverse effects from construction, operation, maintenance, and emergency repair-related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse effects to these resources, including TCPs, from the proposed Project.

6.3.6.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the J2 Segment Option Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to ROI for water resources in the J2 Segment Option Variation Area are summarized in Table 6-127 and shown on Map 6-48. Additional, water resources data beyond

those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmissions structures in floodplains and wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Orange Route and the J2 Segment Option Variation. Neither the Proposed Orange Route nor the J2 Segment Option Variation would cross any trout streams or impaired waters.

The Proposed Orange Route and the J2 Segment Option Variation would each cross PWI watercourses, including unnamed tributaries to Deer Creek and unnamed perennial streams. As shown in Table 6-127, the Proposed Orange Route would cross more PWI watercourses than the J2 Segment Option Variation. Neither the Proposed Orange Route nor the J2 Segment Option Variation would cross PWI waterbodies or wetlands.

The Proposed Orange Route and the J2 Segment Option Variation would both require crossing non-PWI waters. The J2 Segment Option Variation would require more non-PWI water crossings than the Proposed Orange Route and would cross both waterbodies and watercourses (Figure 6-88).

It is anticipated that the PWI crossings and non-PWI crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

The J2 Segment Option Variation would not traverse a floodplain; however the Proposed Orange Route would cross Zone A floodplains of three different unnamed tributaries to Deer Creek. Though the

Table 6-127 Water Resources within the Anticipated ROW in the J2 Segment Option Variation Area

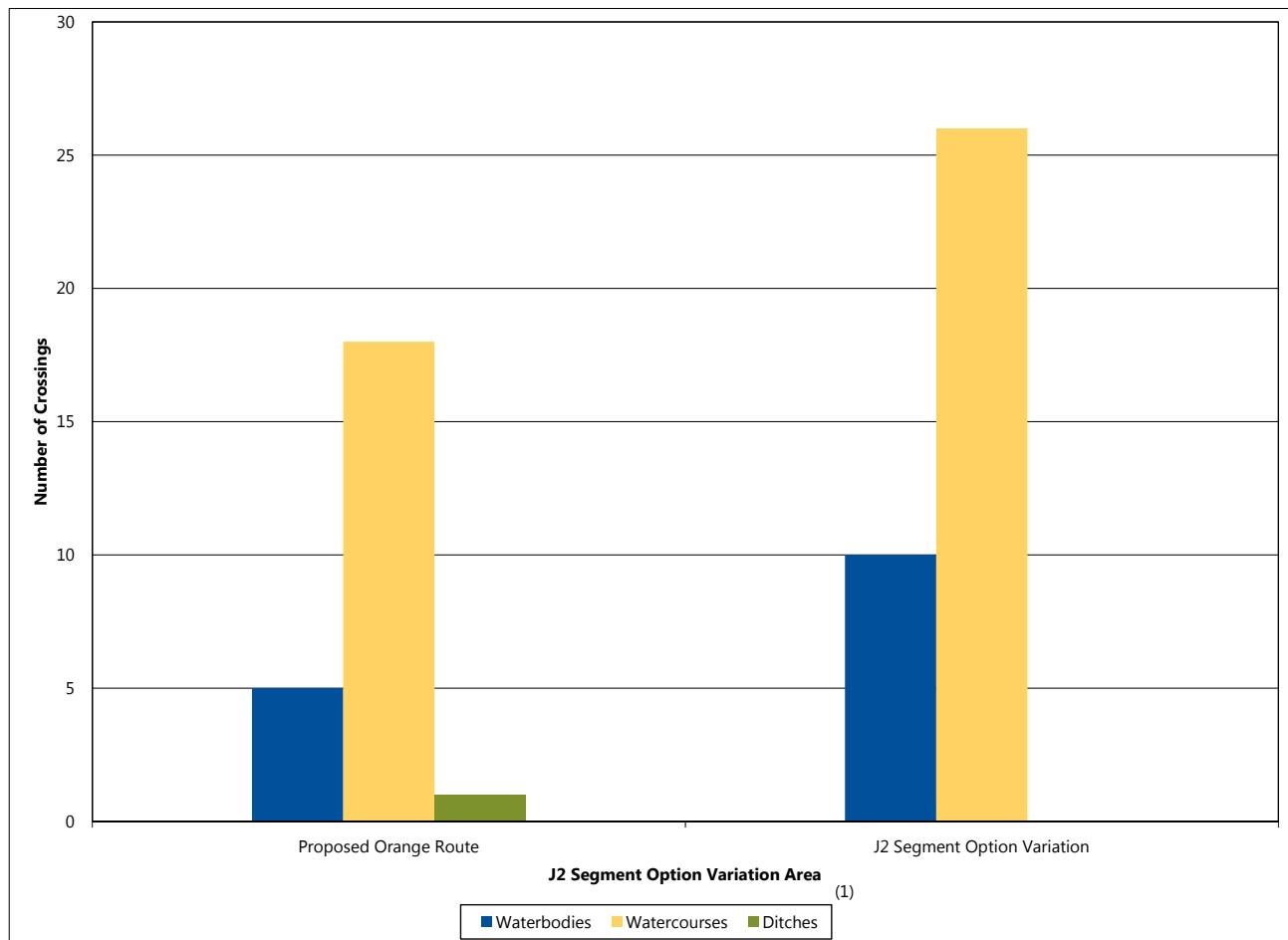
| Resource | Evaluation Parameter | J2 Segment Option Variation Area | |
|-------------------------------|----------------------|----------------------------------|-----------------------------|
| | | Proposed Orange Route | J2 Segment Option Variation |
| Transmission Line | Length (mi) | 42.2 | 45.2 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 6 | 3 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 24 | 36 |
| Floodplains ⁽³⁾ | Acres within ROW | 3 | 0 |
| NWI Wetlands | Acres within ROW | 509 | 353 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); Minnesota Power 2014, reference (163)

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

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.
- (3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

Figure 6-88 Non-PWI Water Crossings by Type in the J2 Segment Option Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

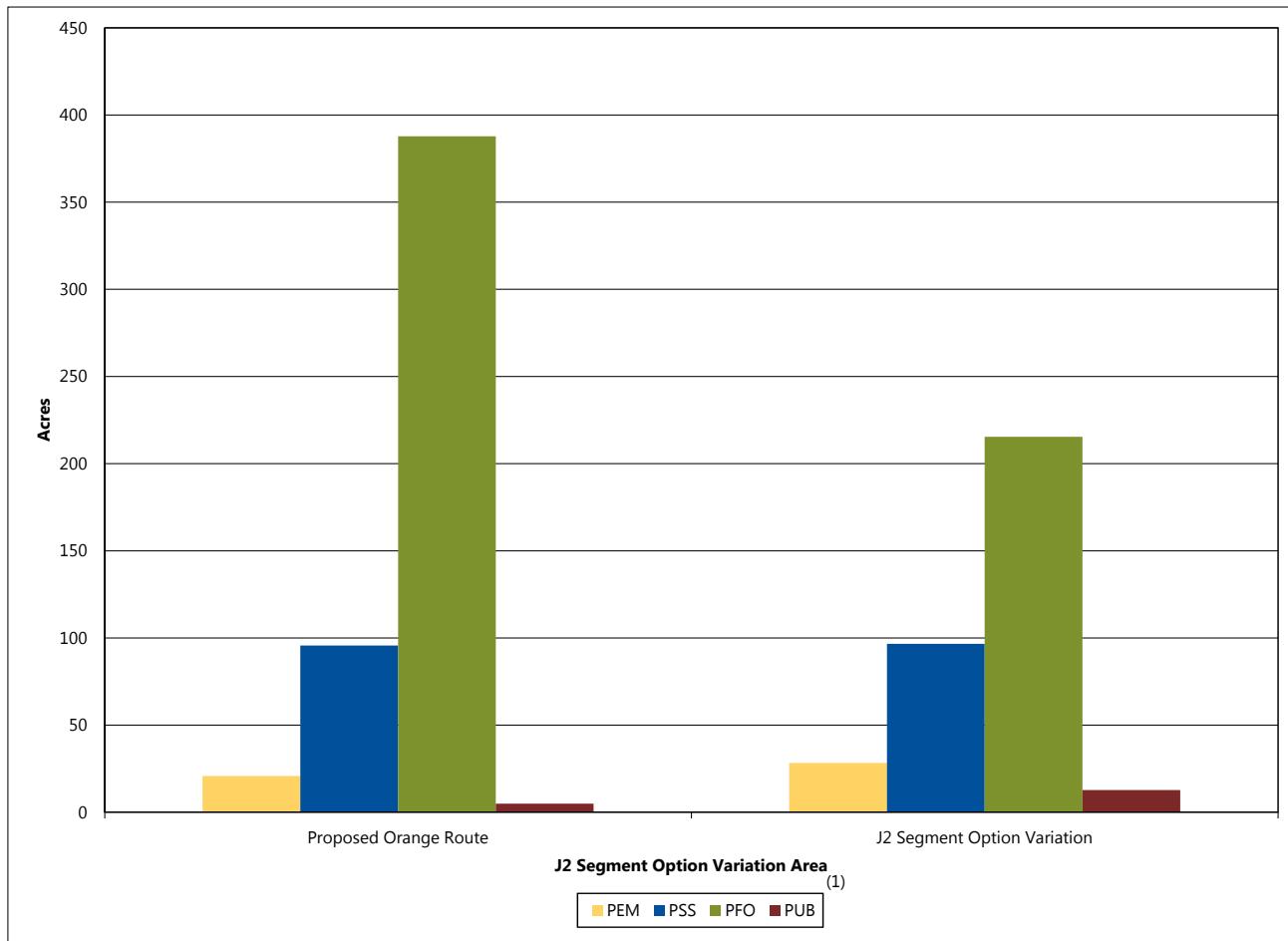
Proposed Orange Route would cross floodplains, the crossings would be less than the average spanning length of 1,250 feet. Therefore, it would be expected that the floodplain crossings would be spanned and transmission structures would not be placed within floodplains.

Based on the NWI, the Proposed Orange Route and the J2 Segment Option Variation would both require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-89, the Proposed Orange Route contains more combined forested and shrub wetland compared to the J2 Segment Option Variation and would result in the greatest amount of wetland type conversion. Impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to have be minimal because of the amount of surrounding

shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed Orange Route and the J2 Segment Option Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed Orange Route and the J2 Segment Option Variation would both require temporary construction access through wetlands, which is also are expected to be minimal due to the short-term, localized nature of the impact, and the

Figure 6-89 Acres of Wetland by Type within the Anticipated ROW in the J2 Segment Option Variation Area



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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the J2 Segment Option Variation Area are summarized in Table 6-128 and shown on Maps 5-12 and 6-48. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

In general, loss or fragmentation of forest would be similar with either the Proposed Orange Route or J2 Segment Option Variation. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-128, the Proposed Orange Route and J2 Segment Option Variation would pass through a similar amount of forested land, with the Proposed Orange Route passing through more state forest land, therefore resulting in more permanent removal of forested vegetation in state forests. Both the Proposed Orange Route and J2 Segment Option Variation would require new corridor for their entire lengths. Because of this both the Proposed Orange Route and J2 Segment Option Variation would result in similar fragmentation of intact forest in

Source(s): USFWS 1997, reference (157)

Table 6-128 Vegetation Resources within the Anticipated ROW in the J2 Segment Option Variation Area

| Resource | Evaluation Parameter | J2 Segment Option Variation Area | |
|--|--|----------------------------------|-----------------------------|
| | | Proposed Orange Route | J2 Segment Option Variation |
| Transmission Line | Length (mi) | 42.2 | 45.2 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 |
| State Forest | Acres within ROW | 851 | 715 |
| Total Forested GAP Land Cover | Acres within ROW | 1,007 | 1,063 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 319 | 124 |
| North American Boreal Forest | Acres within ROW | 477 | 650 |
| Eastern North American Flooded and Swamp Forest | Acres within ROW | 176 | 191 |
| Eastern North American Cool Temperate Forest | Acres within ROW | 36 | 99 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

areas where forest vegetation is present, with the Proposed Orange Route fragmenting more state forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the J2 Segment Option Variation Area are summarized in Table 6-129 and shown on Map 6-48. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Orange Route and J2 Segment Option Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Orange

Route and J2 Segment Option Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.6.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Orange Route and J2 Segment Option Variation.

The Proposed Orange Route would pass through the Big Bog Important Bird Area, while the J2 Segment Option Variation would traverse a smaller portion of the Chippewa Plains Important Bird Area (Table 6-129; Map 6-48). Both the Proposed Orange Route and the J2 Segment Option Variation would require creation of corridor for their entire lengths (Table 6-129). Creation of a new corridor in the Big Bog Important Bird Area would likely result in both short-term and long-term direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be

Table 6-129 Wildlife Resources within the Vicinity of the J2 Segment Option Variation Area

| Resource | Evaluation Parameter | J2 Segment Option Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Orange Route | J2 Segment Option Variation |
| Transmission Line | Length (mi) | 42.2 | 45.2 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 |
| Important Bird Areas | Acres within ROW | 262 | 72 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Audubon Society 2014, reference (181)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

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).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.3.6.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations.

Data related to rare species in the J2 Segment Option Variation Area are summarized in Table 6-130; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the

license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species differs between the Proposed Orange Route and J2 Segment Option Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation, including critical habitat designated for gray wolf.

As indicated in Table 6-130, the Proposed Orange Route has more documented rare species within one mile of its ROW, including the state-threatened sterile sedge and hair-like beakrush. With the exception of the creek heelsplitter mussel, the rare species documented within one mile of the Proposed Orange Route are associated with the calcareous fen located north of the Proposed Orange Route (discussed below). The full extent of potential impacts from either of the Proposed Orange Route or J2 Segment Option Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Two colonial waterbird nesting sites have been documented within one mile of the J2 Segment Option Variation; both are located within 1,500 feet of the anticipated alignments, two of which are also in the ROW. There are no documented colonial waterbird nesting sites within one mile of the Proposed Orange Route. The J2 Segment Option Variation would likely result in more impacts to

Table 6-130 Rare Species Documented within One Mile of the Anticipated ROW in the J2 Segment Option Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | J2 Segment Option Variation Area | |
|---------------------------------|---------------------------------|----------------|-----------------|-------------------|----------------------------------|-----------------------------|
| | | | | | Proposed Orange Route | J2 Segment Option Variation |
| <i>Carex sterilis</i> | Sterile Sedge | None | Threatened | Vascular Plant | X | |
| <i>Rhynchospora capillacea</i> | Hair-like Beak-rush | None | Threatened | Vascular Plant | X | |
| <i>Cladium mariscoides</i> | Twig-rush | None | Special Concern | Vascular Plant | X | |
| <i>Lasmigona compressa</i> | Creek Heelsplitter | None | Special Concern | Mussel | X | |
| <i>Torreyochloa pallida</i> | Torrey's Manna-grass | None | Special Concern | Vascular Plant | | X |
| Colonial Waterbird Nesting Area | Colonial Waterbird Nesting Site | -- | -- | Animal Assemblage | | X |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

colonial waterbirds, due to the proximity of its ROW to these sites.

Both the Proposed Orange Route and the J2 Segment Option Variation would cross critical habitat designated for gray wolf, with the Proposed Orange Route crossing this habitat for approximately 42 miles and the J2 Segment Option Variation crossing it for approximately 13 miles. Neither the Proposed Orange Route nor the J2 Segment Option Variation would parallel and existing transmission line corridor. The J2 Segment Option Variation would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross less of this resource than the Proposed Orange Route.

Any indirect impacts to rare species from the proposed Project are not expected to be significant because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate

impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the J2 Segment Option Variation Area are summarized in Table 6-131 and shown on Map 6-49; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Orange Route and J2 Segment Option Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated in Table 6-131 and on Map 6-49, despite its shorter length, the Proposed Orange Route would pass through more acres of MBS Sites of Biodiversity Significance relative to the J2 Segment Option Variation. Because of this, the Proposed Orange Route would likely result in more impacts on MBS Sites of Biodiversity Significance and the rare communities and species associated with them.

Table 6-131 Rare Communities and Resources within the Vicinity of the J2 Segment Option Variation Area

| Resource | Evaluation Parameter | J2 Segment Option Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Orange Route | J2 Segment Option Variation |
| Transmission Line | Length (mi) | 42.2 | 45.2 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 |
| MBS Sites of Biodiversity Significance ⁽³⁾ | Acres within ROW | 489 | 185 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

One of the calcareous fens documented in Central Section is located just over one mile from the Proposed Orange Route (Map 6-49). This fen is associated with one of the Lost River Peatland SNA units, which is located just under a mile from the Proposed Orange Route (Map 6-49). The Proposed Orange Route would not cross the SNA WPA (described in Section 5.3.5 that is associated with this fen, nor is the WPA present within the ROW (Map 6-49). As mentioned above, several rare species documented within one mile of the Proposed Orange Route are associated with this fen.

The rare communities and resources listed in Table 6-131 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. 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.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.6.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-50 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the J2 Segment Option Variation Area.

Table 6-132 identifies the percentage of total transmission line length that the Proposed Orange Route and J2 Segment Option Variation parallel an existing corridor or linear feature in the J2 Segment Option Variation Area.

The Proposed Orange Route would parallel existing corridors for approximately one tenth of the length (Table 6-132). The J2 Option Segment Variation would parallel existing corridors for slightly more of its length. Neither the proposed route nor variation would follow any existing transmission line or road/trail corridors.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

Table 6-132 Corridor Sharing in the J2 Segment Option Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | J2 Segment Option Variation Area | |
|---|--|----------------------------------|-----------------------------|
| | | Proposed Orange Route | J2 Segment Option Variation |
| Field Line (PLSS may be present within the field line corridor) | Percent of Total Length ⁽²⁾ | 2 | 2 |
| PLSS Only | Percent of Total Length ⁽²⁾ | 11 | 13 |
| None | Percent of Total Length ⁽²⁾ | 87 | 85 |

Source(s): USDA et al. 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al. 2014, reference (174); MnDNR et al. 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al. 2009, reference (177)

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

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-133 Construction Costs in the J2 Segment Option Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|-------------------|-----------------------------|--------------|-------------------------|-------------|
| J2 Segment Option | Proposed Orange Route | \$48,706,641 | \$1,154,186 | 42.2 |
| | J2 Segment Option Variation | \$52,128,879 | \$1,153,294 | 45.2 |

Source(s): Minnesota Power 2015, reference (9)

6.3.6.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-133 summarizes the costs associated with constructing the Proposed Orange Route and J2 Segment Option Variation in the J2 Segment Option Variation Area. As indicated in Table 6-133, the J2 Segment Option Variation would cost more to construct than the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$67,000 to \$72,000 annually for these alternatives in the J2 Segment Option Variation Area.

6.3.7 Northome Variation Area

The Northome Variation Area encompasses two route alternatives: that portion of the J2 Segment Option Variation that lies within the Northome

Variation Area and the Northome Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Northome Variation Area, depending on the route or variation considered.

6.3.7.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Northome Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Northome Variation Area are summarized in Table 6-134 and shown on Maps 6-46, 6-47, 6-48, and 6-50.

As indicated in Table 6-134 for the Northome Variation Area, the J2 Segment Option Variation and Northome Variation would cross or be located within 1,500 feet of one state forest. In addition, the Northome Variation would cross or be located within 1,500 feet of one national forest (Chippewa National Forest). Both the state and national forests are aesthetic resources with high visual sensitivity. Neither alternative would affect other aesthetic resources or residences with high visual sensitivity within 1,500 feet of the anticipated alignment.

The Northome Variation is slightly longer (4.0 miles) than the J2 Segment Option Variation (3.7 miles; Table 6-134) and neither variation parallels an existing large transmission line. Therefore contrast for the transmission lines for both variations would be similar, but potentially slightly more for the slightly longer Northome Variation.

The Northome Variation crosses one state forest and is located within 1,500 feet of a national forest (Chippewa National Forest). The J2 Segment Option Variation also crosses one state forest but is not within 1,500 feet of a national forest. For this reason, the Northome Variation may have a slightly greater effect on an additional aesthetic resource than the J2 Segment Option Variation.

Because the Northome Variation may produce slightly greater contrast and may affect an additional aesthetic resource (i.e., a national forest) with high visual sensitivity, the J2 Segment Option Variation is likely to result in slightly less aesthetic impact than the Northome Variation in the Northome Variation Area.

Although the J2 Segment Option Variation and Northome Variation do not parallel existing large

transmission lines of similar size and design, they are both short in length at 3.7 and 4.0 miles, respectively and affect no residences or historic architectural sites and very few other sensitive visual resources (one state forest and one national forest).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-135 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the J2 Segment Option Variation and Northome Variation in the Northome Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the J2 Segment Option Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the J2 Segment Option Variation and Northome Variation are shown on Map 6-46.

The J2 Segment Option Variation and Northome Variation ROI are both primarily composed of forested and/or swamp land. The Northome Variation ROW contains a slightly greater amount of forested/swamp land than the J2 Segment Option Variation (Table 6-135). A slightly greater amount of

Table 6-134 Aesthetic Resources within the ROI in the Northome Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Northome Variation Area | |
|---|--|-----------------------------|--------------------|
| | | J2 Segment Option Variation | Northome Variation |
| Transmission Line | Length (mi) | 3.7 | 4.0 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 0 | 0 |
| State Forests | Count within 0–1,500 ft | 1 | 1 |
| USDA-USFS National Forest | Count within 0–1,500 ft | 0 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008 reference (189)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

(2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

6.0 Comparative Environmental Consequences

developed and disturbed land and agricultural land is present in the J2 Segment Option Variation ROI compared to the Northome Variation.

Land Ownership and Management

As shown in Table 6-136, the Northome Variation ROW contains a greater amount of state fee land compared to the J2 Segment Option Variation. Less than a half-acre of land in both the J2 Segment Option Variation and Northome Variation is state forest land. No impacts to county lands, state conservation easements would occur under the J2 Segment Option Variation or Northome Variation Area. The J2 Segment Option Variation would

impact 28 acres of USFWS Interest Lands, while the Northome Variation would affect none. The Chippewa National Forest would be located within the ROI of the Northome Variation; however, no impacts to the national forest would be expected (Map 6-46).

Neither the J2 Segment Option Variation nor the Northome Variation would parallel an existing ROW (see Section 6.3.7.6) (Figure 6-90).

Impacts to land use from the proposed Project in the Northome Variation Area would be similar to those described in Section 6.2.1.1. The J2 Segment Option Variation and Northome Variation would

Table 6-135 Land Uses within the ROI in the Northome Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Northome Variation Area | |
|--|------------------------|-------------------------------------|-----------------------------|--------------------|
| | | | J2 Segment Option Variation | Northome Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 1,523 | 1,632 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 24 | 16 |
| | Agricultural | Acres within 0–1,500 ft | 64 | 0 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 1,418 | 1,555 |
| | Other | Acres within 0–1,500 ft | 17 | 61 |

Source(s): USGS 2001, reference (151)

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

- (1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-136 Land Ownership/Management within the Anticipated ROW in the Northome Variation Area

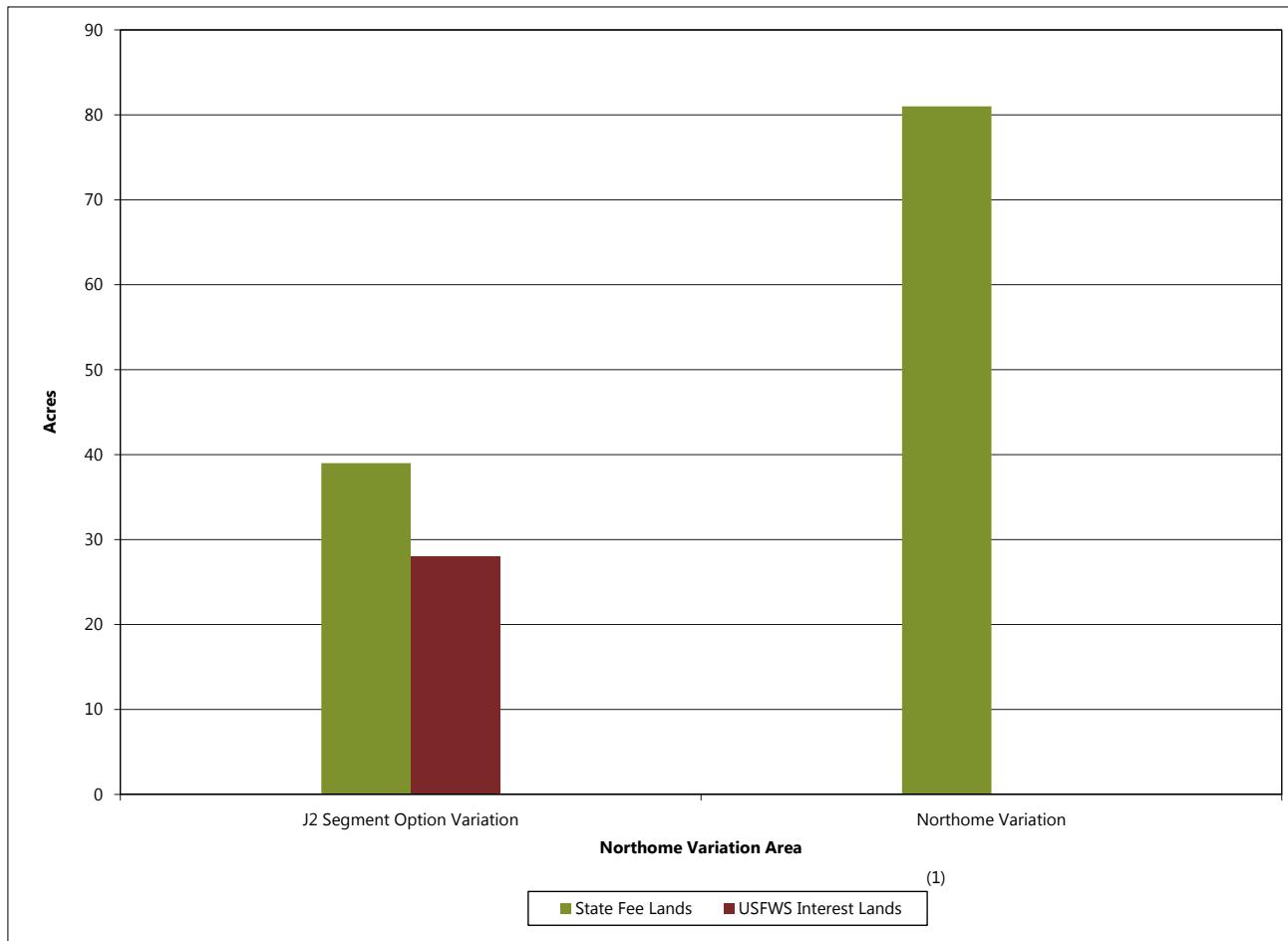
| Resource | Type | Evaluation Parameter | Northome Variation Area | |
|---|---|----------------------|-----------------------------|--------------------|
| | | | J2 Segment Option Variation | Northome Variation |
| Total Lands | -- | Acres within ROW | 91 | 99 |
| State Forests | -- | Acres within ROW | <0.5 | <0.5 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 39 | 81 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 0 | 0 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 15 | 55 |
| | Trust Fund | Acres within ROW | 24 | 26 |
| | Federal - State Lease | Acres within ROW | 0 | 0 |
| USFWS Interest Lands | -- | Acres within ROW | 28 | 0 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 25 | 18 |

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); USFWS 2014, reference (178)

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.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-90 Public Land Ownership/Management within the ROI in the Northome Variation Area



Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); USFWS 2014, reference (178)

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.

both 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. The length of the route that would parallel an existing corridor is also important. The J2 Segment Option Variation avoids a greater amount of state forest and state fee lands than the Variation thereby avoiding long-term changes to land use but neither the J2 Segment Option Variation nor the Northome Variation parallel an existing corridor.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.7.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Northome Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Northome Variation Area are summarized in Table 6-137.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-137 and Figure 6-91 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the J2 Segment Option Variation and Northome Variation in the ROI.

6.0 Comparative Environmental Consequences

Table 6-137 Land-Based Economy Resources within the Anticipated ROW in the Northome Variation Area

| Resource | Type | Evaluation Parameter | J2 Segment Option Variation | Northome Variation |
|---|----------------------------------|--|-----------------------------|--------------------|
| Transmission Line | -- | Length (mi) | 3.7 | 4.0 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 0 | 0 |
| Farmland | Not Farmland | Acres within ROW | 30 | 28 |
| | Prime Farmland if Drained | Acres within ROW | 2 | 15 |
| | Farmland of Statewide Importance | Acres within ROW | 39 | 28 |
| | All Areas are Prime Farmland | Acres within ROW | 20 | 28 |
| State Forest | -- | Acres within ROW | <0.5 | <0.5 |

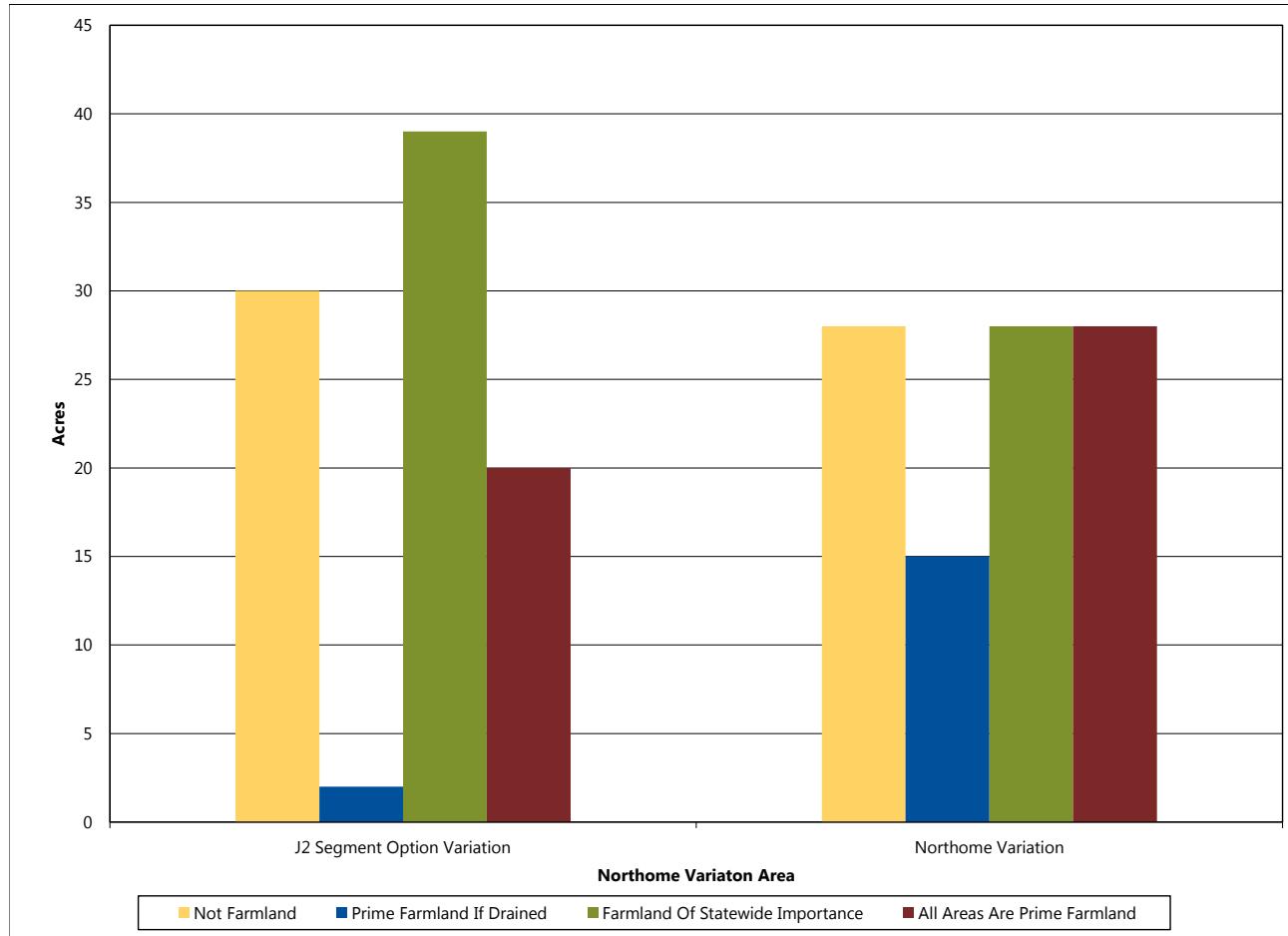
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR 2003, reference (148)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-91 Acres of Farmland by Type within the Anticipated ROW in the Northome Variation Area



Source(s): USDA NRCS 2014, reference (154)

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

The Northome Variation, which has the longer length, would pass through more farmland, including more prime farmland and “prime farmland if drained” (Figure 6-91). However, the Northome Variation would impact fewer acres of farmland of statewide importance. The J2 Segment Option Variation, which has a shorter length, would be expected to have fewer impacts on farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-137 identifies the acreage of state forest land that would be impacted in the ROI by the J2 Segment Option Variation and the Northome Variation.

The J2 Segment Option Variation and the Northome Variation would impact less than 0.5 acres each of state forest lands. There are no USDA-USFS national forest lands within the ROI of the J2 Segment Option Variation or the Northome Variation in the Northome Variation Area.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. There are no active or expired/terminated state mineral leases, records of current mineral mining, or known aggregate resources that would be impacted by the J2 Segment Option Variation or the Northome Variation.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. However, such impacts are not expected from the proposed Project because such activities do not exist nor are planned in this area.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.7.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential indirect effects to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites. Table 6-138 provides a summary of the previously recorded archaeological sites and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the J2 Segment Option Variation and the Northome Variation in the Northome Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within 1,500 feet of

the anticipated alignment (direct APE for cultural resources) or within the ROW (indirect APE for historic architectural resources or Native American resources) for the J2 Segment Option Variation and the Northome Variation in the Northome Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Northome Variation Area, no archaeological sites or historic architectural resources were documented within the ROW of the J2 Segment Option Variation or Northome Variation (Table 6-138; Map 6-47). There are no historic architectural resources documented within the indirect APE of the J2 Segment Option Variation or the Northome Variation in the Northome Variation Area.

There is currently no known potential for direct, long-term, adverse, impacts to archaeological or historic architectural sites as none are documented within the direct APE in the Northome Variation Area, although cultural resource investigations have not yet occurred for the variations. There are no historic architectural sites identified within the indirect APE of the Northome Variation Area, therefore, indirect, long-term, adverse visual effects on architectural resources are not likely to occur.

The J2 Segment Option Variation and Northome Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resources investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the

proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential adverse effects to cultural resources during construction and operation of the proposed Project.

Potential short-term and long-term adverse effects from construction, operation, maintenance, and emergency repair-related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse effects to these resources, including TCPs, from the proposed Project.

6.3.7.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Northome Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Northome Variation Area are summarized in Table 6-139 and shown on Map 6-48. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmission structures in wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed J2 Segment Option Route and the Northome Variation. Neither the Proposed J2 Segment Option Route nor the Northome Variation ROWs contain trout streams, impaired waters, or floodplains.

Table 6-138 Archaeological and Historic Resources within the Northome Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Northome Variation Area | |
|------------------------------|-------------------------------------|-----------------------------|--------------------|
| | | J2 Segment Option Variation | Northome Variation |
| Historic Architectural Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 0 |
| Archaeological Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 1 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

The Proposed J2 Segment Option Variation would not cross any PWI waters. The Northome Variation would cross Little Constance Lake, which is a PWI waterbody. The Proposed J2 Segment Option Variation and Northome Variation would also cross several non-PWI waters. The Proposed J2 Segment Option Route would cross six waterbodies, while the Northome Variation would cross one watercourse. Neither the Proposed J2 Segment Option Route nor the Northome Variation would cross ditches. It is anticipated that both the PWI and non-PWI water crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Based on the NWI, the Proposed J2 Segment Option Variation and the Northome Variation would both require conversion of forested shrub and wetland areas to a herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-92, the Proposed J2 Segment Option Route contains more forested and shrub wetlands compared to the Northome Variation and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed J2 Segment Option Variation and the Northome Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures,

but impacts to wetlands from permanent fill would be expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed J2 Segment Option Variation and the Northome Variation would both require temporary construction access through wetlands, which is also expected to be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Northome Variation Area are summarized in Table 6-140 and shown on Maps 5-12 and 6-48. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

In general, loss or fragmentation of forest would be similar with either the Proposed J2 Segment Option Variation or Northome Variation. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

Table 6-139 Water Resources within the Anticipated ROW in the Northome Variation Area

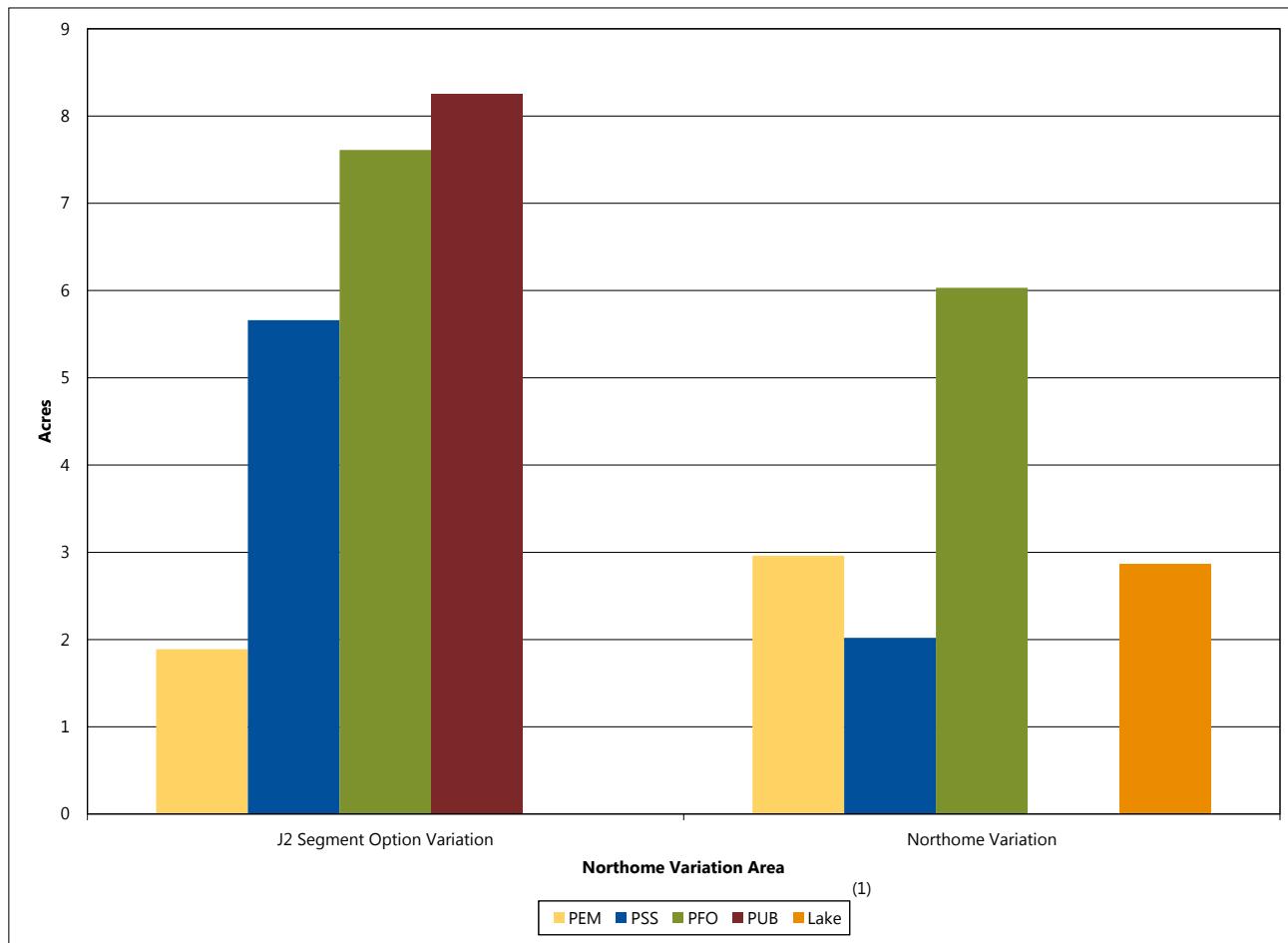
| Resource | Evaluation Parameter | Northome Variation Area | |
|-------------------------------|----------------------|-----------------------------|--------------------|
| | | J2 Segment Option Variation | Northome Variation |
| Transmission Line | Length (mi) | 3.7 | 4.0 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 0 | 1 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 6 | 1 |
| NWI Wetlands | Acres within ROW | 23 | 14 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); Minnesota Power 2014, reference (163)

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

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

Figure 6-92 Acres of Wetland by Type within the Anticipated ROW in the Northome Variation Area



Source(s): USFWS 1997, reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

As indicated in Table 6-140, the Proposed J2 Segment Option Route and Northome Variation would pass through a similar amount of forested land. While neither the Proposed J2 Segment Option Route nor the Northome Variation would pass through state forest land, the Northome Variation borders the Chippewa National Forest, with approximately 171 acres of the National Forest occurring within 1,500 feet of the anticipated alignment for the Northome Variation. Both the Proposed J2 Segment Option Route and Northome Variation would require new corridor for their entire lengths. Because of this both the Proposed J2 Segment Option Route and Northome Variation would result in similar fragmentation of intact forest in areas where forest vegetation is present, with the Northome Variation fragmenting more forest near the Chippewa National Forest. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Northome Variation Area are summarized in Table 6-141 and shown on Map 6-48. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed J2 Segment Option Variation and Northome Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed J2 Segment

Option Variation and Northome Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor and/or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.7.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed J2 Segment Option Variation and Northome Variation.

The Northome Variation would require crossing a MnDNR-designated unnamed shallow lake along a new transmission line corridor, while the Proposed J2 Segment Option Variation would avoid this resource. Crossing a shallow lake could result in impacts on wildlife that utilize this lake (Table 6-141; Map 6-48).

Both the Proposed J2 Segment Option Variation and the Northome Variation would require creation of

new transmission line corridor, with the Northome Variation requiring approximately 0.3 more miles of new corridor than the Northome Variation. The longer length of the Northome Variation would result in more habitat fragmentation and potentially more impacts on wildlife currently inhabiting the area. The Northome Variation also runs adjacent to the Chippewa National Forest and could impact more wildlife species associated with the national forest (Map 6-48).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

Table 6-140 Vegetation Resources within the Anticipated ROW in the Northome Variation Area

| Resource | Evaluation Parameter | Northome Variation Area | |
|--|--|-----------------------------|--------------------|
| | | J2 Segment Option Variation | Northome Variation |
| Transmission Line | Length (mi) | 3.7 | 4.0 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 |
| Total Forested GAP Land Cover | Acres within ROW | 89 | 96 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | |
| North American Boreal Forest | Acres within ROW | 71 | 81 |
| Eastern North American Cool Temperate Forest | Acres within ROW | 10 | 10 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Table 6-141 Wildlife Resources within the Vicinity of the Northome Variation Area

| Resource | Evaluation Parameter | Northome Variation Area | |
|---|--|-----------------------------|--------------------|
| | | J2 Segment Option Variation | Northome Variation |
| Transmission Line | Length (mi) | 3.7 | 4.0 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 |
| Shallow Lakes | Count within ROW | 0 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2010, reference (180)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

6.3.7.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation.

No state or federally listed species have been documented within one mile of the Proposed J2 Segment Option Variation or Northome Variation. However, the full extent of impacts from either the Proposed J2 Segment Option Variation or Northome Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

One colonial waterbird nesting site has been documented within one mile of the Proposed J2 Segment Option Variation and two colonial waterbird nesting sites have been documented with one mile of the Northome Variation (Appendix F). None of these sites are located within the ROW or within 1,500 feet of the anticipated alignment.

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. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

While both the Proposed J2 Segment Option Variation and Northome Variation pass through native vegetation, at present, there are no documented rare communities within either ROW (the ROI for rare communities).

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.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.7.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-50 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear feature in the Northome Variation Area.

The J2 Segment Option Variation and the Northome Variation would not parallel any existing corridors or linear features in the Northome Variation Area.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.3.7.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-142 summarizes the costs associated with constructing the J2 Segment Option Variation and the Northome Variation in the Northome Variation Area. As indicated in Table 6-142, the Northome Variation would cost more to construct than the J2 Segment Option Variation.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$6,000 to \$6,500 annually for these alternatives in the Northome Variation Area.

6.3.8 Cutfoot Variation Area

The Cutfoot Variation Area encompasses two route alternatives: the Proposed Orange Route and the Cutfoot Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Cutfoot Variation Area, depending on the route or variation considered.

6.3.8.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Cutfoot Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic

resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Cutfoot Variation Area are summarized in Table 6-143 and shown on Maps 6-46, 6-47, 6-48, and 6-50.

As indicated in Table 6-143 for the Cutfoot Variation Area, the Proposed Orange Route and the Cutfoot Variation would each cross or be located within 1,500 feet of three state forests. These state forests are aesthetic resources with high visual sensitivity. Neither the proposed route nor variation would affect other aesthetic resources such as historic architectural sites, state trails, etc., or residences with high visual sensitivity within 1,500 feet of the anticipated alignments for the Proposed Orange Route or Cutfoot Variation.

The Cutfoot Variation is slightly longer (4.8 miles) than the Proposed Orange Route (Table 6-143) and neither route parallel an existing large transmission line. Therefore contrast for both transmission lines would be similar, but potentially slightly greater for the slightly longer Cutfoot Variation.

Although the Proposed Orange Route and Cutfoot Variation would affect aesthetic resources with high visual sensitivity similarly (i.e., three state forests), the Cutfoot Variation may have a greater effect on aesthetic resources because it is slightly longer than the Proposed Orange Route. For these reasons, the Proposed Orange Route is likely to result in slightly less aesthetic impact than the Cutfoot Variation.

Although the Proposed Orange Route and the Cutfoot Variation do not parallel existing large transmission lines of similar size and design, they are both short in length and affect no residences and very few other sensitive visual resources (three state forests).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Table 6-142 Construction Costs in the Northome Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|----------------|-----------------------------|--------------|-------------------------|-------------|
| Northome | J2 Segment Option Variation | \$4,192,942 | \$1,121,108 | 3.7 |
| | Northome Variation | \$6,385,615 | \$1,596,404 | 4 |

Source(s): Minnesota Power 2015, reference (9)

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-144 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Orange Route and Cutfoot Variation in the Cutfoot Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the Cutfoot Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Orange Route and Cutfoot Variation are shown on Map 6-46.

The Proposed Orange Route and Cutfoot Variation ROI are both primarily composed of forested and/or swamp land (Table 6-144). The Cutfoot Variation ROW contains a slightly greater amount of forested/swamp land than the Proposed Orange Route. A similar amount of developed and disturbed land is located in both the Proposed Orange Route and Cutfoot Variation ROI, while no agricultural land is present in either ROI.

Land Ownership and Management

Table 6-145 and Figure 6-93 show the Proposed Orange Route and Cutfoot Variation ROW contain a similar amount of state forest land and state fee land. No impacts to county lands, state conservation easements, or USFWS Interest Lands would occur under the Proposed Route or Cutfoot Variation.

Neither the Proposed Orange Route nor the Cutfoot Variation would parallel an existing ROW (see Section 6.3.8.6).

Table 6-143 Aesthetic Resources within the ROI in the Cutfoot Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Cutfoot Variation Area | |
|---|--|------------------------|-------------------|
| | | Proposed Orange Route | Cutfoot Variation |
| Transmission Line | Length (mi) | 4.2 | 4.8 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 0 | 0 |
| State Forests | Count within 0-1,500 ft | 3 | 3 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

(2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Impacts to land use from the proposed Project in the Cutfoot Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Orange Route and Cutfoot Variation would both 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. The length of the route that would parallel an existing corridor is also important. The Cutfoot Variation avoids slightly more state forest and state fee lands than the Proposed Orange Route, but would impact slightly more state forest land. Neither the Cutfoot Variation nor the Proposed Orange Route would parallel an existing corridor.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.8.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Cutfoot Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Cutfoot Variation Area are summarized in Table 6-146.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-146 and Figure 6-94 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide

Table 6-144 Land Uses within the ROI in the Cutfoot Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Cutfoot Variation Area | |
|--|------------------------|-------------------------------------|------------------------|-------------------|
| | | | Proposed Orange Route | Cutfoot Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 1,697 | 1,887 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 15 | 13 |
| | Agricultural | Acres within 0–1,500 ft | 0 | 0 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 1,652 | 1,874 |
| | Other | Acres within 0–1,500 ft | 30 | 0 |

Source(s): USGS 2001, reference (151)

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

- (1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-145 Land Ownership/Management within the Anticipated ROW in the Cutfoot Variation Area

| Resource | Type | Evaluation Parameter | Cutfoot Variation Area | |
|--|---|----------------------|------------------------|-------------------|
| | | | Proposed Orange Route | Cutfoot Variation |
| Total Lands | -- | Acres within ROW | 103 | 116 |
| State Forests | -- | Acres within ROW | 103 | 116 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 95 | 93 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 0 | 0 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 30 | 20 |
| | Trust Fund | Acres within ROW | 65 | 73 |
| | Federal - State Lease | Acres within ROW | 0 | 0 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 8 | 23 |

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.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

importance that would be impacted by the Proposed Orange Route and Cutfoot Variation in the ROI.

The Cutfoot Variation would pass through more acres of farmland, including prime farmland if drained (Figure 6-94). The Proposed Orange Route and Cutfoot Variation would each impact less than 5 acres of farmland of statewide importance and no prime farmland. Because there are fewer acres of farmland in the ROI of the Proposed Orange Route, it would be expected to result in fewer impacts on farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion.

Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

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Table 6-146 Land-Based Economy Resources within the Anticipated ROW in the Cutfoot Variation Area

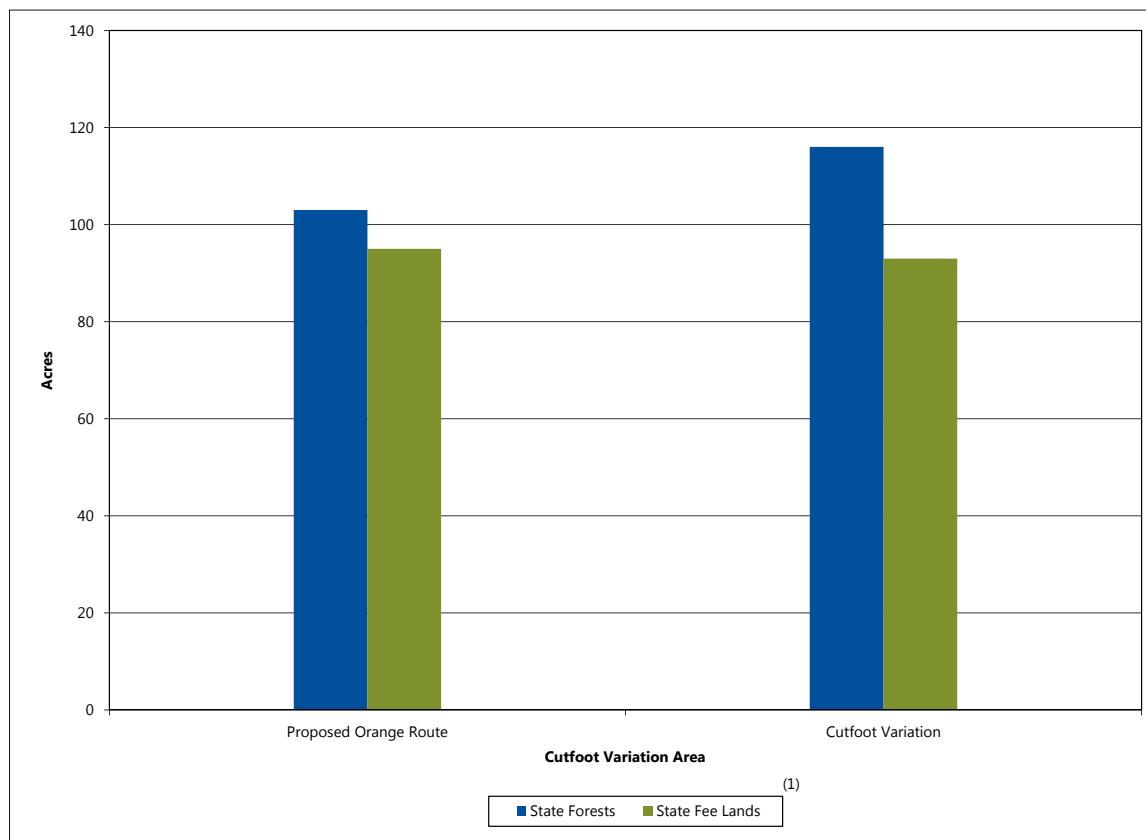
| Resource | Type | Evaluation Parameter | Cutfoot Variation Area | |
|---|----------------------------------|--|------------------------|-------------------|
| | | | Proposed Orange Route | Cutfoot Variation |
| Transmission Line | -- | Length (mi) | 4.2 | 4.8 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 0 | 0 |
| Farmland | Not Farmland | Acres within ROW | 48 | 81 |
| | Prime Farmland if Drained | Acres within ROW | 53 | 32 |
| | Farmland of Statewide Importance | Acres within ROW | 2 | 4 |
| | All Areas are Prime Farmland | Acres within ROW | 0 | 0 |
| State Forest | -- | Acres within ROW | 103 | 116 |
| State Mineral Leases (active and/or terminated/expired) | -- | Acres within ROW | 29 | 4 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-93 Public Land Ownership/Management within the ROI in the Cutfoot Variation Area

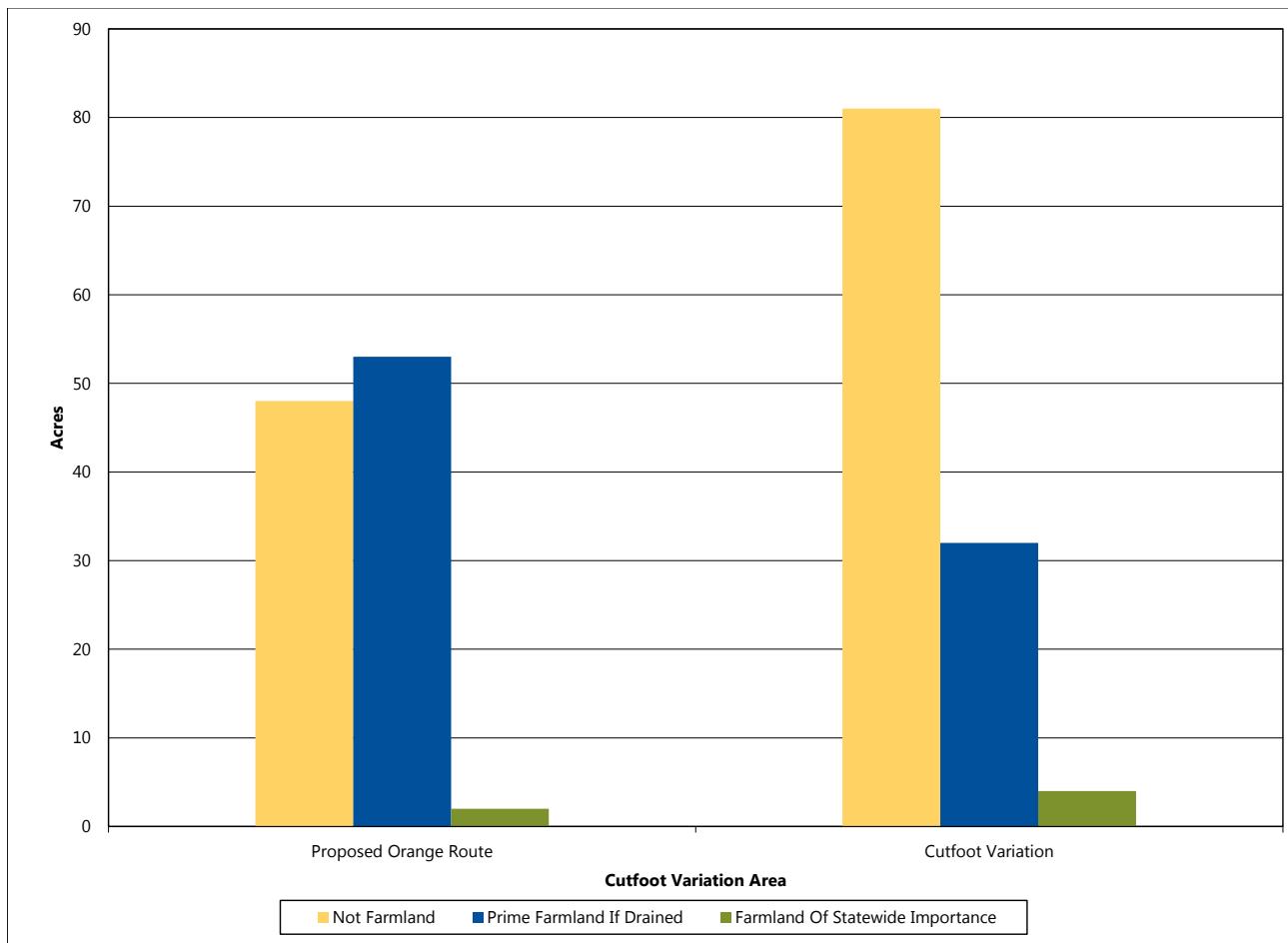


Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152)

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.

Figure 6-94 Acres of Farmland by Type within the Anticipated ROW in the Cutfoot Variation Area



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

Source(s): USDA NRCS 2014, reference (154)

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-146 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Orange Route and the Cutfoot Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Orange Route or the Cutfoot Variation in the Cutfoot Variation Area.

The Cutfoot Variation would cross more acres of state forest lands—the Koochiching and Big Fork State Forests—than the Proposed Orange Route (Figure 6-95); therefore the Proposed Orange Route would be expected to have fewer impacts on timber activities on State Forest lands.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct

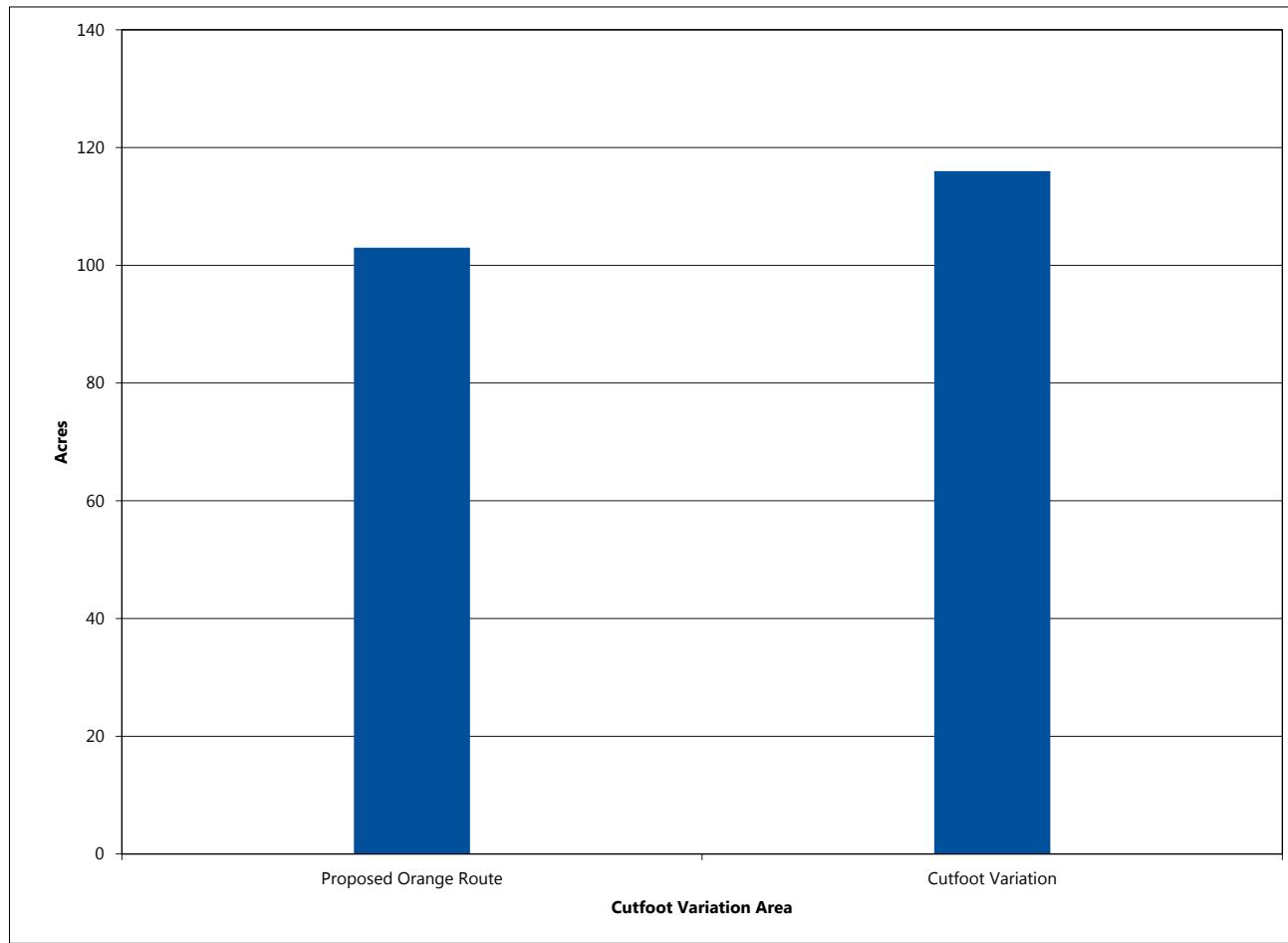
adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-146, Figure 6-96, and Map 6-46 identify the acreage of mining lands with terminated/expired state mineral leases that may be

Figure 6-95 Acres of State Forest Land within the Anticipated ROW in the Cutfoot Variation Area



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

Source(s): MnDNR 2003, reference (148)

impacted in the Cutfoot Variation Area. There are no active mineral leases in the ROI of either the Proposed Orange Route or the Cutfoot Variation. Map 6-46 identifies the state aggregate resources that may be impacted in the Cutfoot Variation Area.

The Proposed Orange Route traverses several acres of mining lands with terminated/expired state mineral leases, while the Cutfoot Variation deviates away from the majority of these state mineral lease lands (Map 6-46). Due to the higher concentration of state mineral lease lands in the ROI, the Proposed Orange Route could potentially result in greater interference with future mining activities in this area.

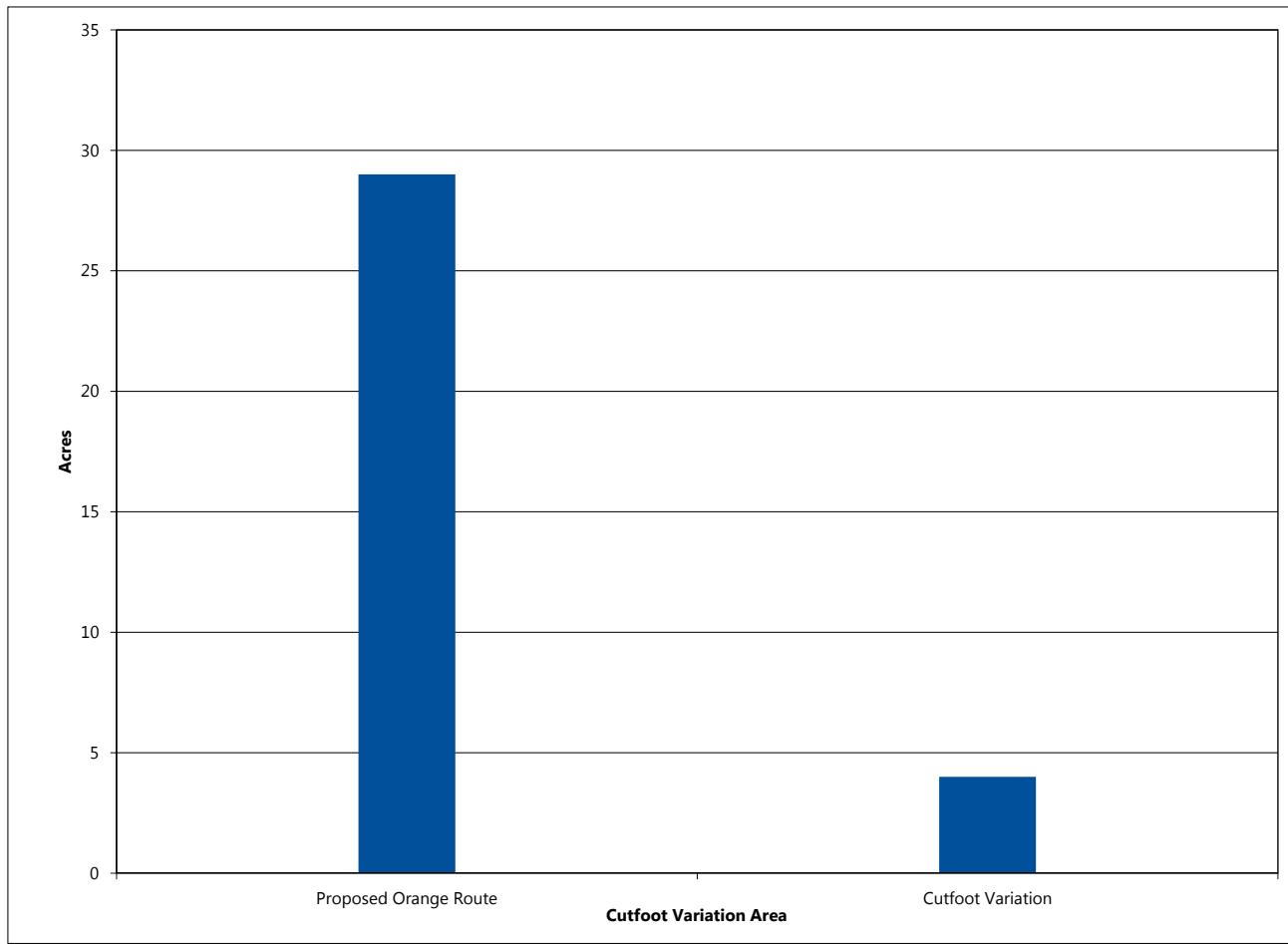
According to the Minnesota Department of Transportation Aggregate Source Information System data, aggregate resources are present within the vicinity of both the Proposed Orange Route and the Cutfoot Variation (Map 6-46). Based on review of the aggregate resource data in conjunction with 2013 aerial photographs (described in Section 5.3.2.3), there is one aggregate resource within the ROI of the

Proposed Orange Route and one aggregate resource within the ROI of the Cutfoot Variation. Both the Proposed Orange Route and the Cutfoot Variation could interfere with current or future aggregate mining activities. The full extent of impacts on aggregate resources in the Proposed Orange Route and Cutfoot Variation, and whether micro siting of the anticipated alignment within an approved route width can avoid these impacts, cannot be determined without field surveys.

As discussed in Section 5.4.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid,

Figure 6-96 Acres of State Mineral Leases within the Anticipated ROW in the Cutfoot Variation Area



Source(s): MnDNR 2014, reference (179)

minimize, or mitigate impacts on these resources from the proposed Project.

6.3.8.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential indirect effects to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites.

Table 6-147 provides a summary of the previously recorded archaeological and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Orange Route and Cutfoot Variation in the Cutfoot Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

Within the Cutfoot Variation Area, there are no previously recorded archaeological sites or historic architectural resources within the proposed ROW. Additionally, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Orange Route and Cutfoot Variation in the Cutfoot Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Additionally, there are no historic architectural sites documented within the indirect APE (one mile) of the proposed transmission line for either the Proposed Orange Route or Cutfoot Variation.

There is currently no known potential for direct, long-term, adverse, effects to archaeological sites or historic architectural resources within the Cutfoot Variation Area since none are documented within the

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ROW. Since there are not any historic architectural sites within the indirect APE of either the Proposed Orange Route or the Cutfoot Variation, no adverse indirect long-term effects are expected to occur.

The Proposed Orange Route and Cutfoot Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural site surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resources investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential adverse effects to historic architectural sites, including traditional cultural resources, from construction and operation of the proposed Project.

Potential short-term and long-term adverse effects from construction, operation, maintenance, and emergency repair-related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse

effects to these resources, including TCPs, from the proposed Project.

6.3.8.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Cutfoot Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Cutfoot Variation Area are summarized in Table 6-148 and shown on Map 6-48. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmission structures in wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Orange Route and the Cutfoot Variation. Neither the Proposed Orange Route nor the Cutfoot Variation ROWs contain PWIs, trout streams, impaired waters, or floodplains.

The Proposed Orange Route would cross two non-PWI waterbodies, while the Cutfoot Variation

Table 6-147 Archaeological and Historic Resources within the Cutfoot Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Cutfoot Variation Area | |
|------------------------------|-------------------------------------|------------------------|-------------------|
| | | Proposed Orange Route | Cutfoot Variation |
| Historic Architectural Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |
| | Count within 0–5,280 ft | 0 | 0 |
| Archaeological Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-148 Water Resources within the Anticipated ROW in the Cutfoot Variation Area

| Resource | Evaluation Parameter | Cutfoot Variation Area | |
|-------------------------------|----------------------|------------------------|-------------------|
| | | Proposed Orange Route | Cutfoot Variation |
| Transmission Line | Length (mi) | 4.2 | 4.8 |
| Non-PWI Waters ⁽¹⁾ | Number of Crossings | 2 | 0 |
| NWI Wetlands | Acres within ROW | 57 | 67 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

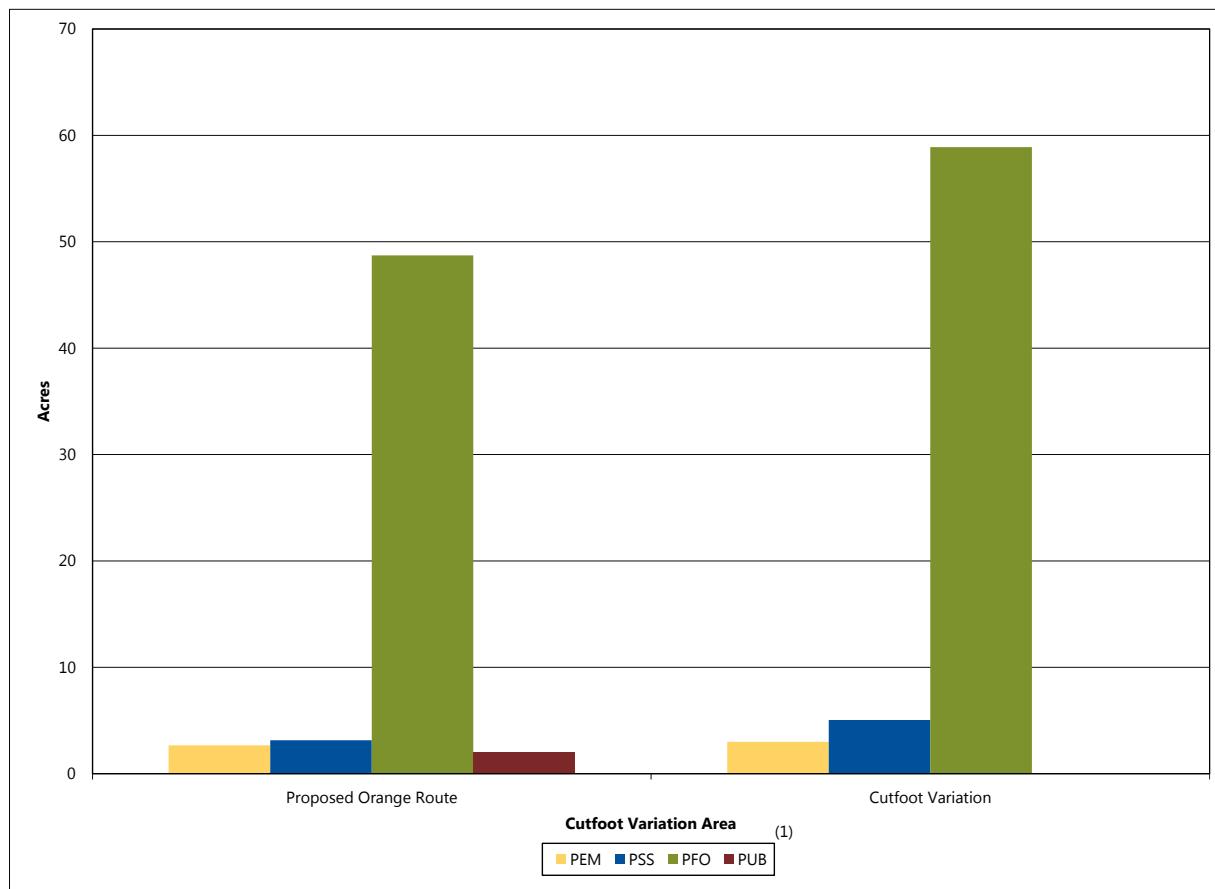
would not require crossing non-PWI watercourses or waterbodies. It is anticipated that these non-PWI water crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Based on the NWI, the Proposed Orange Route and the Cutfoot Variation would both require conversion of forested shrub and wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-97, the Cutfoot Variation contains more forested and shrub wetlands compared to the Proposed Orange Route and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would

need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed Orange Route and the Cutfoot Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill would be expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed Orange Route and the Cutfoot Variation would both require temporary construction access through wetlands, which is also expected to be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-

Figure 6-97 Acres of Wetland by Type within the Anticipated ROW in the Cutfoot Variation Area



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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

Source(s): USFWS 1997, reference (157)

Table 6-149 Vegetation Resources within the Anticipated ROW in the Cutfoot Variation Area

| Resource | Evaluation Parameter | Cutfoot Variation Area | |
|--|--|------------------------|-------------------|
| | | Proposed Orange Route | Cutfoot Variation |
| Transmission Line | Length (mi) | 4.2 | 4.8 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 |
| State Forest | Acres within ROW | 103 | 116 |
| Total Forested GAP Land Cover | Acres within ROW | 99 | 115 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 28 | 30 |
| North American Boreal Forest | Acres within ROW | 30 | 64 |
| Eastern North American Flooded and Swamp Forest | Acres within ROW | 39 | 20 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

(3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Cutfoot Variation Area are summarized in Table 6-149 and shown on Maps 5-12 and 6-48. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation for the Proposed Orange Route and Cutfoot Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-149 and Figure 6-98, due to its slightly longer length, the Cutfoot Variation would pass through slightly more forested land, including approximately 13 more acres of state forest land, therefore resulting in more permanent removal of forested vegetation. Both the Proposed Orange Route and the Cutfoot Variation would require creation of new corridor for their entire length (Table 6-149). Because the Cutfoot Variation is 0.6 miles longer, it would result in more fragmentation of intact forest in areas where forest

vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

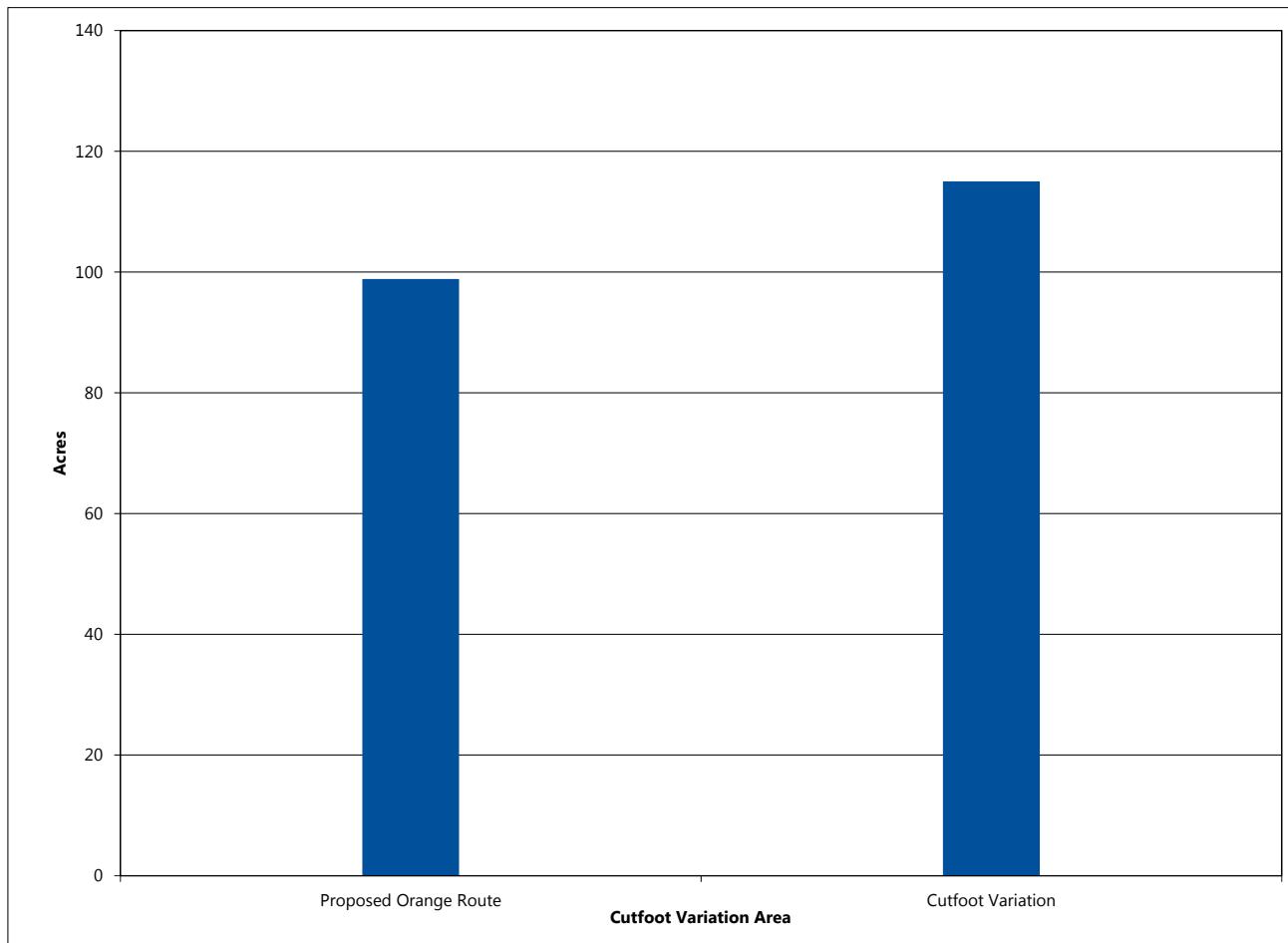
Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Cutfoot Variation Area are shown on Map 6-48. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Orange Route and Cutfoot Variation include loss and fragmentation of natural wildlife habitat; no managed wildlife habitats are present within the ROI of the Proposed Orange Route or Cutfoot Variation. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.8.4 (Vegetation) summarizes potential

Figure 6-98 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Cutfoot Variation Area



Source(s): USGS 2001, reference (151)

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

impacts on forested vegetation from the Proposed Orange Route and Cutfoot Variation.

Both the Proposed Orange Route and the Cutfoot Variation would require creation of new transmission line corridor for their entire length, with the Cutfoot Variation requiring approximately 0.6 more miles of new corridor than the Proposed Orange Route. The longer length of the Cutfoot Variation would result in more habitat fragmentation and potentially more impacts on wildlife currently inhabiting the area.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.3.8.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased

habitat fragmentation, including critical habitat designated for gray wolf.

No state or federally listed species have been documented within one mile of the Proposed Orange Route or Cutfoot Variation. However, the full extent of potential impacts from either the Proposed Orange Route or Cutfoot Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Both the Proposed Orange Route and the Cutfoot Variation would cross critical habitat designated for gray wolf, with the Proposed Orange Route crossing this habitat for approximately 4 miles and the Cutfoot Variation crossing it for approximately 5 miles. Neither the Proposed Orange Route nor the Cutfoot Variation would parallel an existing transmission line corridor. The Proposed Orange Route would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross slightly less of this resource than the Cutfoot Variation.

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. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Cutfoot Variation Area are summarized in Table 6-150 and shown on Map 6-49; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Orange Route and Cutfoot Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated in Table 6-150 and on Map 6-49, the Cutfoot Variation, which is just over one-half mile longer than the Proposed Orange Route, would pass through more acres of MBS Sites of Biodiversity Significance than the Proposed Orange Route. Because of this, the Cutfoot Variation would likely result in more impacts on MBS Sites of Biodiversity Significance and the rare communities and species associated with them.

The rare communities and resources listed in Table 6-150 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. 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.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.8.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-50 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Cutfoot Variation Area.

The Proposed Orange Route and Cutfoot Variation would not parallel any existing corridors or linear features in the Cutfoot Variation Area.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.3.8.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-151 summarizes the costs associated with constructing the Proposed Orange Route and the Cutfoot Variation in the Cutfoot Variation Area. As indicated in Table 6-151, the Cutfoot Variation would cost more to construct than the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$7,000 to \$7,700 annually for these alternatives in the Cutfoot Variation Area.

6.3.9 Relative Merits Summary

As discussed in Section 1.2.1.1, the MN PUC is charged with selecting routes that minimize adverse human and environmental impacts while ensuring continuing electric power system reliability and integrity. MN PUC must take into account the 14 factors identified in Minnesota Rules, part 7850.4100 when making a decision on a Route Permit. See Section 6.2.6 for additional details on the relative merits analysis methodology.

6.3.9.1 Pine Island Variation Area

Within the Pine Island Variation Area, the analysis indicates a trade-off between impacts to human settlement factors and impacts to natural environment factors. Though both **alternatives** would pass through reaches of forest lands and floodplain and forested wetlands too large to span, the Proposed Orange Route would cross **fewer**, resulting in placement of fewer structures in floodplains and requiring the least wetland type conversion. The Proposed Blue Route would have a greater impact on the watercourse/waterbody crossing indicator of the water resources element as it would cross a trout stream, potentially requiring vegetation along the banks of the stream to be cleared. With respect to the wildlife element of the natural environment factor, the Proposed Orange Route would cross more of the WMA and Important Bird Area. The Proposed Orange Route may have more impacts on the federal and state

Table 6-150 Rare Communities and Resources within the Vicinity of the Cutfoot Variation Area

| Resource | Evaluation Parameter | Cutfoot Variation Area | |
|---|--|------------------------|-------------------|
| | | Proposed Orange Route | Cutfoot Variation |
| Transmission Line | Length (mi) | 4.2 | 4.8 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 |
| MBS Sites of Biodiversity Significance ⁽³⁾ | Acres within ROW | 43 | 60 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

Table 6-151 Construction Costs in the Cutfoot Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|----------------|-----------------------|--------------|-------------------------|-------------|
| Cutfoot | Proposed Orange Route | \$5,640,538 | \$1,336,620 | 4.2 |
| | Cutfoot Variation | \$6,222,257 | \$1,309,949 | 4.8 |

Source(s): Minnesota Power 2015, reference (9)

listed species element of the rare and unique natural resources factor because there are more NHIS records present within one mile. In contrast, the Proposed Blue Route may have more impacts to the rare community element of the rare and unique natural resources factor because it crosses more Ecologically Important Lowland Conifer stands.

The Proposed Blue Route would impact the aesthetics element of the human settlement factor by passing near more residences than the Proposed Orange Route. Although the Proposed Orange Route would pass near the Big Bog Recreation area, a valued resource with respect to both the aesthetics element and the recreation and tourism element of the human settlement factor, the Proposed Orange Route would not be visible from the Big Bog Recreation Area. The Proposed Blue Route crosses more private land and both the Proposed Blue Route and the Proposed Orange Route would cross USFWS Interest Lands, affecting the land use compatibility element of the human settlement factor; however, the Proposed Blue Route could avoid USFWS Interest Lands, by using the Silver Creek Alignment Modification. The Proposed Blue Route would cross more expired/terminated state mineral lease lands, affecting the mining and mineral resources element of the land based economies factor, although the Proposed Orange Route would pass in close proximity to more aggregate resources. The Proposed Blue Route would parallel existing corridors, including transmission line corridors, for a greater length than the Proposed Orange Route. The Proposed Blue Route would cost less to construct.

Table 6-152 provides an overview of this relative merits assessment for the alternatives in the Pine Island Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.2 Beltrami South Central Variation Area

The Beltrami South Central Variation would avoid USFWS Interest Lands, having less impact on the land use compatibility element of the human settlement factor. However, the Beltrami South Central Variation would have more impacts on the water resources and wildlife elements of the natural environment factor, as it would cross more forested and shrub wetland, requiring the most wetland type conversion, and would cross more

Important Bird Area. Furthermore, the Beltrami South Central Variation would not parallel any existing corridors and would be longer than the Proposed Orange Route, requiring more corner structures and costing more to build.

Table 6-153 provides an overview of this relative merits assessment for the alternatives in the Beltrami South Central Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.3 Beltrami South Variation Area

The Beltrami South Variation would avoid USFWS Interest Lands, having less impact on the land use compatibility element of the human settlement factor. However, the Beltrami South Variation would have more impact on the mining and mineral resources element of the land based economies factor because it would cross more expired/terminated state mineral lease lands. The Beltrami South Variation may also have more impact on the federal and state listed species element of the rare and unique resources factor because there are more NHIS records documented within one mile of it, including a state-threatened species. Furthermore, the Beltrami South Variation would not parallel any existing corridors and would be longer than the Proposed Orange Route, requiring more corner structures and costing more to build.

Table 6-154 provides an overview of this relative merits assessment for the alternatives in the Beltrami South Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.4 North Black River Variation Area

The North Black River Variation would have more impacts to the aesthetics and land use compatibility elements of the human settlement factor as it would pass close to more residences and crosses more private land than the Proposed Blue Route, but these impacts are moderated to some extent by paralleling existing roadway and transmission line corridors.

Some impacts associated with the North Black River Variation may be moderated by paralleling existing corridors for its entire length; the proposed Blue Route would not parallel any existing corridors. The North Black River Variation is longer and would have a slightly higher construction cost.

Table 6-155 provides an overview of this relative merits assessment for the alternatives in the North Black River Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.5 C2 Segment Option Variation Area

The C2 Segment Option Variation would have more potential impacts to the aesthetic and land use compatibility elements of human settlement factor as it would pass near more residences and private land; but these impacts are moderated to some extent by paralleling existing roadway and transmission line corridors for much of its length. The C2 Segment Option Variation could have more impact on the mining and mineral resources element of the land based economies factor, as it would also cross more state expired/terminated mineral lease lands. However, the Proposed Blue Route would have more impact on the forestry element of the land based economies factor, as it would cross almost three times more state forest land and would primarily do so while not paralleling existing corridor.

The C2 Segment Option Variation may have more impacts on the rare and unique natural resources factor, as it has a NHIS record for threatened species within one mile, has an SNA within 1,500 feet of the anticipated alignment and would pass through a SNA WPA. However, the C2 Segment Option Variation would moderate impacts to some extent by paralleling existing corridors. Due to its longer length and many angle structures, the C2 Segment Option Variation would cost more to construct than the Proposed Blue Route.

Table 6-156 provides an overview of this relative merits assessment for the alternatives in the C2 Segment Option Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.6 J2 Segment Option Variation Area

The J2 Segment Option Variation would have more impacts on the aesthetics and land use compatibility elements of the human settlement factor, as it would pass by more residences and private land and would cross USFWS Interest Lands. The J2 Segment Option Variation may also have more impact on the archaeological and historic architectural resources factor, as it would cross several sections with known archaeological and historic architectural resources. The J2 Segment Option Variation would cost more to construct due to its greater length.

The Proposed Orange Route may have more impact on the mining and mineral resources element of the land based economies factor, as it would cross more state expired/terminated mineral lease lands and aggregate resources. The Proposed Orange Route may also have more impact on the wildlife element of the natural environment factor, as it would cross more than three times as much Important Bird Area. Furthermore, the Proposed Orange Route may have more impact on both the federal and state listed species and rare communities elements of the rare and unique natural resources factor, as it would cross more critical habitat designated for gray wolf, has more NHIS records within one mile, and crosses more MBS Sites of Biodiversity Significance.

Table 6-157 provides an overview of this relative merits assessment for the alternatives in the J2 Segment Option Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.7 Northome Variation Area

The J2 Segment Option Variation would have a greater impact on the land use compatibility element of the human settlement factor by crossing USFWS Interest Lands. The J2 Segment Option Variation would also have more impact on the water resources element of the natural environment factor, as it would cross the most forested and shrub wetland, requiring the most wetland type conversion.

The Northome Variation would have more impact on the wildlife element of the natural environment factor, as it would cross a MnDNR-designated shallow lake. The Northome Variation may

also have more impacts on the archaeological and historic architectural resources factor, as it would cross a section with known archaeological resource. The Northome Variation is longer and would cost more to construct.

Table 6-158 provides an overview of this relative merits assessment for the alternatives in the Northome Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.8 Cutfoot Variation Area

The Cutfoot Variation may have more impact on the land use compatibility element of the human settlement factor, as it would cross more private land. The Cutfoot Variation may also have more impact on the rare community element of the rare and unique natural resources factor because it would cross more MBS Sites of Biodiversity Significance. The Cutfoot Variation would also cost more to construct.

The Proposed Orange Route may have more impact on the mining and mineral resources element of the land based economies factor because it would cross more state expired/terminated mineral lease lands.

Table 6-159 provides an overview of this relative merits assessment for the alternatives in the Cutfoot Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

Table 6-152 Relative Merits Assessment for the Pine Island Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | Pine Island Variation Area | | |
|--|----------------------------------|----------------------------|-----------------------|---|
| Factor | Element | Proposed Blue Route | Proposed Orange Route | Notes |
| Human settlement | Aesthetics | | | Proposed Blue Route would pass by more residences within 1,500 feet of the anticipated alignment. Proposed Orange Route would pass near the Big Bog Recreation Area, but is not visible. |
| | Land use compatibility | | | Proposed Blue Route and Proposed Orange Route would cross USFWS Interest Lands (8 acres and 16 acres, respectively), but the Proposed Blue Route could avoid it by using the Silver Creek Alignment Modification. Proposed Orange Route would pass near the Big Bog Recreation Area, but is not visible. Proposed Blue Route crosses more private land than the Proposed Orange Route. |
| Land-based economies | Agriculture | | | Proposed Blue Route and Proposed Orange Route would cross a relatively similar amounts of farmland. |
| | Forestry | | | Proposed Blue Route and Proposed Orange Route would cross relatively similar amounts of state forest land. |
| | Mining and mineral resources | | | Proposed Blue Route would cross more expired/terminated mineral lease lands. Proposed Orange route would pass in close proximity to more aggregate resources. |
| Archaeological and historic architectural resources | | | | Proposed Blue Route would cross a section identified as containing known archaeological resources; Proposed Orange Route does not cross any of these sections. Proposed Orange Route has more historic architectural sites within 1 mile than the Proposed Blue Route. |
| Natural environment | Water resources | | | Proposed Blue Route and Proposed Orange Route would cross similar numbers of watercourses/ waterbodies; however, the Proposed Blue Route would cross one trout stream. All crossings are expected to be spanned, although clearing vegetation adjacent to trout streams could result in increased water temperature, potentially resulting in less suitable trout habitat. Both alternatives would cross relatively similar areas of FEMA-designated floodplain that cannot be spanned. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | | | Proposed Blue Route and Proposed Orange Route would cross a relatively similar amount of forested land cover. |
| | Wildlife | | | Both alternatives would cross a WMA and Important Bird Area. Proposed Orange Route would cross a greater portion of these areas. |
| Rare and unique natural resources | Federal and state-listed species | | | There are no federally listed species identified for these alternatives. Both alternatives would cross critical habitat designated for gray wolf. Proposed Orange Route has more threatened and endangered NHIS records within 1 mile. |
| | State rare communities | | | Proposed Blue Route and Proposed Orange Route would have an SNA within 1,500 feet; however, the Proposed Blue Route would parallel an existing corridor in this area, while the Proposed Orange Route would not. Proposed Orange Route would cross more SNA WPAs. Proposed Blue Route would cross more Ecologically Important Lowland Conifer Areas. |
| Use or paralleling of existing ROWs | | | | Both alternatives would parallel existing transmission line, roadway, and/or trail corridor. |
| Electrical system reliability | | | | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | | | The cost of the alternative is within 20% of the cost of the Proposed Blue Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-153 Relative Merits Assessment for the Beltrami South Central Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | Beltrami South Central Variation Area | | |
|--|----------------------------------|---------------------------------------|----------------------------------|--|
| Factor | Element | Proposed Orange Route | Beltrami South Central Variation | Notes |
| Human settlement | Aesthetics | | | No residences are present within 1,500 feet of the anticipated alignment for either alternative. |
| | Land use compatibility | Yellow | Green | Proposed Orange Route would cross USFWS Interest Lands (16 acres), while the Beltrami South Central Variation would not. Neither alternative would cross private land. |
| Land-based economies | Agriculture | | | Neither alternative would cross farmland. |
| | Forestry | | | Both alternatives cross relatively similar amounts of state forest land. Proposed Orange Route parallels existing corridor for its entire length. |
| | Mining and mineral resources | | | No active or expired/terminated mineral lease lands or aggregate resources are present in the ROW of any alternative. |
| Archaeological and historic architectural resources | | | | There are no known archaeological or historic architectural resources that would be affected by the alternatives. |
| Natural environment | Water resources | Green | Yellow | There are no differences between the alternatives for crossing watercourses, waterbodies, and floodplains. Proposed Orange Route and Beltrami South Central Variation would cross wetlands that are too large to span. Proposed Orange Route and Beltrami South Central Variation would cross relatively similar areas of wetlands that are too large to span would result in relatively similar areas of forest wetland type conversion. Beltrami South Central Variation would have the most shrub wetland; therefore, would require the most shrub wetland type conversion. |
| | Vegetation | | | Both alternatives would cross a relatively similar amounts of forested land cover. Proposed Orange Route parallels existing corridor for its entire length. |
| | Wildlife | Green | Yellow | Both alternatives would cross a relatively similar amount of Important Bird Area. Proposed Orange Route parallels existing corridor for its entire length. |
| Rare and unique natural resources | Federal and state-listed species | | | There are no federally listed species identified for these alternatives. Both alternatives have the same number of NHIS records within 1 mile. |
| | State rare communities | | | Both alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance. Proposed Orange Route would parallel existing corridor for its entire length. |
| Use or paralleling of existing ROWs | | Green | Red | Proposed Orange Route would parallel an existing transmission line, roadway, and/or trail corridor for the entire length. Beltrami South Central Variation would not parallel any corridors. |
| Electrical system reliability | | | | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Red | The cost of the alternative is more than 20% above the cost of the Proposed Orange Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-154 Relative Merits Assessment for the Beltrami South Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | Beltrami South Variation Area | | |
|--|----------------------------------|-------------------------------|-------------------------------|---|
| Factor | Element | Proposed Orange Route | Beltrami South Variation Area | Notes |
| Human settlement | Aesthetics | | | No residences are present within 1,500 feet of the anticipated alignment for either alternative. |
| | Land use compatibility | Yellow | Green | Beltrami South Variation would avoid USFWS Interest Lands. It is unknown whether the anticipated alignment of the Proposed Orange Route would impact USFWS Interest Lands; land surveys would need to be completed to determine impacts. Beltrami South Variation would cross more private land. |
| Land-based economies | Agriculture | | | Neither alternative would cross farmland. |
| | Forestry | | | Both alternatives cross relatively similar amounts of state forest land. Proposed Orange Route would parallel an existing transmission line corridor for its entire length. |
| | Mining and mineral resources | Green | Yellow | Beltrami South Variation crosses more expired/terminated mineral lease lands. |
| Archaeological and historic architectural resources | | | | There are no known archaeological and historic architectural resources that would be affected by the alternatives. |
| Natural environment | Water resources | | | There are no differences between the alternatives for crossing watercourses, waterbodies, or floodplains. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | | | Both alternatives would cross relatively similar amounts of state forest land. Proposed Orange Route would parallel an existing transmission line corridor for its entire length. |
| | Wildlife | | | Both alternatives would cross a relatively similar amount of Important Bird Area. Proposed Orange Route would parallel existing corridor for its entire length. |
| Rare and unique natural resources | Federal and state-listed species | Green | Yellow | There are no federally listed species identified for these alternatives. Both alternatives cross minimal amounts of critical habitat designated for gray wolf, with Beltrami South Variation crossing slightly more than the Proposed Orange Route. Beltrami South Variation has more NHIS records within 1 mile, including a NHIS record for a threatened species. |
| | State rare communities | | | Both alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance. Proposed Orange Route would parallel an existing transmission line corridor for its entire length. |
| Use or paralleling of existing ROWs | | Green | Red | Proposed Orange Route would parallel an existing transmission line, roadway, and/or trail corridor for the entire length. Beltrami South Variation would not parallel any corridors. |
| Electrical system reliability | | | | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Red | The cost of the alternative is more than 20% above the cost of the Proposed Orange Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-155 Relative Merits Assessment for the North Black River Variation Area

| Relative Merits ⁽¹⁾ | | North Black River Variation Area | | |
|--|----------------------------------|----------------------------------|-----------------------------|---|
| Factor | Element | Proposed Blue Route | North Black River Variation | Notes |
| Human settlement | Aesthetics | Green | Yellow | North Black River Variation would pass by more residences within 1,500 feet of the anticipated alignment. North Black River would parallel existing transmission line corridor for its entire length. |
| | Land use compatibility | Green | Yellow | North Black River Variation would cross more private land. |
| Land-based economies | Agriculture | Gray | Gray | Both alternatives would cross a relatively similar amount of farmland. |
| | Forestry | Gray | Gray | Both alternatives would cross a relatively similar amount of state forest land. North Black River Variation would parallel an existing transmission line corridor for its entire length. |
| | Mining and mineral resources | Gray | Gray | Both alternatives would cross a relatively similar amount of expired/terminated mineral lease lands. North Black River Variation would parallel an existing transmission line corridor for its entire length. |
| Archaeological and historic architectural resources | | Gray | Gray | There are no known archaeological and historic architectural resources that would be affected by the alternatives. |
| Natural environment | Water resources | Gray | Gray | There would be no differences between the alternatives for crossing watercourses, waterbodies, and floodplains. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | Gray | Gray | Both alternatives would cross a relatively similar amount of forested land cover. North Black River Variation would parallel an existing transmission line corridor for its entire length. |
| | Wildlife | Gray | Gray | Both alternatives would cross a relatively similar amount of Important Bird Area. North Black River Variation would parallel an existing transmission line corridor for its entire length. |
| Rare and unique natural resources | Federal and state-listed species | Gray | Gray | There are no federally listed species identified for these alternatives. The alternatives avoid critical habitat designated for gray wolf. There are no documented NHIS records within 1 mile of these alternatives. |
| | State rare communities | Gray | Gray | Both alternatives would cross a relatively similar amount of a SNA WPA and MBS Sites of Biodiversity Significance. North Black River Variation would parallel an existing transmission line corridor for its entire length. |
| Use or paralleling of existing ROWs | | Red | Green | North Black River Variation would parallel an existing transmission line, roadway, and/or trail corridor for its entire length. Proposed Blue Route would not parallel any corridors. |
| Electrical system reliability | | Gray | Gray | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Yellow | The cost of the alternative is within 20% of the cost of the Proposed Blue Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-156 Relative Merits Assessment for the C2 Segment Option Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | C2 Segment Option Variation Area | | |
|--|----------------------------------|----------------------------------|-----------------------------|---|
| Factor | Element | Proposed Blue Route | C2 Segment Option Variation | Notes |
| Human settlement | Aesthetics | Green | Yellow | C2 Segment Option Variation would pass by more residences within 1,500 feet of the anticipated alignment. C2 Segment Option Variation would parallel existing transmission line corridor for the majority of its length. |
| | Land use compatibility | Green | Red | C2 Segment Option Variation would pass near an airstrip, but could avoid potential impacts by using the Airstrip Alignment Modification. C2 Segment Option Variation would cross more private land. |
| Land-based economies | Agriculture | Gray | Gray | Both alternatives would cross farmland. C2 Segment Option Variation would parallel existing transmission line corridor for the majority of its length, while the Proposed Blue Route would not parallel any existing corridor. |
| | Forestry | Yellow | Green | Proposed Blue Route would cross more state forest land. |
| | Mining and mineral resources | Green | Yellow | C2 Segment Option Variation would cross more expired/terminated mineral lease lands. |
| Archaeological and historic architectural resources | | Gray | Gray | There are no known archaeological and historic architectural resources that would be affected by the alternatives. |
| Natural environment | Water resources | Gray | Gray | Proposed Blue Route would cross the most watercourses/waterbodies; however, all crossings are expected to be spanned. Proposed Blue Route and the C2 Segment Option Variation cross FEMA-designated floodplain. C2 Segment Option Variation would cross the most floodplain. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | Gray | Gray | Both alternatives would cross a relatively similar amount of forested land cover. C2 Segment Option Variation would parallel existing transmission line corridors for most of its length, while the Proposed Blue Route would not parallel any existing corridor. |
| | Wildlife | Gray | Gray | Both alternatives would cross a relatively similar amount of Important Bird Area. C2 Segment Option Variation would parallel existing transmission line corridors for most of its length, while the Proposed Blue Route would not parallel any existing corridor. |
| Rare and unique natural resources | Federal and state-listed species | Green | Yellow | There are no federally listed species identified for these alternatives. Both alternatives would cross the same amount of critical habitat designated for gray wolf. Both alternatives have the same number of NHIS records within 1 mile; however, the C2 Segment Option Variation has a NHIS record for a state-threatened species. |
| | State rare communities | Green | Yellow | C2 Segment Option Variation would have an SNA within 1,500 feet; however, it would not have an SNA within its ROW. The C2 Segment Option Variation also would pass through a SNA WPA. Both alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance and Ecologically Important Lowland Conifer Areas. C2 Segment Option Variation would parallel existing transmission line corridors for most of its length, while the Proposed Blue Route would not parallel any existing corridor. |
| Use or paralleling of existing ROWs | | Red | Green | C2 Segment Option Variation would parallel an existing transmission line, roadway, and/or trail corridor for most of its length. Proposed Blue Route would not parallel any existing transmission line, roadway, or trail corridor. |
| Electrical system reliability | | Gray | Gray | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Red | The cost of the alternative is more than 20% above the cost of the Proposed Blue Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-157 Relative Merits Assessment for the J2 Segment Option Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | J2 Segment Option Variation Area | | |
|--|----------------------------------|----------------------------------|-----------------------------|---|
| Factor | Element | Proposed Orange Route | J2 Segment Option Variation | Notes |
| Human settlement | Aesthetics | Green | Yellow | J2 Segment Option Variation would pass by more residences within 1,500 feet of the anticipated alignment. |
| | Land use compatibility | Green | Yellow | J2 Segment Option Variation would cross USFWS Interest Lands (28 acres) and would cross more private land. |
| Land-based economies | Agriculture | Gray | Gray | Both alternatives would cross a relatively similar amount of farmland. |
| | Forestry | Gray | Gray | Both alternatives would cross a relatively similar amount of state forest land. |
| | Mining and mineral resources | Yellow | Green | Both alternatives would cross a relatively similar amount of expired/terminated mineral lease lands. The Proposed Orange Route would pass by more aggregate resources. |
| Archaeological and historic architectural resources | | Green | Yellow | J2 Segment Option Variation has more historic architectural sites within 1 mile than the Proposed Orange Route. There are no known archaeological sites that would be affected by the alternatives. |
| Natural environment | Water resources | Gray | Gray | Both alternatives would cross relatively similar numbers of watercourses/waterbodies, all of which are expected to be spanned. Proposed Orange Route would cross FEMA-designated floodplains; however the areas are small and would be spanned. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | Gray | Gray | Both alternatives would cross a relatively similar amount of forested land cover. |
| | Wildlife | Yellow | Green | Proposed Orange Route would cross more of Important Bird Area. |
| Rare and unique natural resources | Federal and state-listed species | Yellow | Green | There are no federally listed species identified for these alternatives. Proposed Orange Route crosses more critical habitat designated for gray wolf. Proposed Orange Route has more NHIS records within 1 mile. Proposed Orange Route has 2 threatened NHIS records within 1 mile. |
| | State rare communities | Yellow | Green | Proposed Orange Route would cross more MBS Sites of Biodiversity Significance. |
| Use or paralleling of existing ROWs | | Gray | Gray | Neither alternative would parallel existing transmission line, roadways, or trails corridors. |
| Electrical system reliability | | Gray | Gray | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Yellow | The cost of the alternative is within 20% of the cost of the Proposed Orange Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-158 Relative Merits Assessment for the Northome Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | Northome Variation Area | | |
|--|----------------------------------|-----------------------------|--------------------|---|
| Factor | Element | J2 Segment Option Variation | Northome Variation | Notes |
| Human settlement | Aesthetics | | | No residences are present within 1,500 feet of the anticipated alignment for either alternative. |
| | Land use compatibility | Yellow | Green | J2 Segment Option Variation would cross USFWS Interest Lands (28 acres). Both alternatives would cross a relatively similar amount of private land. |
| Land-based economies | Agriculture | | | Both alternatives cross a relatively similar amount of farmland. |
| | Forestry | | | Both alternatives would cross minimal state forest land. |
| | Mining and mineral resources | | | No active or expired/terminated mineral lease lands or aggregate resources are present in the ROW of any alternative. |
| Archaeological and historic architectural resources | | Green | Yellow | Northome Variation would cross a section identified with a known archaeological resource. There are no known historic architectural sites that would be affected by either alternative. |
| Natural environment | Water resources | Yellow | Green | J2 Segment Option Variation would cross the most watercourses/waterbodies; however, all crossings are expected to be spanned. There would be no differences between the alternatives for crossing floodplains. J2 Segment Option Variation and Northome would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of forest wetland type conversion. J2 Segment Option Variation would have the most shrub wetland; therefore, would require the most shrub wetland type conversion. |
| | Vegetation | | | Both alternatives would cross a relatively similar amount of forested land cover. |
| | Wildlife | Green | Yellow | Northome Variation would cross a shallow lake. |
| Rare and unique natural resources | Federal and state-listed species | | | There are no federally listed species identified for these alternatives. There are no documented NHIS records within 1 mile of these alternatives. |
| | State rare communities | | | No records of rare resources or communities have been documented in the ROW of either alternative. |
| Use or paralleling of existing ROWs | | | | Neither alternative would parallel existing transmission line, roadways, or trails corridors. |
| Electrical system reliability | | | | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Red | The cost of the alternative is more than 20% above the cost of the Proposed Blue Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

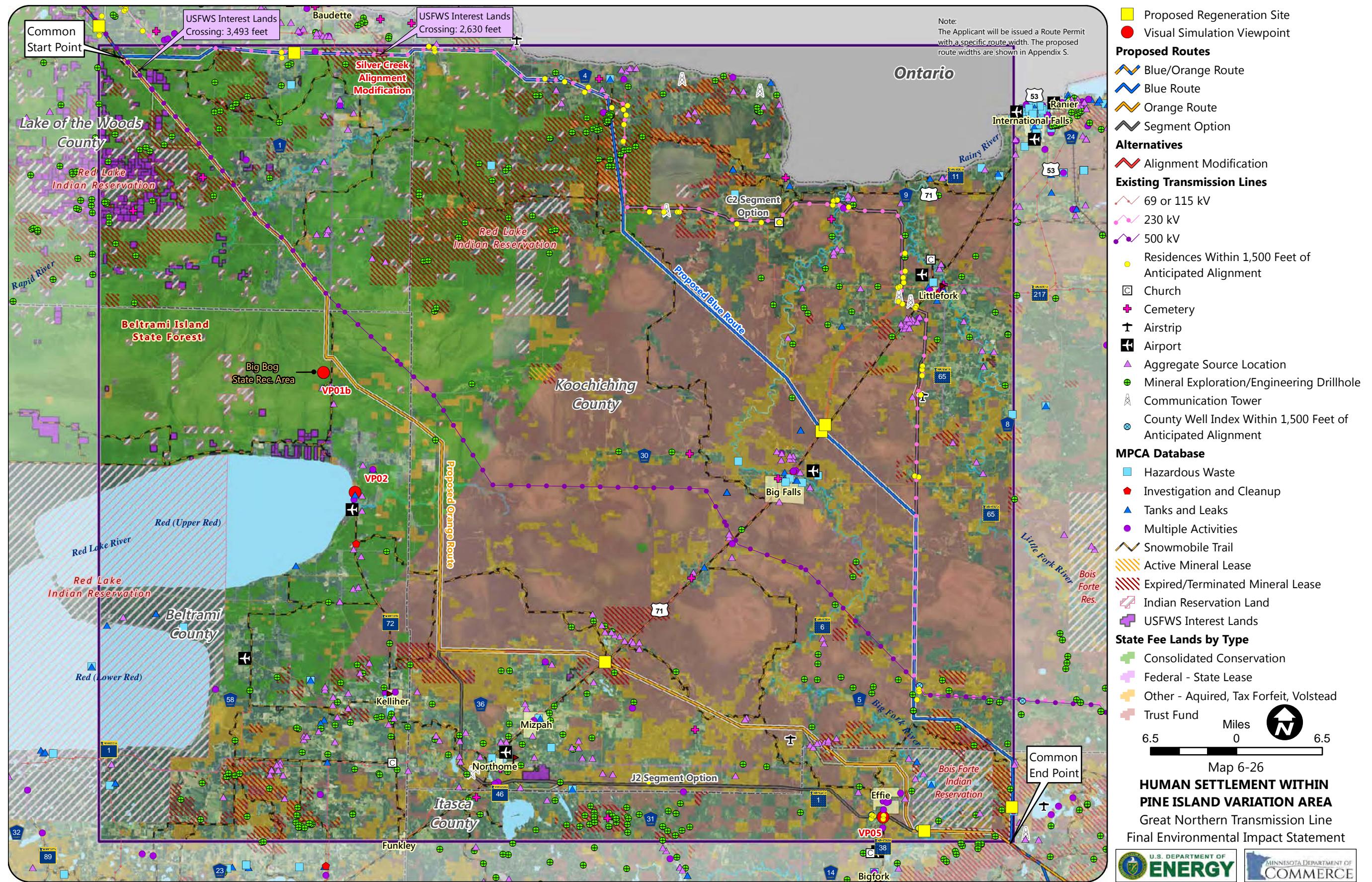
Table 6-159 Relative Merits Assessment for the Cutfoot Variation Area⁽²⁾

| Relative Merits ⁽¹⁾ | | Cutfoot Variation Area | | |
|--|----------------------------------|------------------------|-------------------|--|
| Factor | Element | Proposed Orange Route | Cutfoot Variation | Notes |
| Human settlement | Aesthetics | | | No residences are present within 1,500 feet of the anticipated alignment for either alternative. |
| | Land use compatibility | Green | Yellow | The Cutfoot Variation would cross more private land. |
| Land-based economies | Agriculture | | | Both alternatives would cross a relatively similar amount of farmland. |
| | Forestry | | | Both alternatives would cross a relatively similar amount of state forest land. |
| | Mining and mineral resources | Yellow | Green | Proposed Orange Route would cross more expired/terminated mineral lease lands. Both alternatives have aggregate resources within the ROW. |
| Archaeological and historic architectural resources | | | | Proposed Orange Route would cross more expired/terminated mineral lease lands. Both alternatives have aggregate resources within the ROW. |
| Natural environment | Water resources | | | Proposed Orange Route would cross the most watercourses/waterbodies; however, all crossings are expected to be spanned. There would be no differences between the alternatives for crossing floodplains. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | | | Both alternatives would cross a relatively similar amount of forested land cover. |
| | Wildlife | | | Neither alternative would cross designated wildlife resources. |
| Rare and unique natural resources | Federal and state-listed species | | | There are no federally listed species identified for these alternatives. Both alternatives would cross minimal amounts of critical habitat designated for gray wolf. There are no NHIS records within 1 mile of these alternatives. |
| | State rare communities | Green | Yellow | Cutfoot Variation would cross more MBS Sites of Biodiversity Significance. |
| Use or paralleling of existing ROWs | | | | Neither alternative would parallel existing transmission line, roadways, or trails corridors. |
| Electrical system reliability | | | | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Yellow | The cost of the alternative is within 20% of the cost of the Proposed Orange Route. |

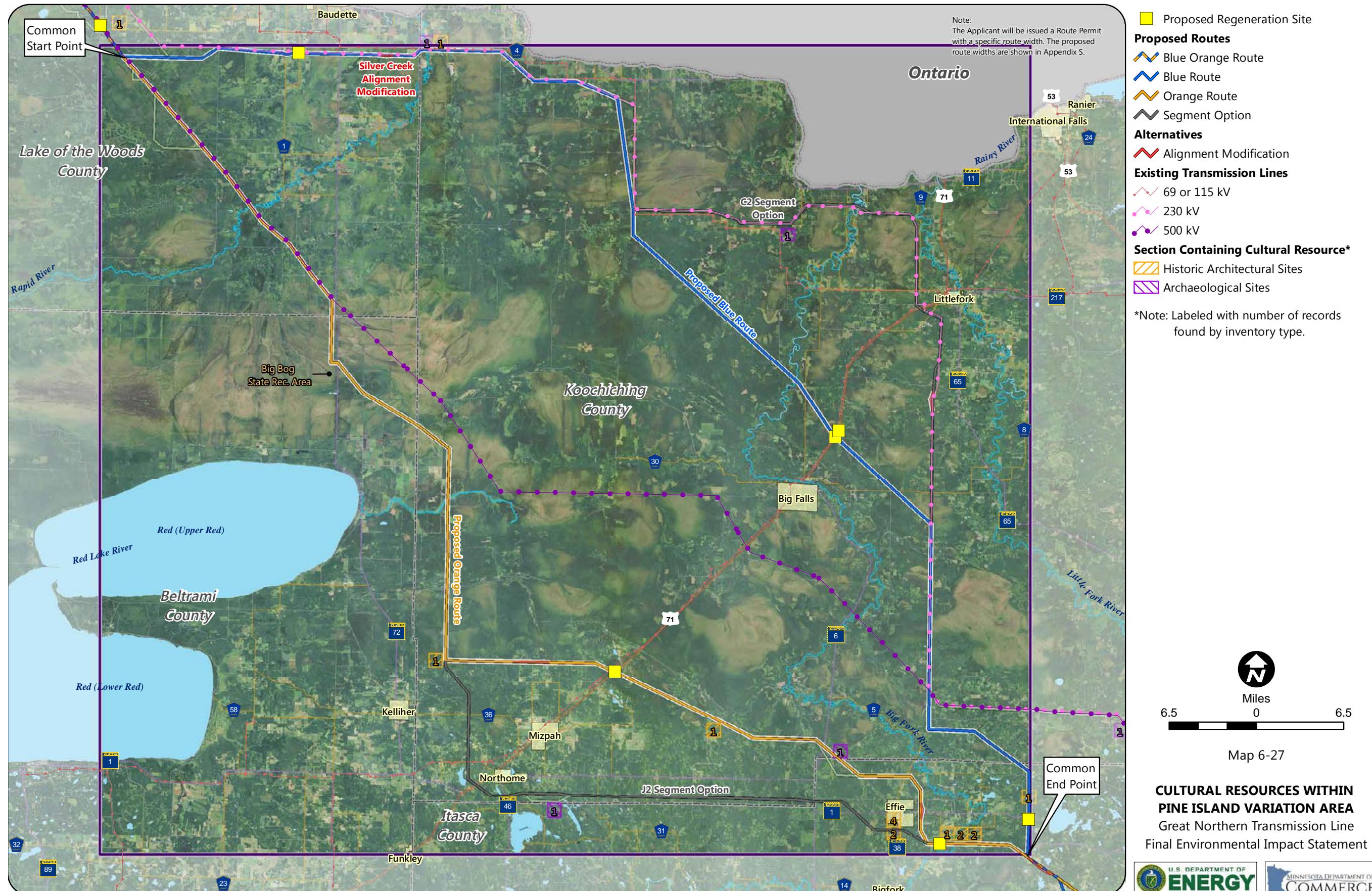
(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

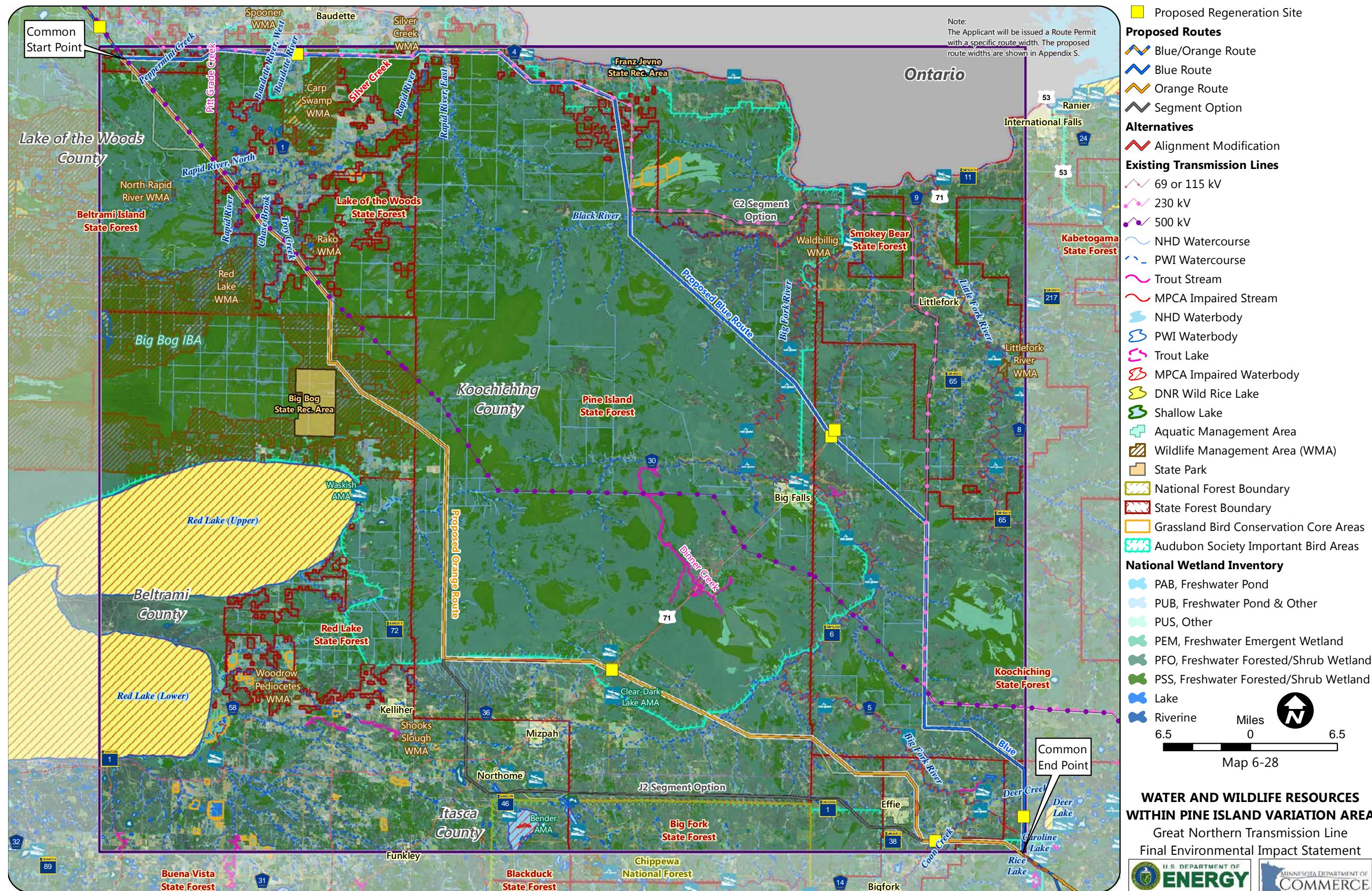
Map 6-26 Human Settlement within Pine Island Variation Area



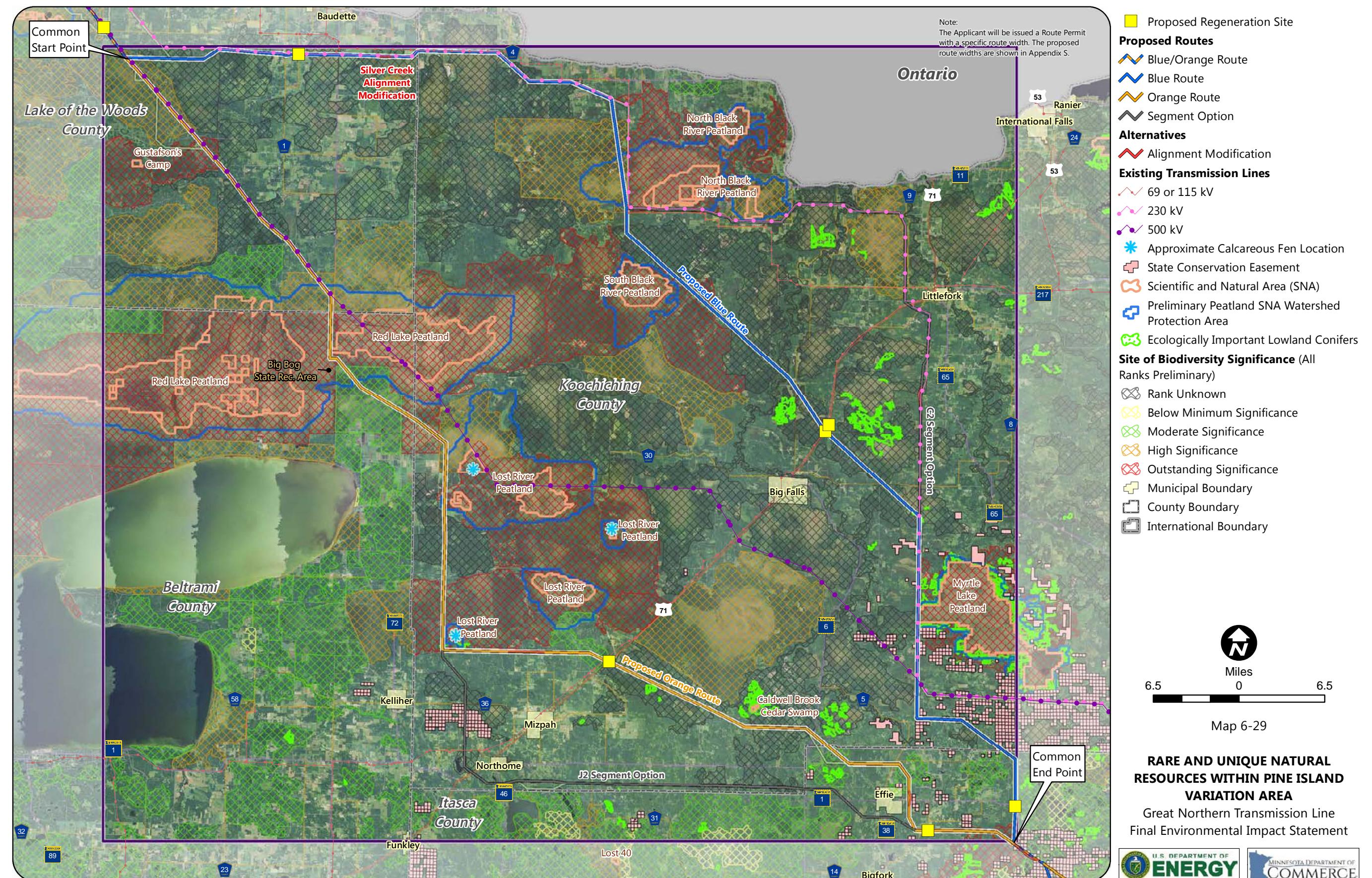
Map 6-27 Cultural Resources within Pine Island Variation Area



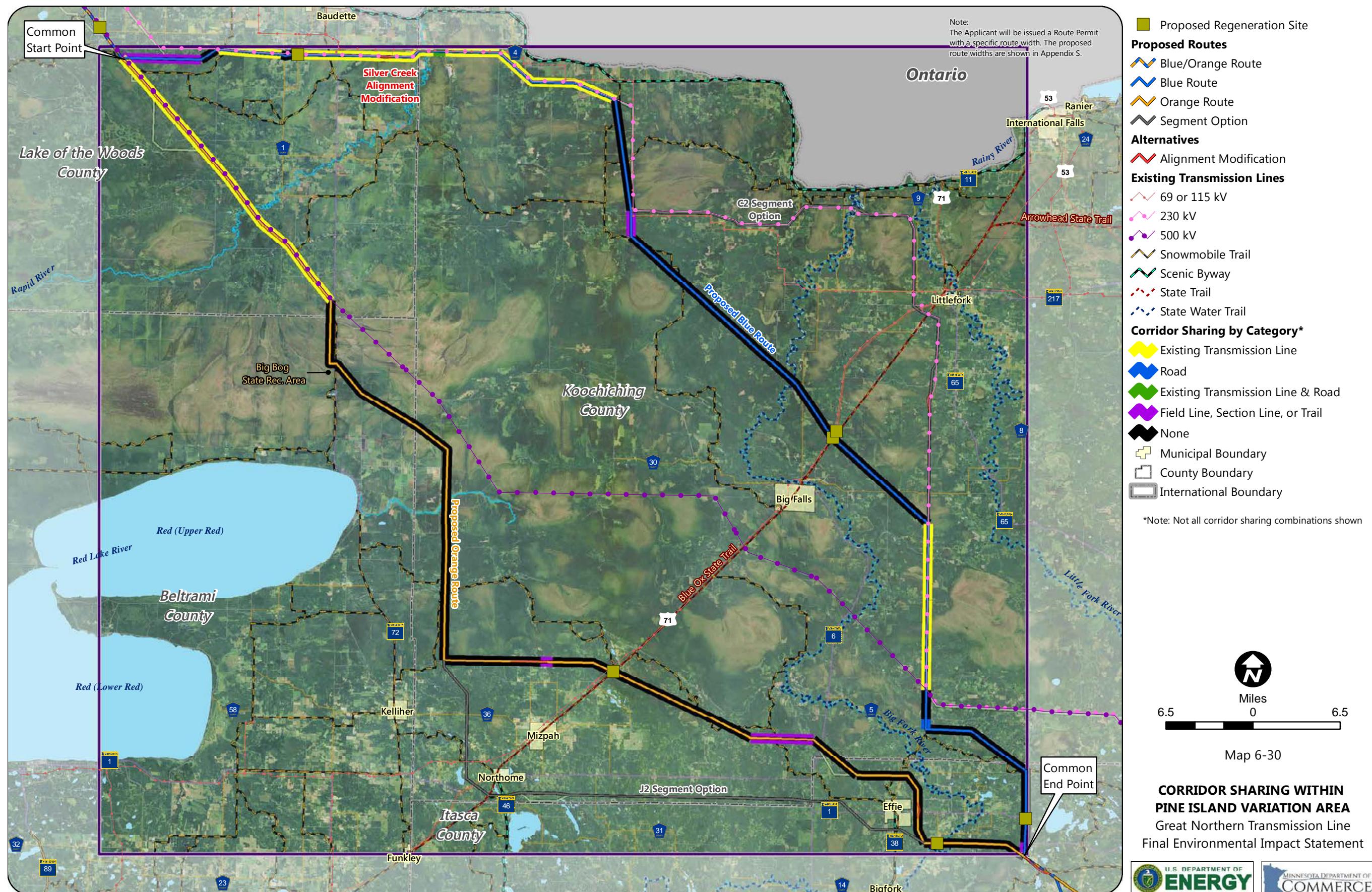
Map 6-28 Water and Wildlife Resources within Pine Island Variation Area



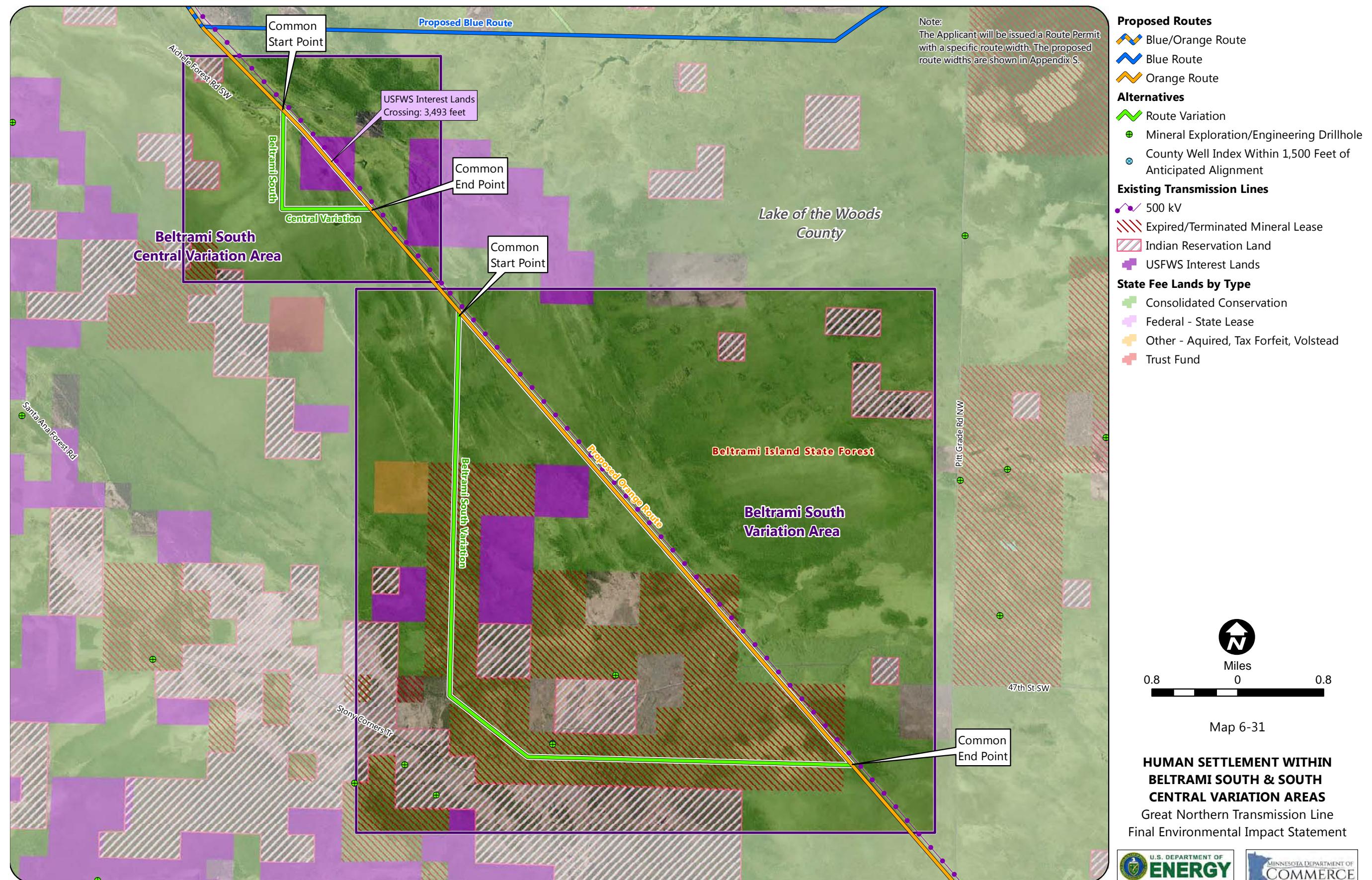
Map 6-29 Rare and Unique Natural Resources within Pine Island Variation Area



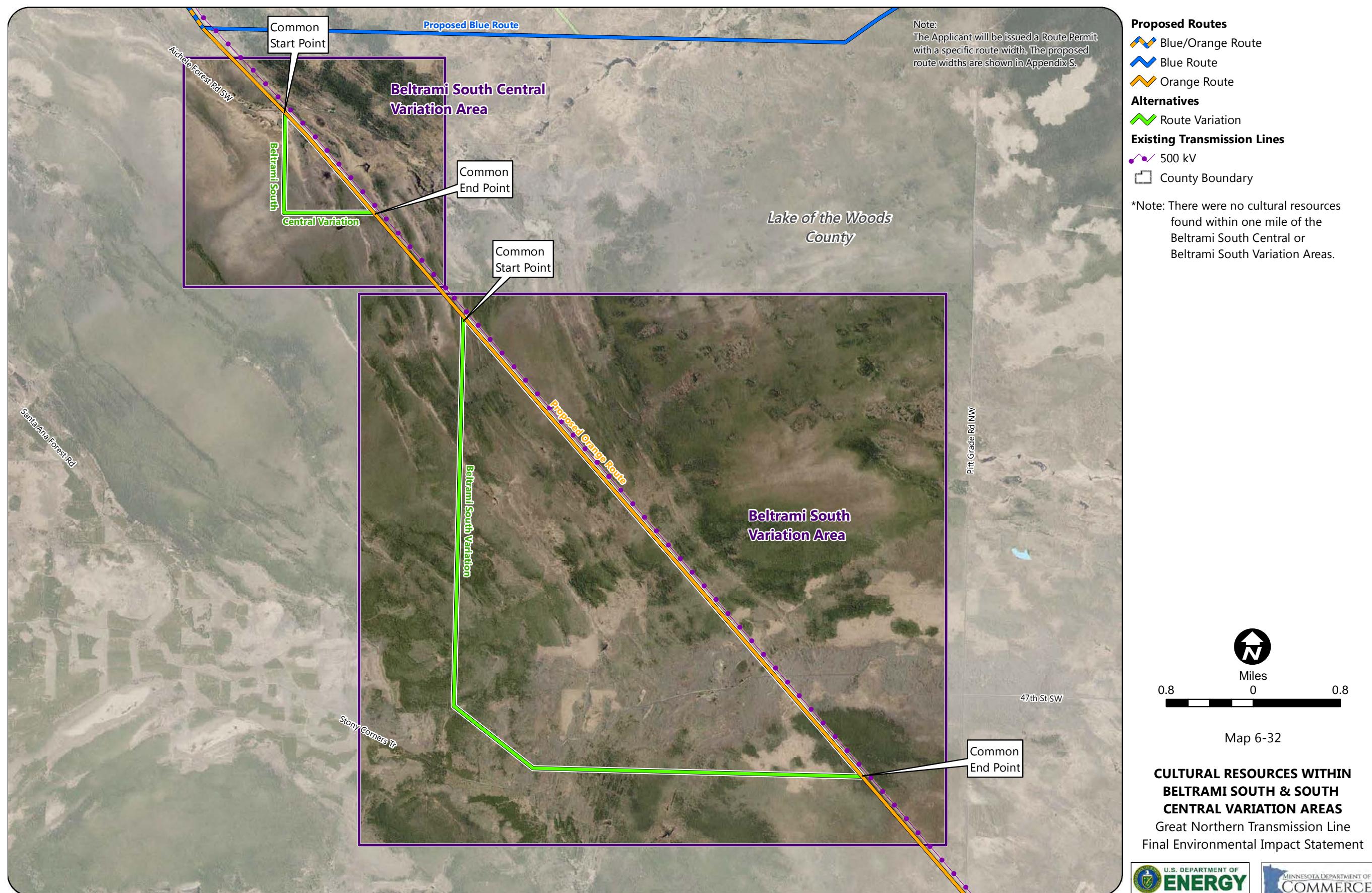
Map 6-30 Corridor Sharing within Pine Island Variation Area



Map 6-31 Human Settlement within Beltrami South and South Central Variation Areas



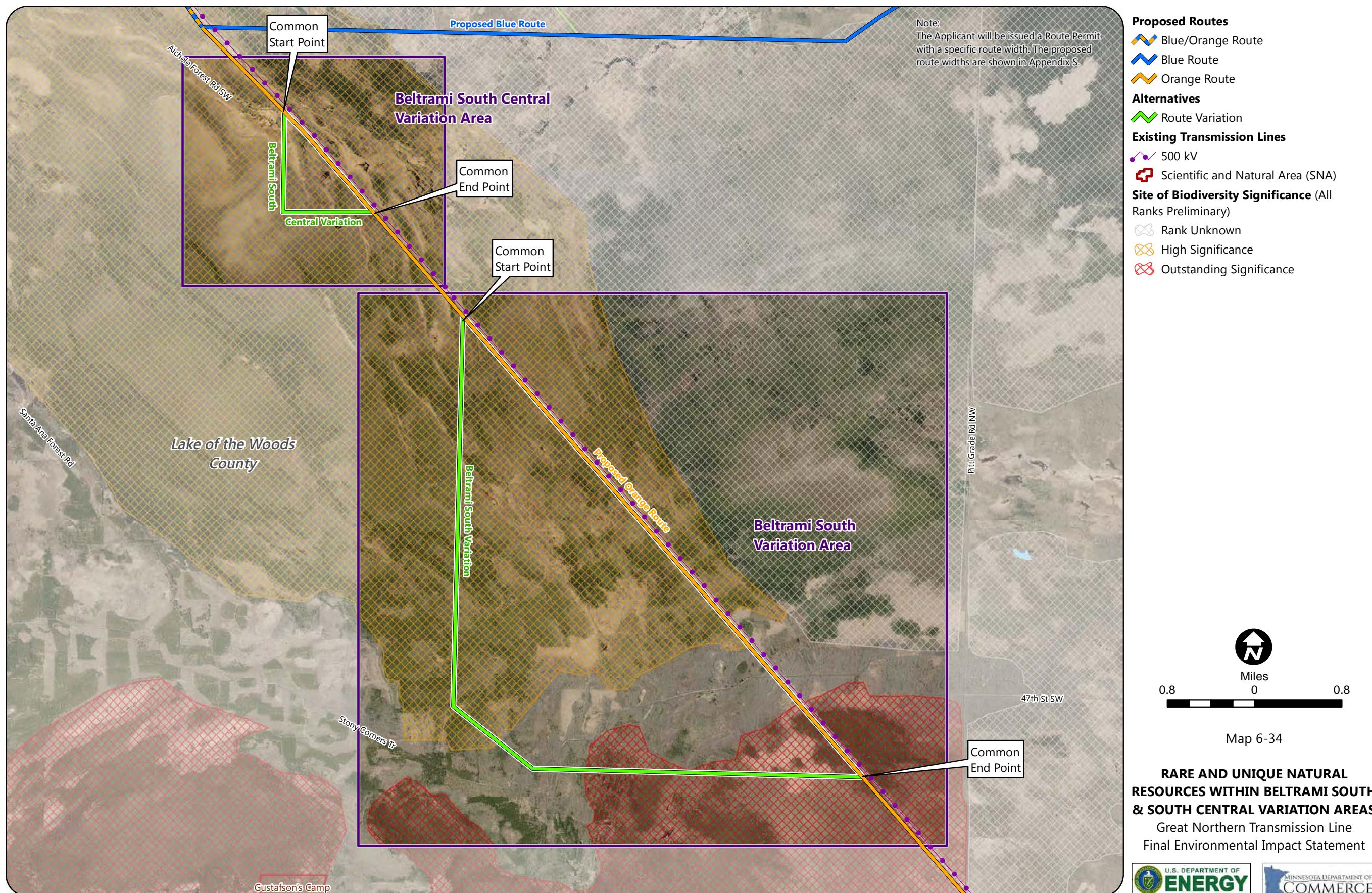
Map 6-32 Cultural Resources within Beltrami South and South Central Variation Areas



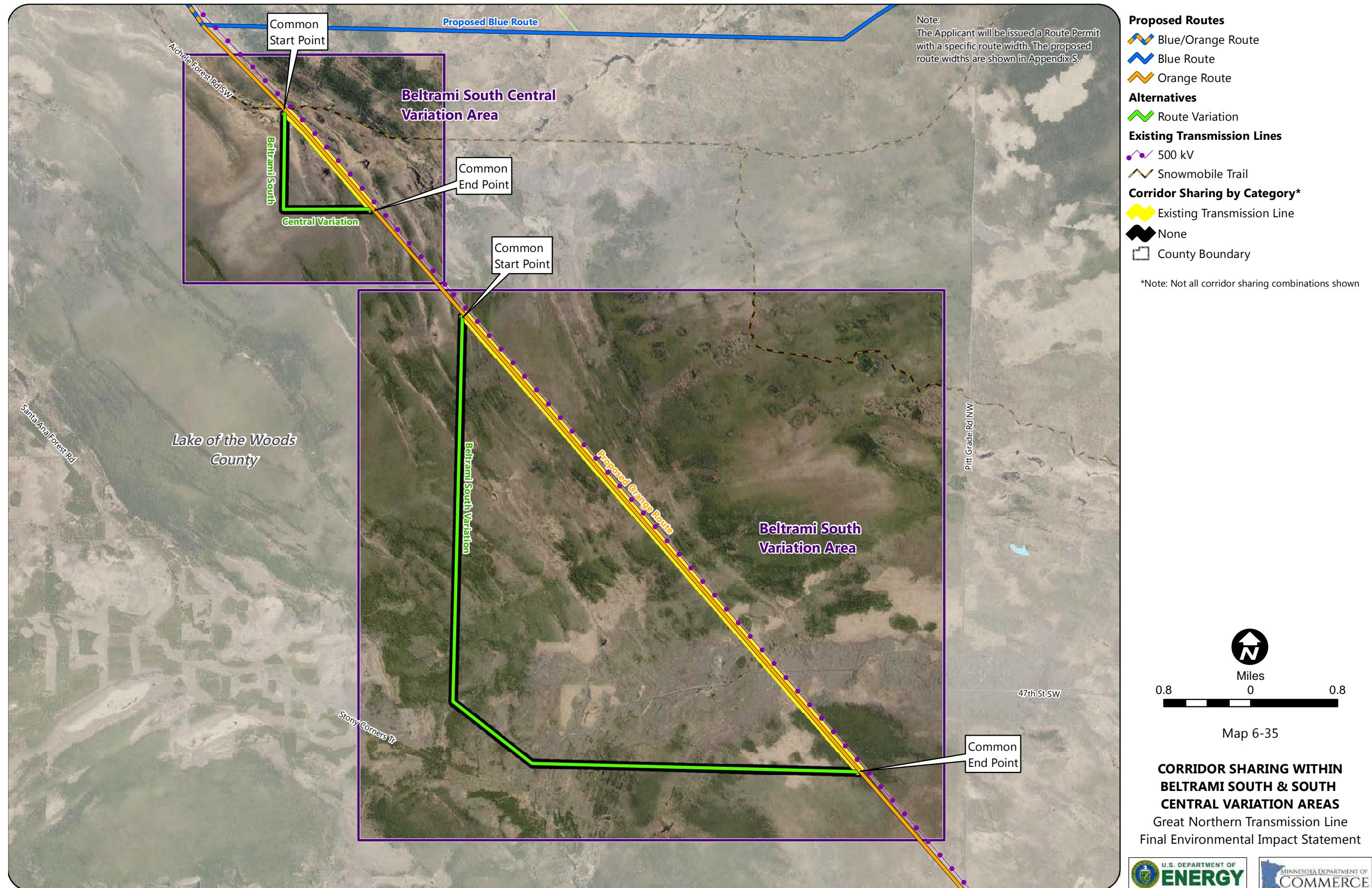
Map 6-33 Water and Wildlife Resources within Beltrami South and South Central Variation Areas



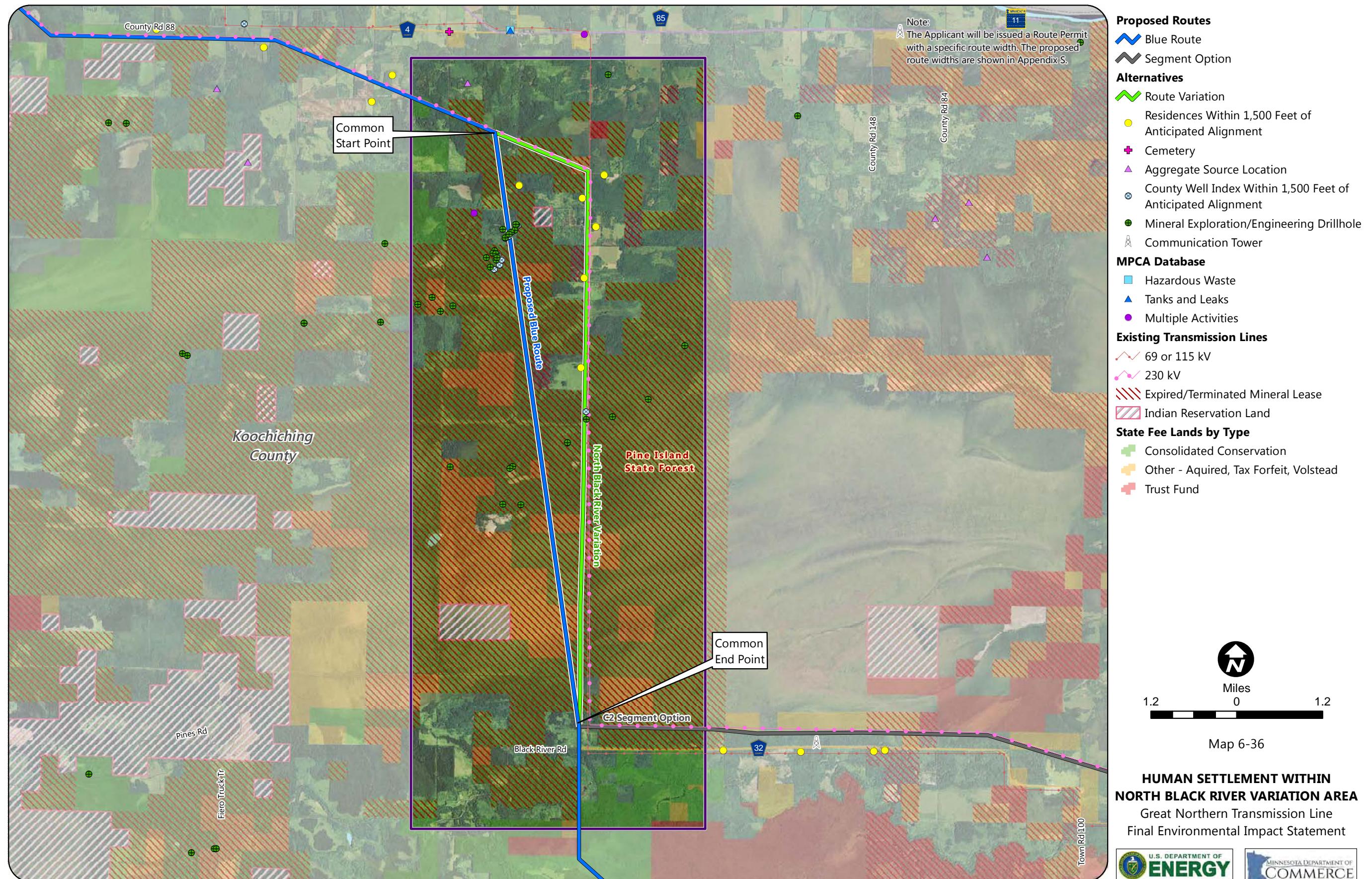
Map 6-34 Rare and Unique Natural Resources within Beltrami South and South Central Variation Areas



Map 6-35 Corridor Sharing within Beltrami South and South Central Variation Areas



Map 6-36 Human Settlement within North Black River Variation Area

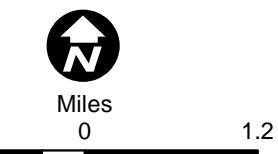


Map 6-37 Cultural Resources within North Black River Variation Area



- Proposed Routes**
 - Blue Route
 - Segment Option
- Alternatives**
 - Route Variation
- Existing Transmission Lines**
 - 69 or 115 kV
 - 230 kV
- County Boundary**

*Note: There were no cultural resources found within one mile of the North Black River Variation

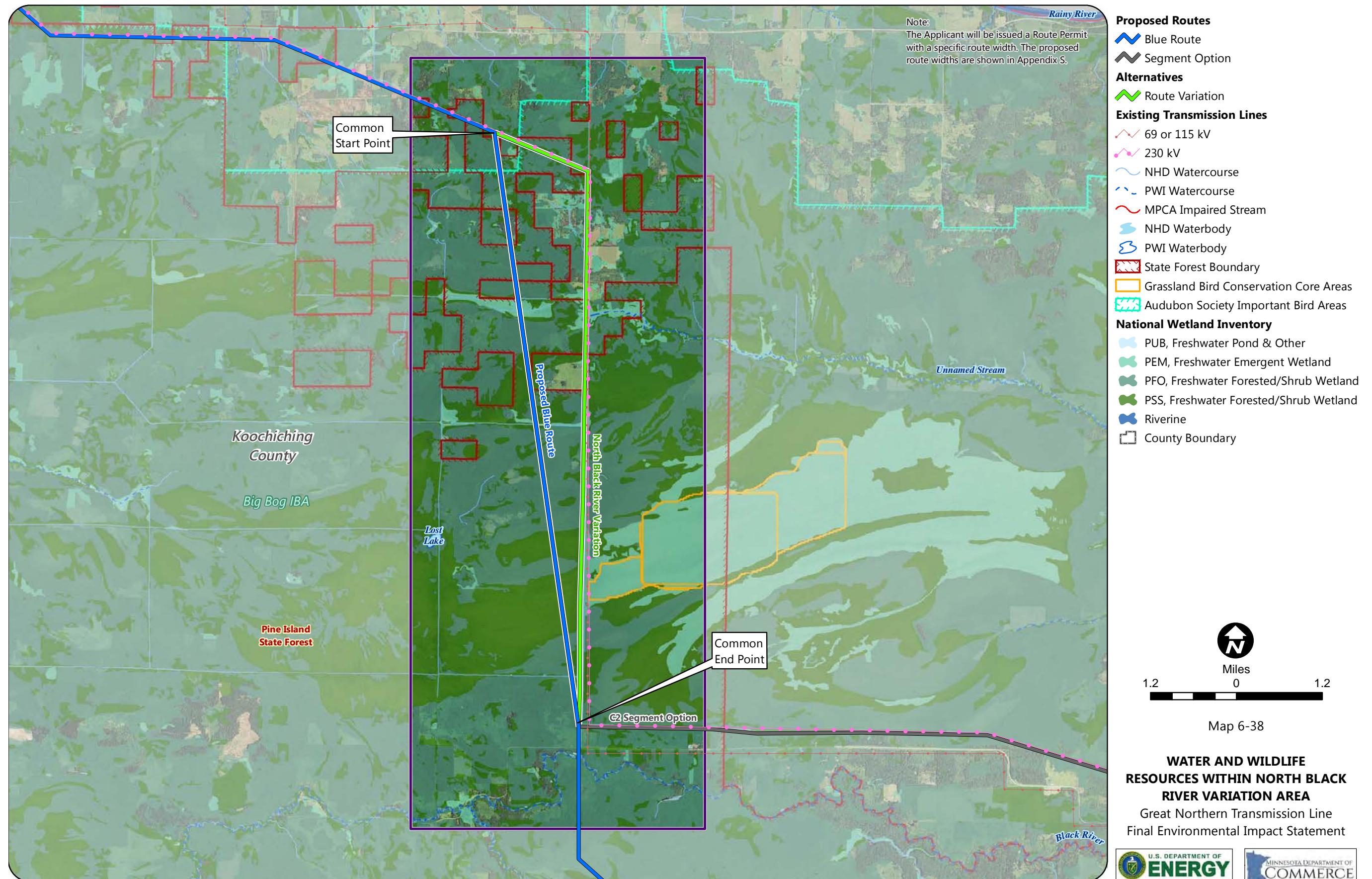


Map 6-37

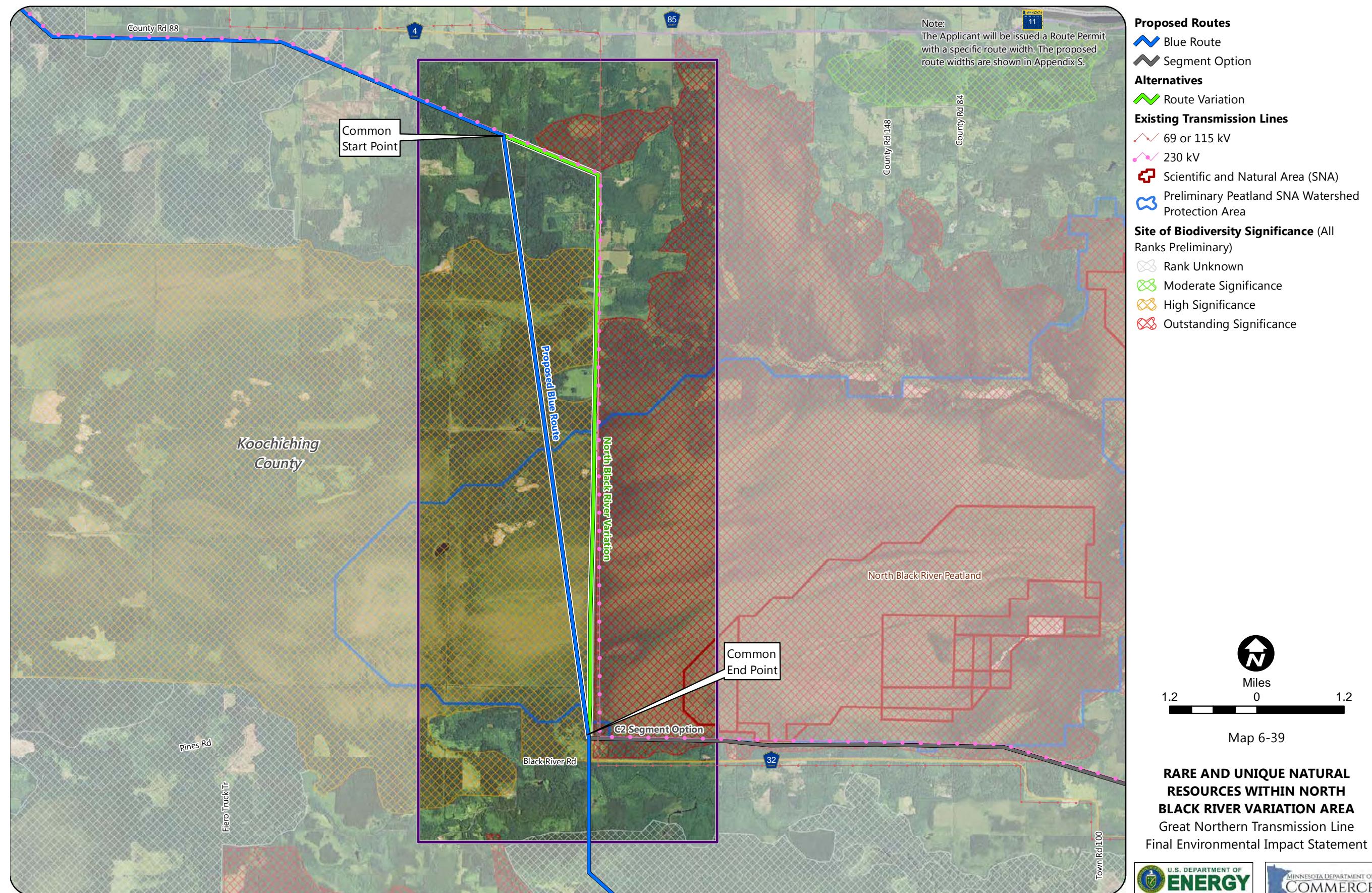
CULTURAL RESOURCES WITHIN NORTH BLACK RIVER VARIATION AREA
Great Northern Transmission Line
Final Environmental Impact Statement



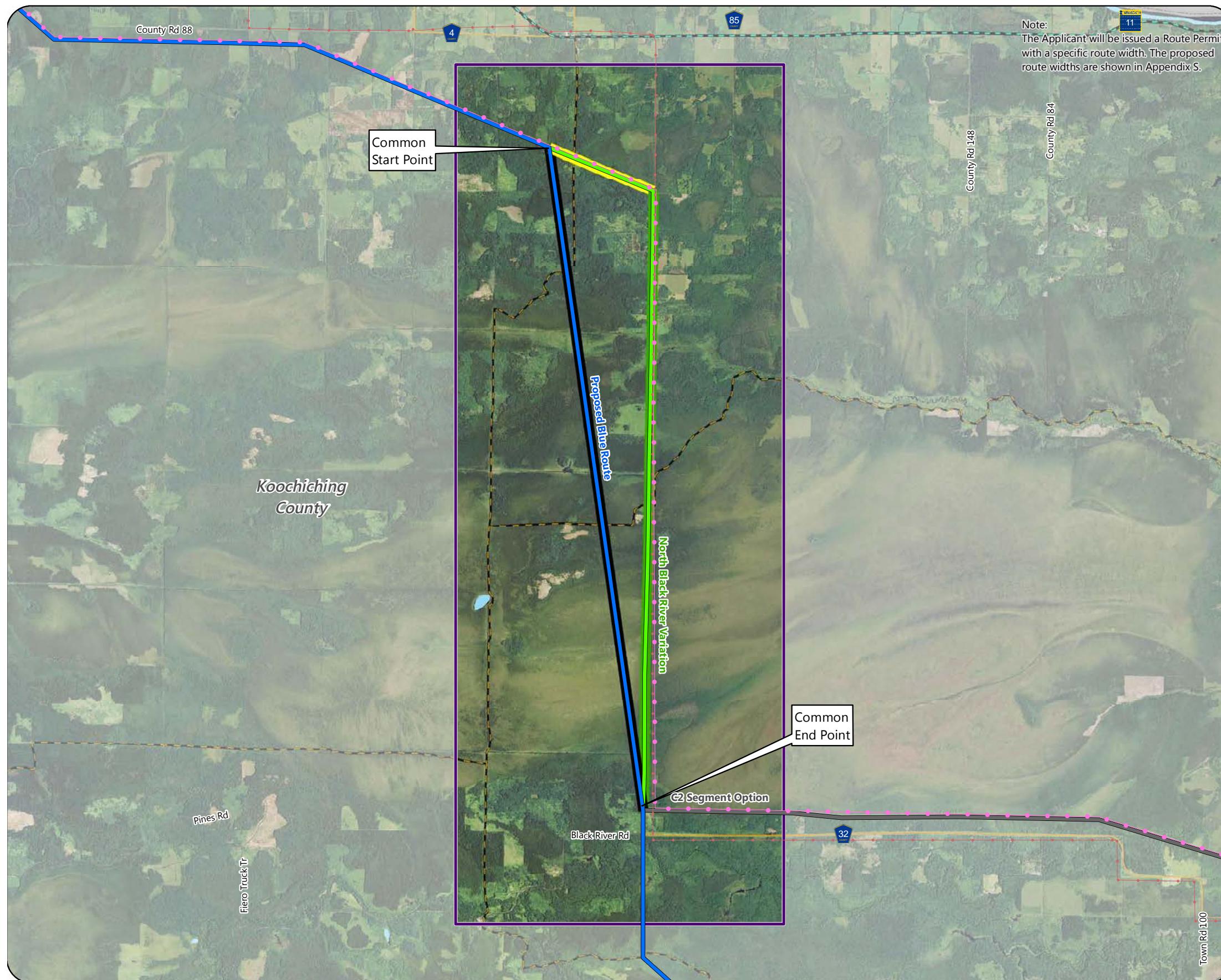
Map 6-38 Water and Wildlife Resources within North Black River Variation Area



Map 6-39 Rare and Unique Natural Resources within Black River Variation Area



Map 6-40 Corridor Sharing within North Black River Variation Area



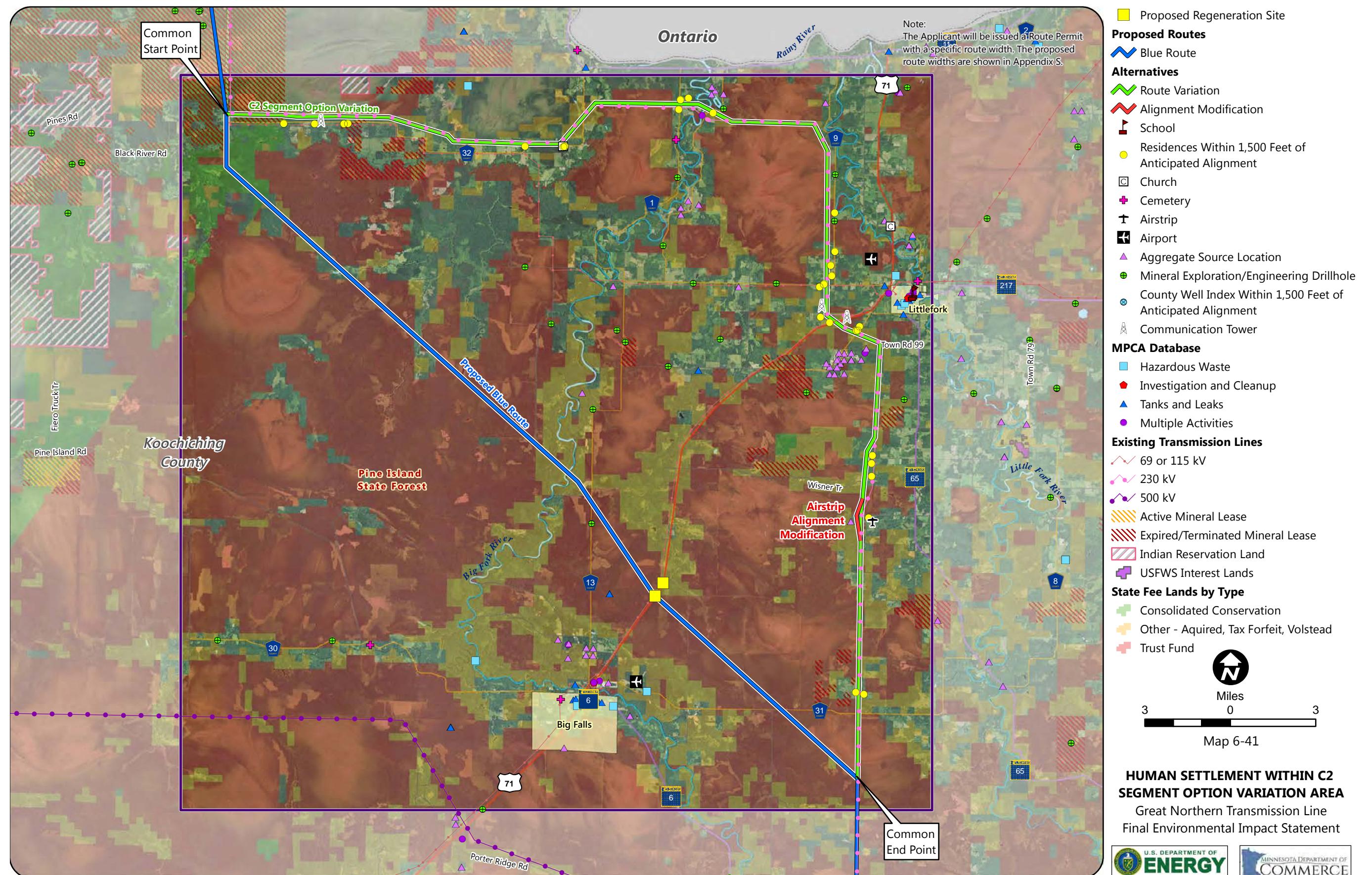
Map 6-40

CORRIDOR SHARING WITHIN NORTH BLACK RIVER VARIATION AREA

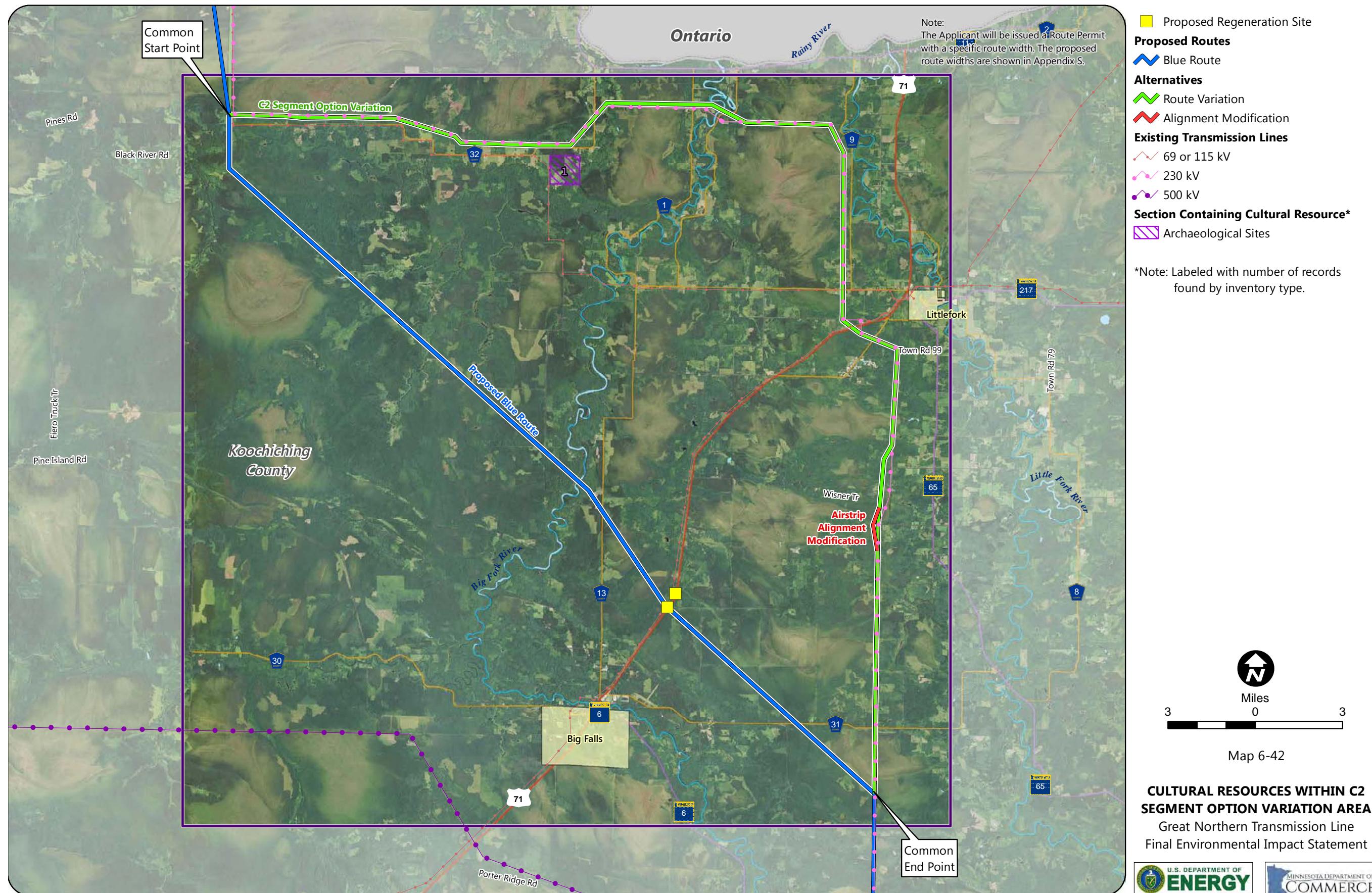
Great Northern Transmission Line
Final Environmental Impact Statement



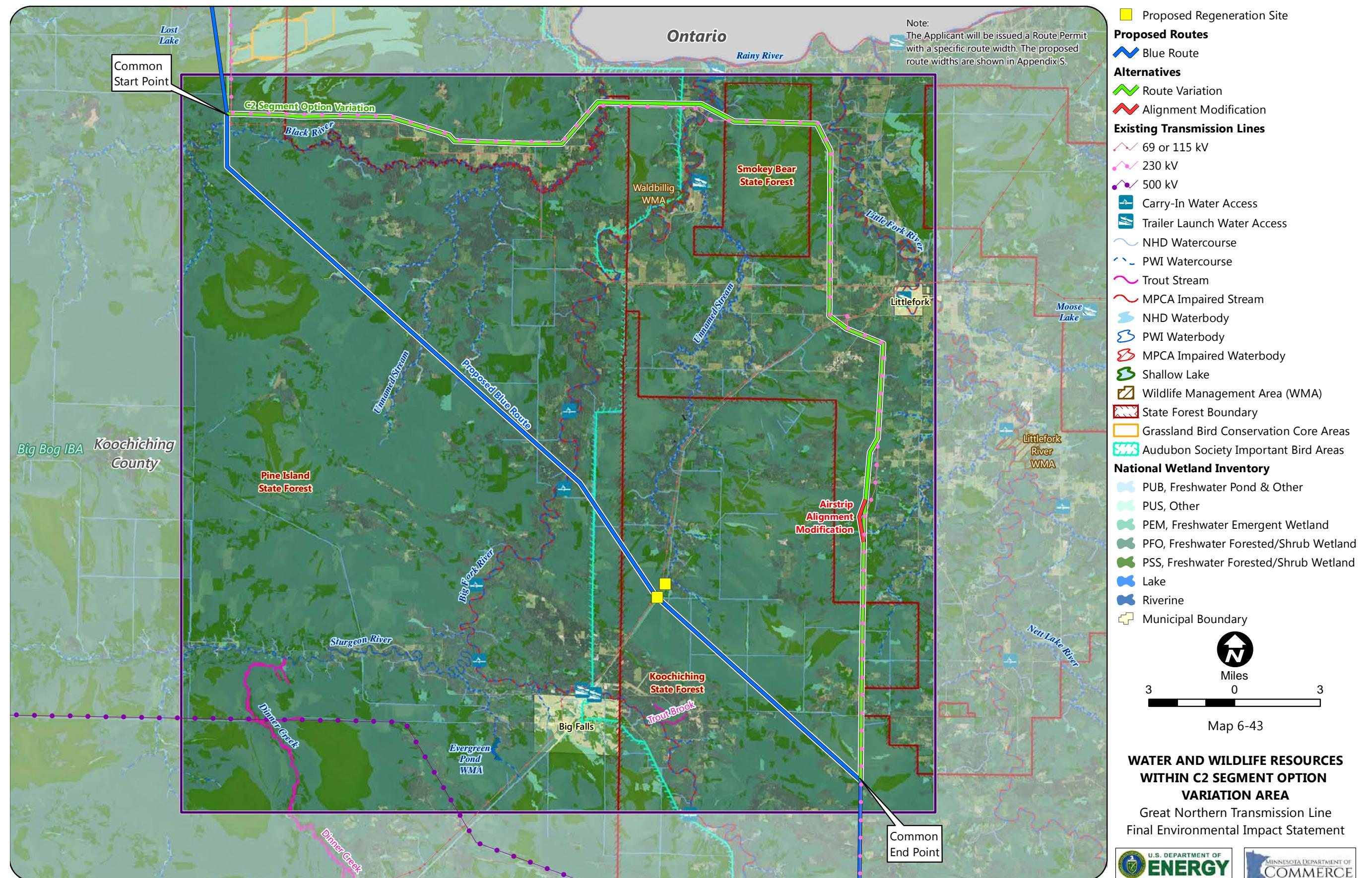
Map 6-41 Human Settlement within C2 Segment Option Variation Area



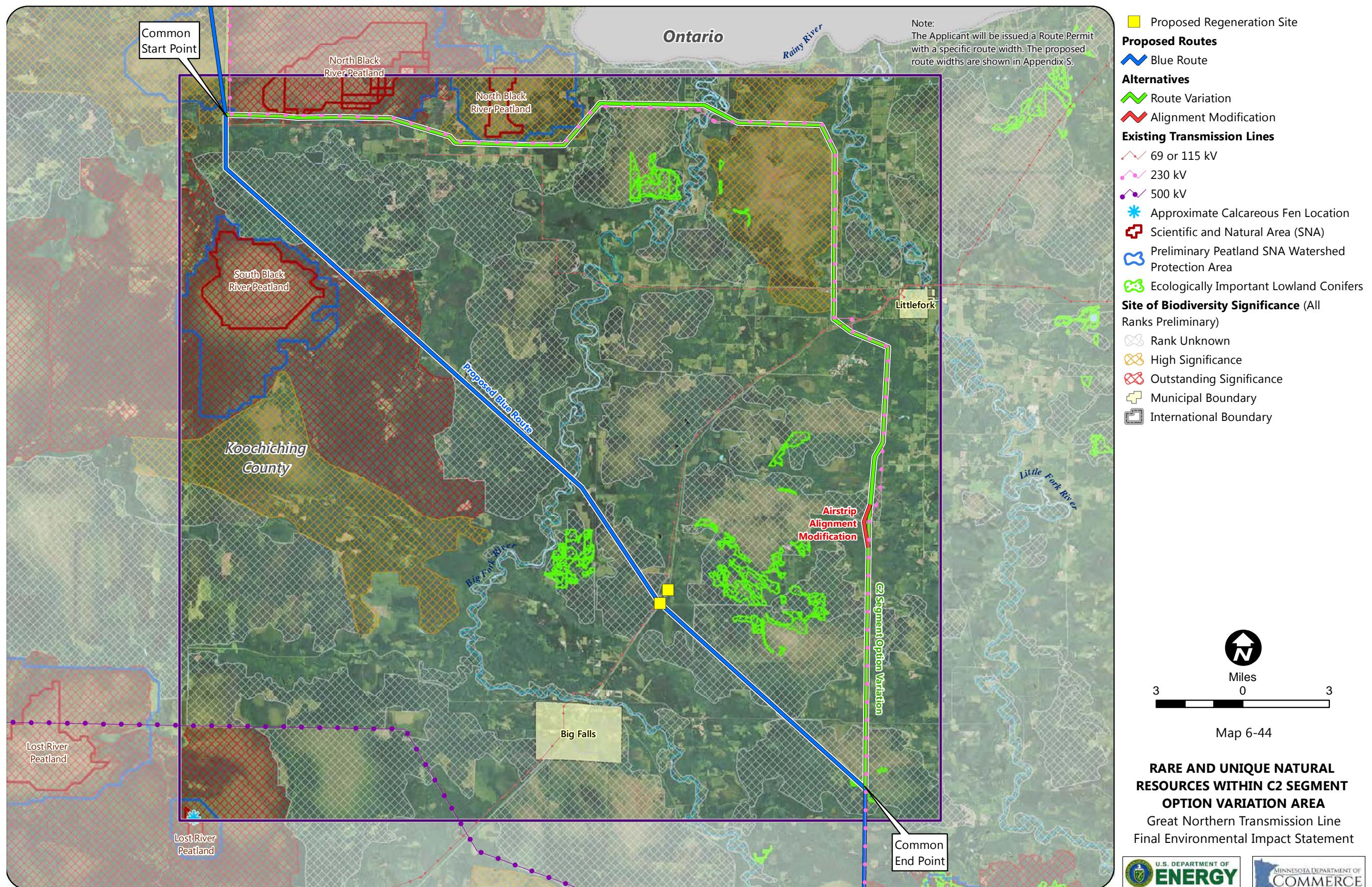
Map 6-42 Cultural Resources within C2 Segment Option Variation Area



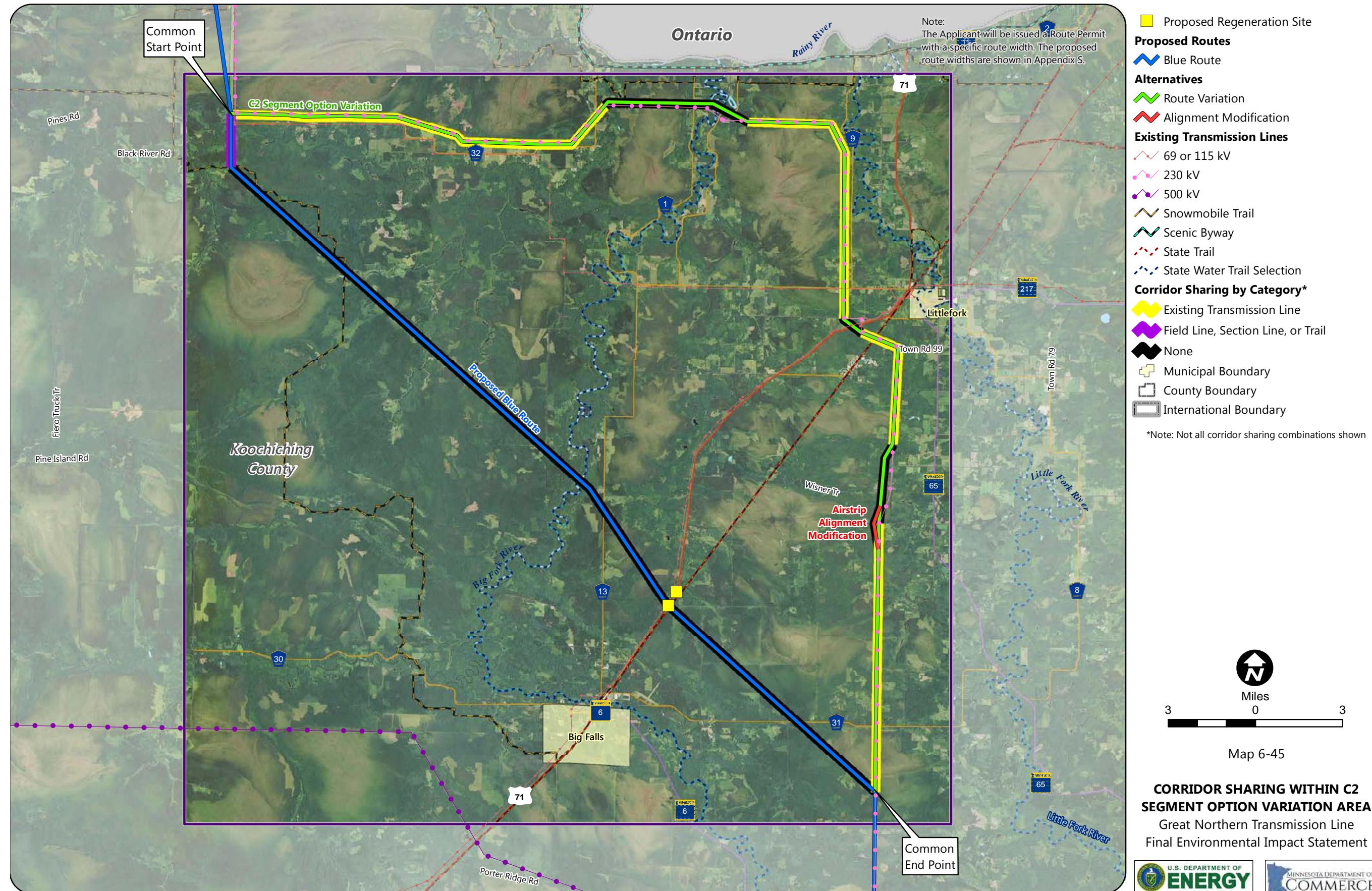
Map 6-43 Water and Wildlife Resources within C2 Segment Option Variation Area



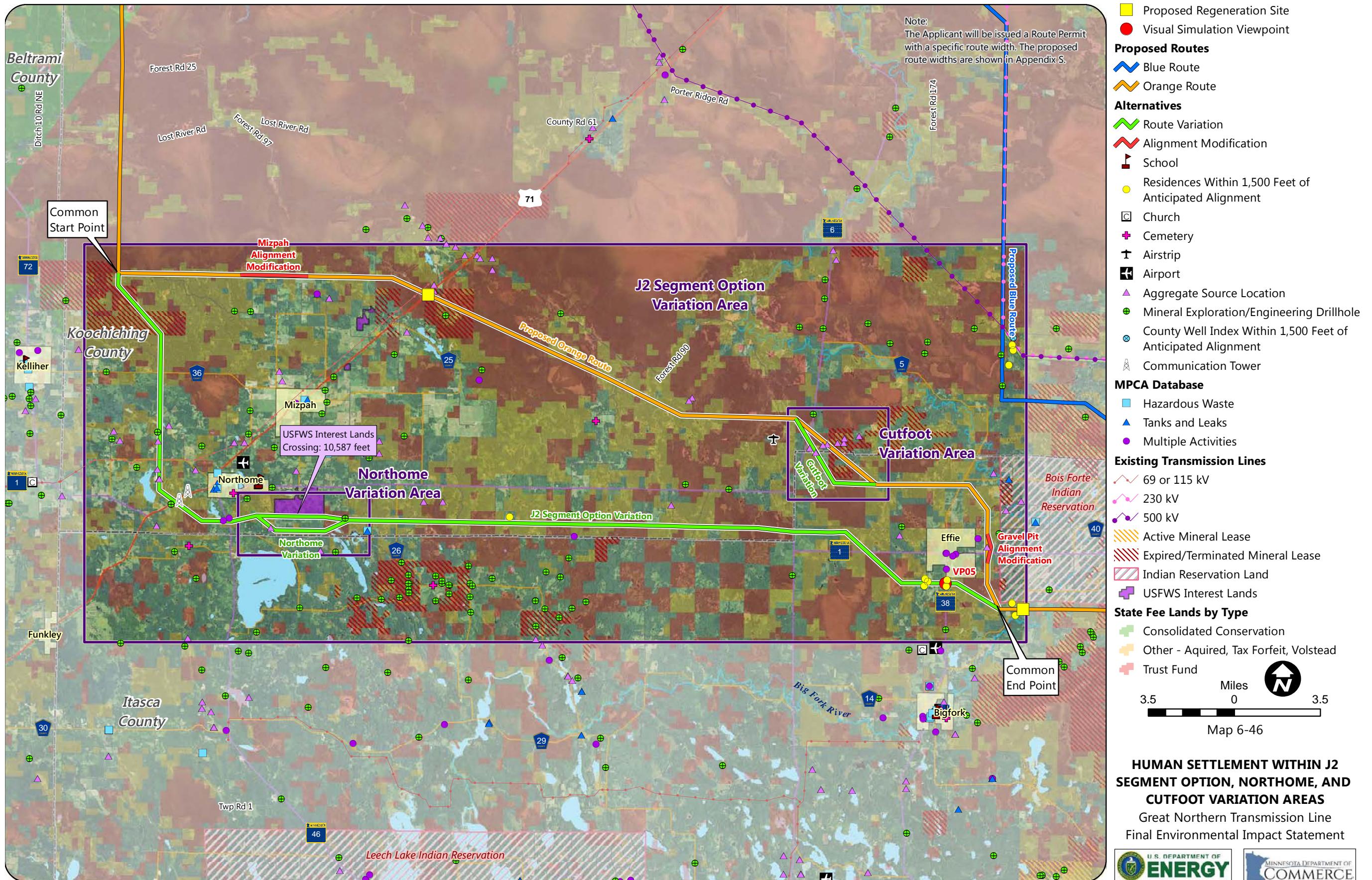
Map 6-44 Rare and Unique Natural Resources within C2 Segment Option Variation Area



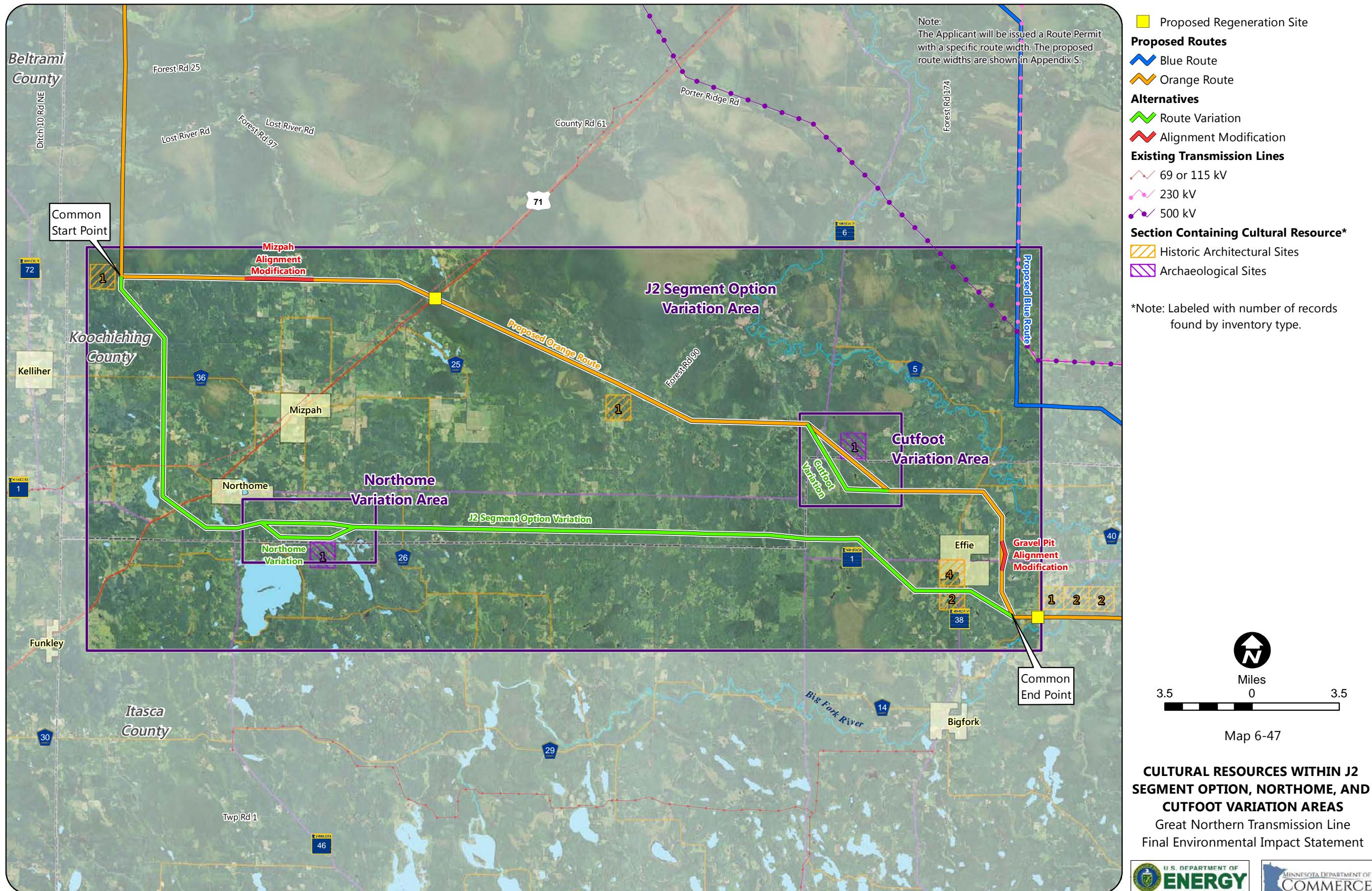
Map 6-45 Corridor Sharing within C2 Segment Option Variation Area



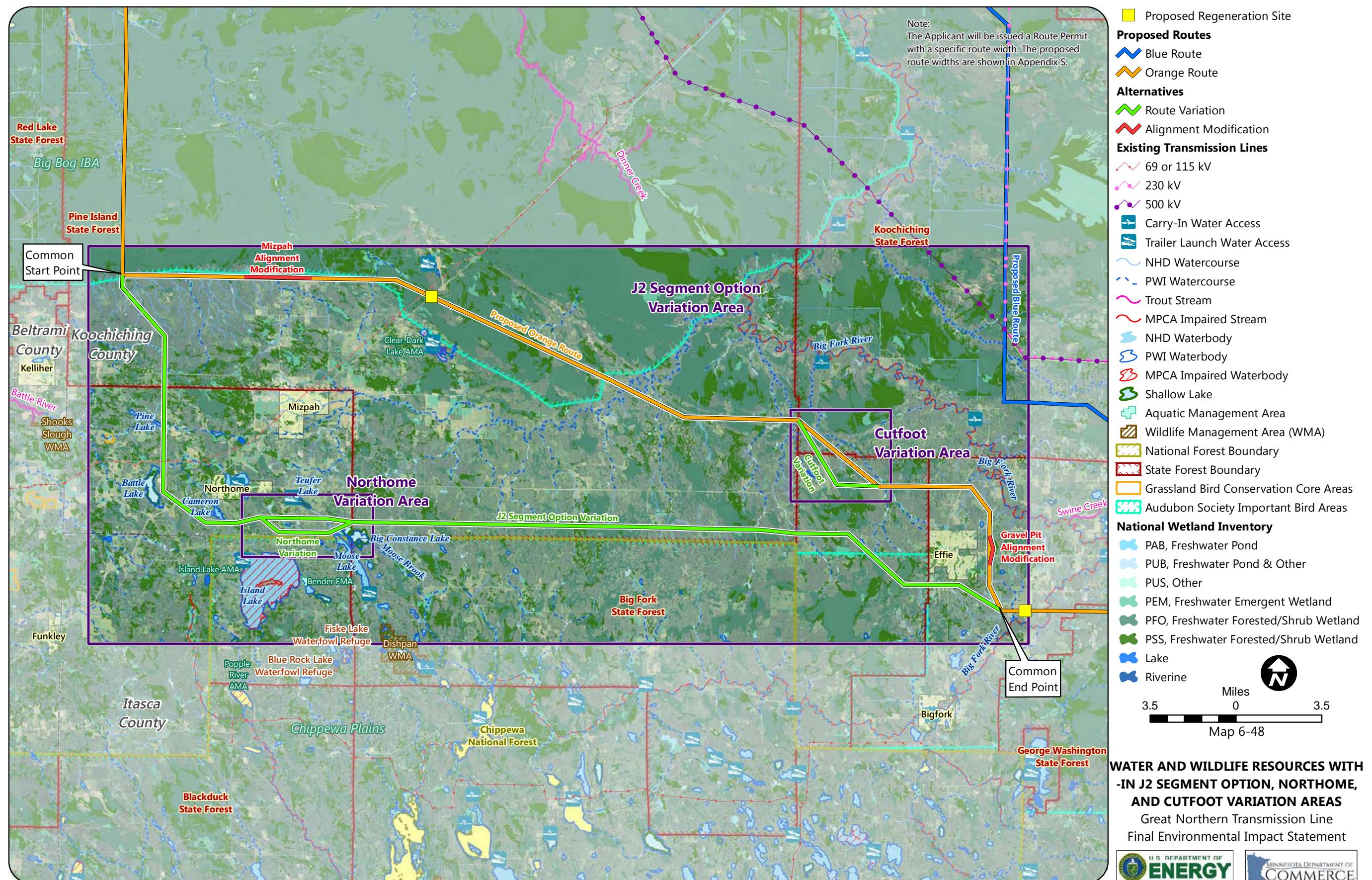
Map 6-46 Human Settlement within J2 Segment Option, Northome, and Cutfoot Variation Area



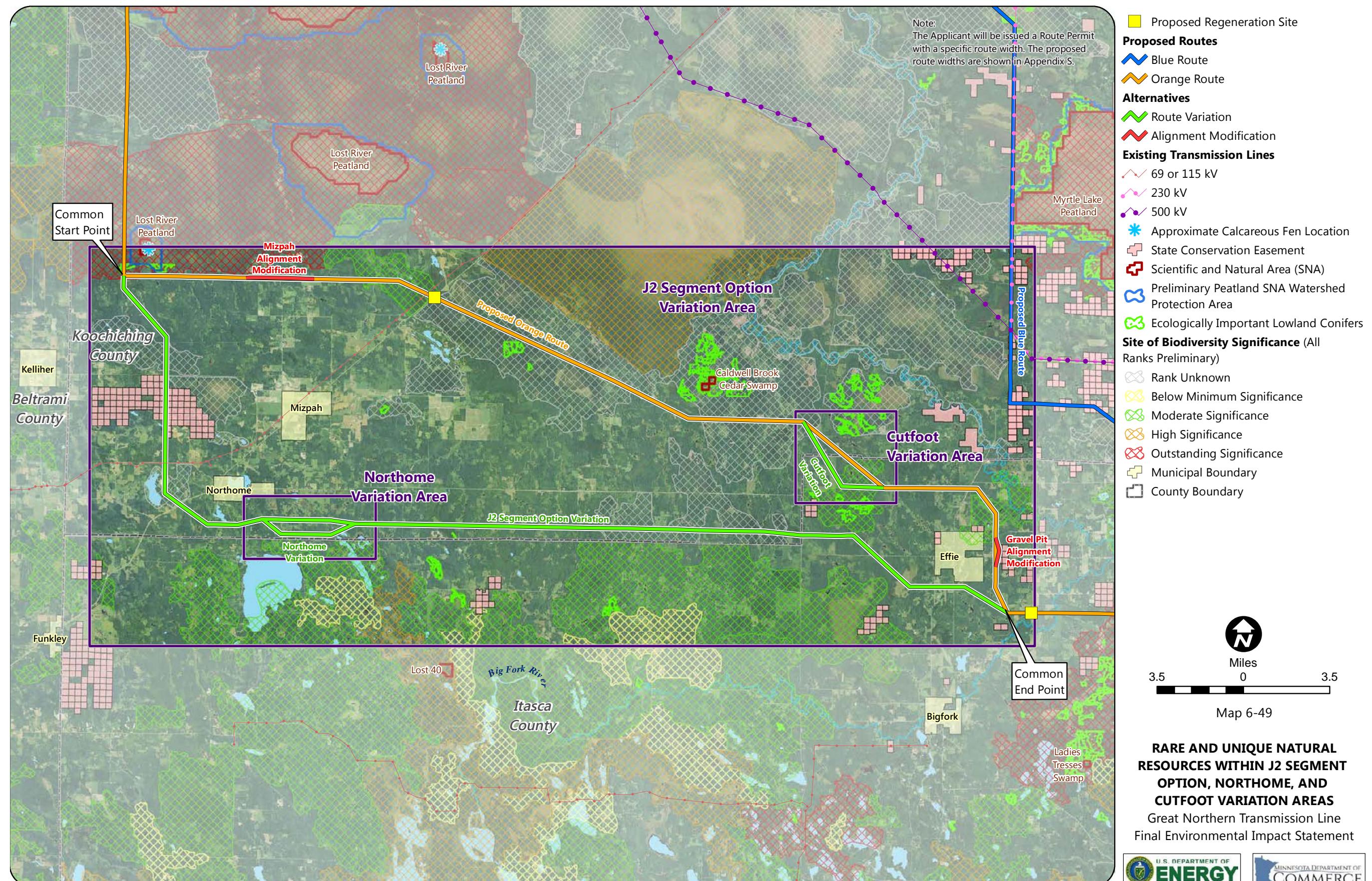
Map 6-47 Cultural Resources within J2 Segment Option, Northome, and Cutfoot Variation Areas



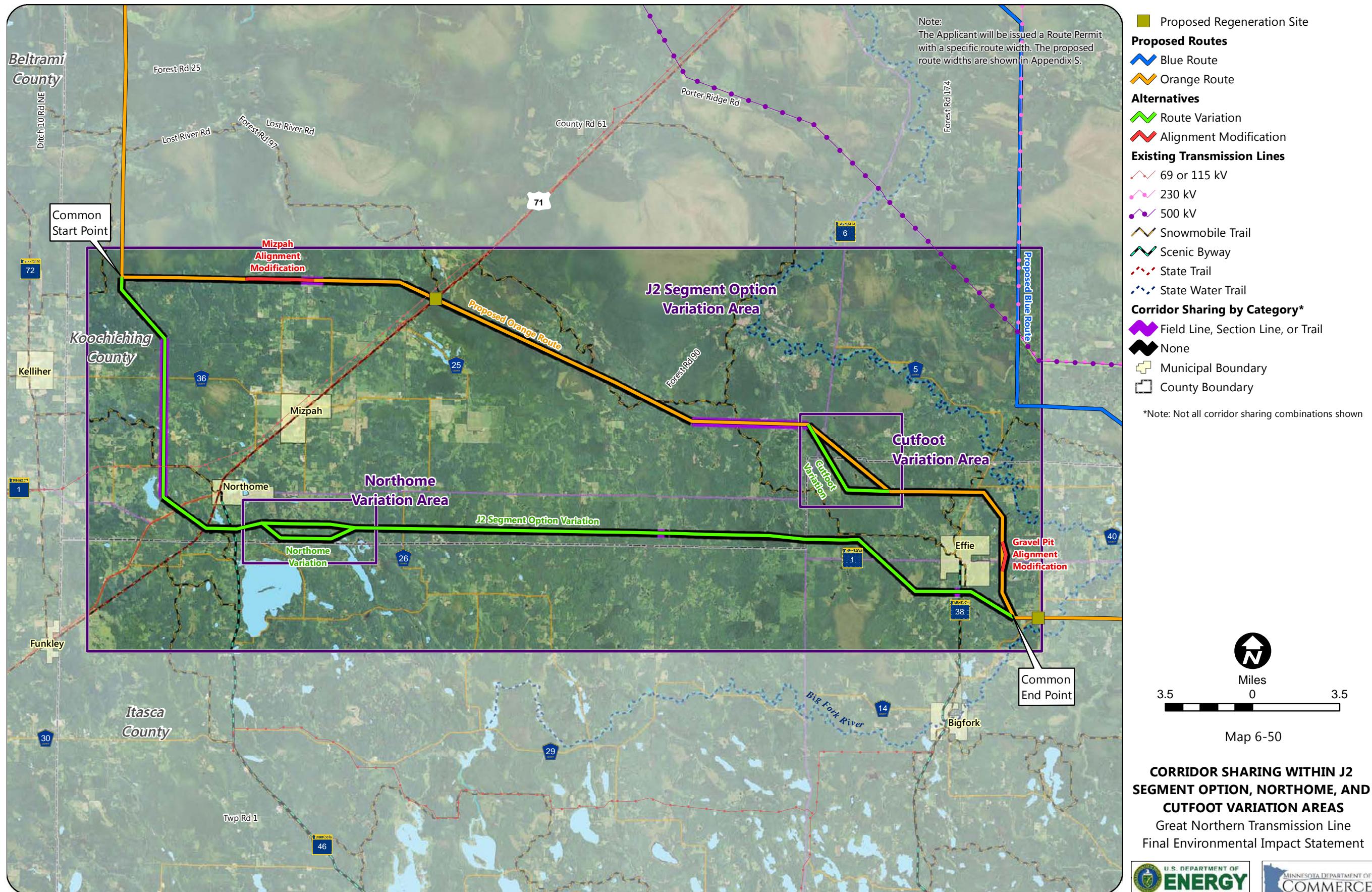
Map 6-48 Water and Wildlife Resources within J2 Segment Option, Northome, and Cutfoot Variation Areas



Map 6-49 Rare and Unique Natural Resources within J2 Segment Option, Northome, and Cutfoot Variation Areas



Map 6-50 Corridor Segment Sharing within J2 Segment Option, Northome, and Cutfoot Variation Areas



6.4 East Section

Chapter 5 provides a discussion of general impacts for each resource, and that discussion provides the general nature of the impacts, such as the duration, extent, whether it is direct or indirect and whether it is adverse or beneficial. It also describes the general nature of the disturbances such as tree clearing, soil disturbance, structure placement, access road construction, and other impacts related to components of the proposed Project. Those general details are not repeated in Chapter 6, which focuses on site specific resources and impacts and refers back to the general details of Chapter 5.

As described in Section 4.5 and identified on Map 4-14, the Central Section is composed of five variation areas: Effie, East Bear Lake, Balsam, Dead Man's Pond, and Blackberry. Section 5.5 previously described, in general, the human settlement, land-based economies, archaeological and historic architectural resources, natural environment, rare and unique natural resources, corridor sharing, and electric system reliability, and costs of constructing, operating, and maintaining the facilities as they relate to the Central Section and the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project. The following sections provide a more detailed description and analysis of the resources present and potential impacts from the proposed Project within the variation areas in the Central Section.

6.4.1 Effie Variation Area

The Effie Variation Area encompasses three route alternatives: the Proposed Blue Route, Proposed Orange Route, and the Effie Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Effie Variation Area, depending on the route or variation considered.

6.4.1.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Effie Variation Area and the potential impacts from the proposed Project.

Aesthetics

Impacts on aesthetic resources within the Effie Variation Area would be determined based largely on the level of increased contrast in views by sensitive viewers as a result of the proposed Project. These impacts are based on the number of visual

resources, including residences, with high visual sensitivity in close proximity to the transmission line that are likely to have views of and be affected by the proposed Project. Aesthetic impacts are likely to be greatest for views of the proposed Project by sensitive viewers at close distances (e.g., in the foreground distance zone, which can extend out to approximately 0.5 miles), but may also be substantial for views from greater distances. The vegetation surrounding high visual sensitivity areas can also affect the degree of aesthetic impact from the proposed Project. Areas with high visual sensitivity located in a densely forested area may be less likely to see the transmission line, even at a close distance, than a high visual sensitivity area located in an open, agricultural area, located at a much greater distance. Because of the difference in site-specific landscape characteristics among areas deemed as having a high visual sensitivity, the actual impact of the proposed Project could vary widely.

Residences and other aesthetic resources within 1,500 feet from the anticipated alignment of the proposed Project would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI for aesthetic resources. If existing large transmission lines would be followed, a new transmission line would not require clearing of new corridors, but rather an expansion of existing corridors. By paralleling an existing transmission line with structures of similar design and height, a new transmission line would produce less contrast than a transmission line that does not parallel an existing large transmission line.

Data related to aesthetic resources in the Effie Variation Area are summarized in Table 6-160 and shown on Maps 6-51, 6-52, 6-53, and 6-55.

As indicated in Table 6-160 for the Effie Variation Area, the Proposed Blue Route, Proposed Orange Route, and Effie Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including snowmobile trails, a state trail, and state forests. As previously described in Section 5.3.1.1, high viewer sensitivity is typically assigned to viewer groups engaged in recreational or leisure activities; traveling on scenic routes for pleasure or to or from recreational or scenic areas; experiencing or traveling to or from protected, natural, cultural, or historic areas; or experiencing views from resort areas or their residences. Not including residences, the proposed routes and variation would affect similar numbers of aesthetic resources, with the Proposed Blue Route affecting 10, the Proposed Orange Route affecting 11, and the Effie Variation affecting 10. The Proposed Blue

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Table 6-160 Aesthetic Resources within the ROI in the Effie Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Effie Variation Area | | |
|---|--|----------------------|-----------------------|-----------------|
| | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| Transmission Line | Length (mi) | 41.1 | 44.6 | 49.8 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 0 | 0 | 80 |
| Residences | Count within 0–500 ft | 0 | 1 | 2 |
| | Count within 0–1,000 ft | 1 | 2 | 12 |
| | Count within 0–1,500 ft | 4 | 5 | 16 |
| Historic Architectural Sites | Count within 0–1,500 ft | 1 | 1 | 0 |
| | Count within 0–5,280 ft | 1 | 1 | 3 |
| State Trails | Count within 0–1,500 ft | 1 | 1 | 1 |
| County/Local Parks | Count within 0–1,500 ft | 1 | 1 | 0 |
| State Forests | Count within 0–1,500 ft | 2 | 2 | 2 |
| Snowmobile Trails | Count within 0–1,500 ft | 5 | 6 | 4 |
| Water Access Points | Count within 0–1,500 ft | 0 | 0 | 1 |
| State Water Trails | Count within 0–1,500 ft | 0 | 0 | 0 |

Source: Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2003, reference (182); Itasca County, reference (153); MnDNR 2003, reference (148); MnDNR 2010, reference (150); MnDNR 2003, reference (190); MnDNR 2010, reference (183)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

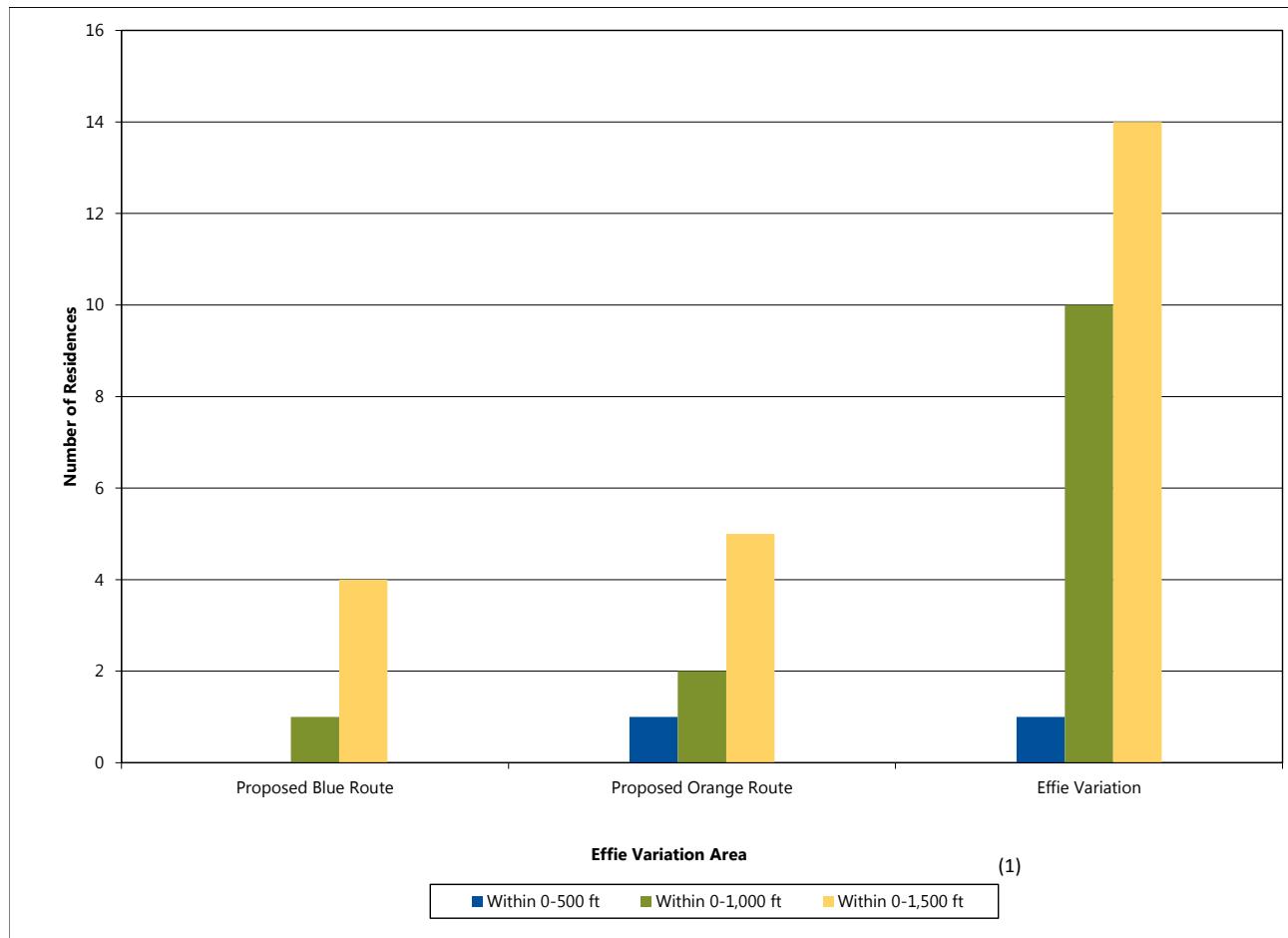
Route would cross five snowmobile trails, one state trail, and two state forests and would be located within 1,500 feet of a county park (Map 6-53 and Map 6-55). The Proposed Orange Route would cross six snowmobile trails, one state trail, and two state forests and would be located within 1,500 feet of a county park. The Effie Variation would cross four snowmobile trails, one state trail, and two state forests (Map 6-53 and Map 6-55). It would also be located within 1,500 feet of a water access point. **The Proposed Blue Route and the Proposed Orange Route would both be located within 1,500 feet of a historic architectural site and the Effie Variation would be located within one mile of three historic architectural sites.**

The Effie Variation would be located within 1,500 feet of 16 residences (12 of which are located within 1,000 feet and two of which are within 500 feet), which have potentially high visual sensitivity, whereas the Proposed Blue Route and Proposed Orange Route would be located within 1,500 feet of four (only one residence within 1,000 feet and no residences within 500 feet) and five residences (two within 1,000 feet and one within 500 feet), respectively (Figure 6-99). The Effie Variation has more residences within 1,500 feet of its anticipated alignment that could potentially be impacted

(depending on the surrounding vegetation at each location) and could potentially affect more non-residential aesthetic resources.

The Effie Variation is longer (49.8 miles) than either the Proposed Blue Route (41.1 miles) or the Proposed Orange Route (44.6 miles; Table 6-160). However, the Effie Variation parallels two existing adjacent large transmission lines (both a 500 kV and a 230 kV transmission line) for 80 percent of its length, whereas the other two alternatives do not parallel any existing large transmission lines and would require new corridors to be cleared. By paralleling two existing large transmission lines, the Effie Variation would produce substantially less contrast than either the Proposed Blue Route or the Proposed Orange Route.

Although the Effie Variation would be longer and produce substantially less contrast than the other two routes, **it would affect more residences (16), including 12 within 1,000 feet and two within 500 feet of the anticipated alignment,** and aesthetic resources with high visual sensitivity (three historic architectural sites, one state trail, two state forests, four snowmobile trails, one water access point). However, by paralleling existing multiple large transmission lines already visible from many of the

Figure 6-99 Residences within the ROI in the Effie Variation Area

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

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

residences and other aesthetic resources, it is likely that the addition of a third large transmission line adjacent to the existing transmission lines would result in only an incremental increase in contrast for views of the new transmission line in conjunction with the existing transmission lines. The incremental increase in contrast would be slightly greater where the new transmission line is located between the existing lines and viewers and slightly less where the new transmission line is located on the opposite side of the existing transmission line from viewers. For these reasons, it is likely that despite being longer and affecting more residences and other aesthetic resources with high viewer sensitivity, the Effie Variation would result in less aesthetic impact than the either the Proposed Blue Route or Proposed Orange Route in the Effie Variation Area.

Because the Proposed Blue Route and Proposed Orange Route are moderately long at 41.1 and 44.6 miles, respectively, do not parallel existing transmission lines of similar size and design, and

affect several residences (**four to five** residences) and other sensitive visual resources (one historic architectural site each, one state trail, one county/local park, two state forests, and five to six snowmobile trails), potential aesthetic impacts of the Proposed Blue Route and Proposed Orange Route are expected to be significant. Although the Effie Variation parallels an existing large transmission line for much of its length (80 percent), it is moderately long (49.8 miles) and affects **16** residences and several other sensitive visual resources(three historic architectural sites, one state trail, two state forests, four snowmobile trails, and one water access point). For these reasons, potential aesthetic impacts of the Effie Variation are also expected to be significant.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize,

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or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-161 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Blue Route, Proposed Orange Route, and Effie Variation in the Effie Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the variation area are shown in Map 5-19 and residences, churches, cemeteries, and airports near the Proposed Blue Route, Proposed Orange Route, and Effie Variation are shown on Map 6-51.

The Proposed Blue Route, Proposed Orange Route, and Effie Variation ROI are both primarily composed of forested and/or swamp land (Table 6-161). The Effie Variation ROW contains a greater amount of forested/swamp land and developed or disturbed area as compared to the Proposed Blue Route and the Proposed Orange Route.

Land Ownership and Management

Table 6-162 and Figure 6-100 show that the Effie Variation ROW contains a greater amount of state forest land and state fee land than the Proposed Blue Route and Proposed Orange Route; with the Proposed Blue Route ROW containing the least amount of these land ownership categories. No impacts to USFWS Interest Lands would occur for the proposed routes or variation. Both the Proposed

Blue Route and Proposed Orange Route would impact a small amount of county land, while the Effie Variation would not impact this land ownership type. The Proposed Blue Route and Proposed Orange Route would impact a similar amount of state conservation land; however, the Effie Variation would impact a greater amount of this land type.

Neither of the proposed routes would parallel an existing corridor; however a small segment of each would parallel a road or fence line. Approximately 80 percent of the Effie Variation would parallel an existing corridor, and therefore would be expected to have less incompatibility with surrounding land uses compared to the proposed routes (see Section 6.4.1.6).

Impacts to land use from the proposed Project in the Effie Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route, Proposed Orange Route, and the Effie Variation would all result in a long-term change in land use for areas currently forested and/or swamp land and therefore would all have significant impacts on land use. The level of significance is largely related to the amount of forested and/or swamp land, specifically state forest and state fee land that would be within the ROW of the proposed routes and variation. However, the length of the route that would parallel an existing corridor is also important. The Proposed Blue Route avoids a greater amount of state forest and state fee lands than the Proposed Orange Route and the Effie Variation thereby avoiding long-term changes to land use. However, the Effie Variation would parallel a greater length of existing corridor compared to the Proposed Blue Route and Proposed Orange Route and would minimize indirect impacts to state forests and state fee lands such as forest fragmentation.

Table 6-161 Land Uses within the ROI in the Effie Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Effie Variation Area | | |
|--|------------------------|-------------------------------------|----------------------|-----------------------|-----------------|
| | | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 15,085 | 16,344 | 18,273 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 239 | 398 | 493 |
| | Agricultural | Acres within 0–1,500 ft | 0 | 0 | 0 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 14,723 | 15,801 | 17,696 |
| | Other | Acres within 0–1,500 ft | 123 | 145 | 84 |

Source(s): USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland & Shrubland and Introduced & Semi Natural Vegetation. See detailed summary of all types in Appendix E.

(2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-162 Land Ownership/Management within the Anticipated ROW in the Effie Variation Area

| Resource | Type | Evaluation Parameter | Effie Variation Area | | |
|--|---|----------------------|----------------------|-----------------------|-----------------|
| | | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| Total Land | -- | Acres within ROW | 997 | 1,081 | 1,209 |
| State Forests | -- | Acres within ROW | 909 | 958 | 1,086 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 645 | 694 | 772 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 0 | 0 | 0 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 409 | 471 | 507 |
| | Trust Fund | Acres within ROW | 235 | 223 | 265 |
| | Federal - State Lease | Acres within ROW | 0 | 0 | 0 |
| County Lands | -- | Acres within ROW | 10 | 4 | 0 |
| State Conservation Easements | -- | Acres within ROW | 200 | 196 | 293 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 342 | 383 | 437 |

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); Itasca County 2014, reference (153); MnDNR 2010, reference (184)

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.

(2) Acreage for private lands was calculated as the difference between total lands and public lands.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.1.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Effie Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Effie Variation Area are summarized in Table 6-163.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-163 and Figure 6-101 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route, Proposed Orange Route and Effie Variation in the ROI.

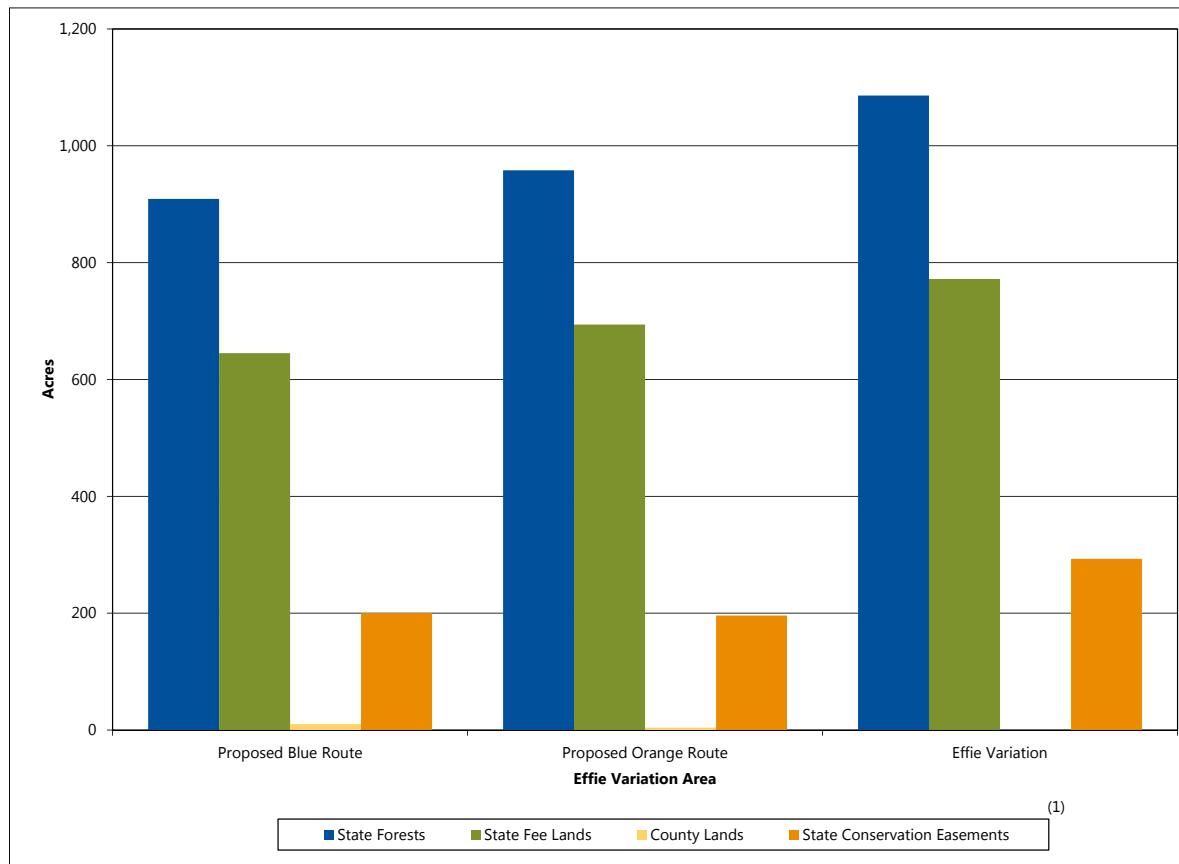
The Effie Variation, which has the longest length, would pass through the most acres of farmland (Figure 6-101). The Proposed Blue Route, which has the shortest length, would be expected to have the fewest impacts on farmland, farmland of statewide importance, and prime farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

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Figure 6-100 Public Land Ownership/Management within the ROI in the Effie Variation Area



Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); Itasca County 2014, reference (153); MnDNR 2010, reference (184)

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.

Table 6-163 Land-Based Economy Resources within the Anticipated ROW in the Effie Variation Area

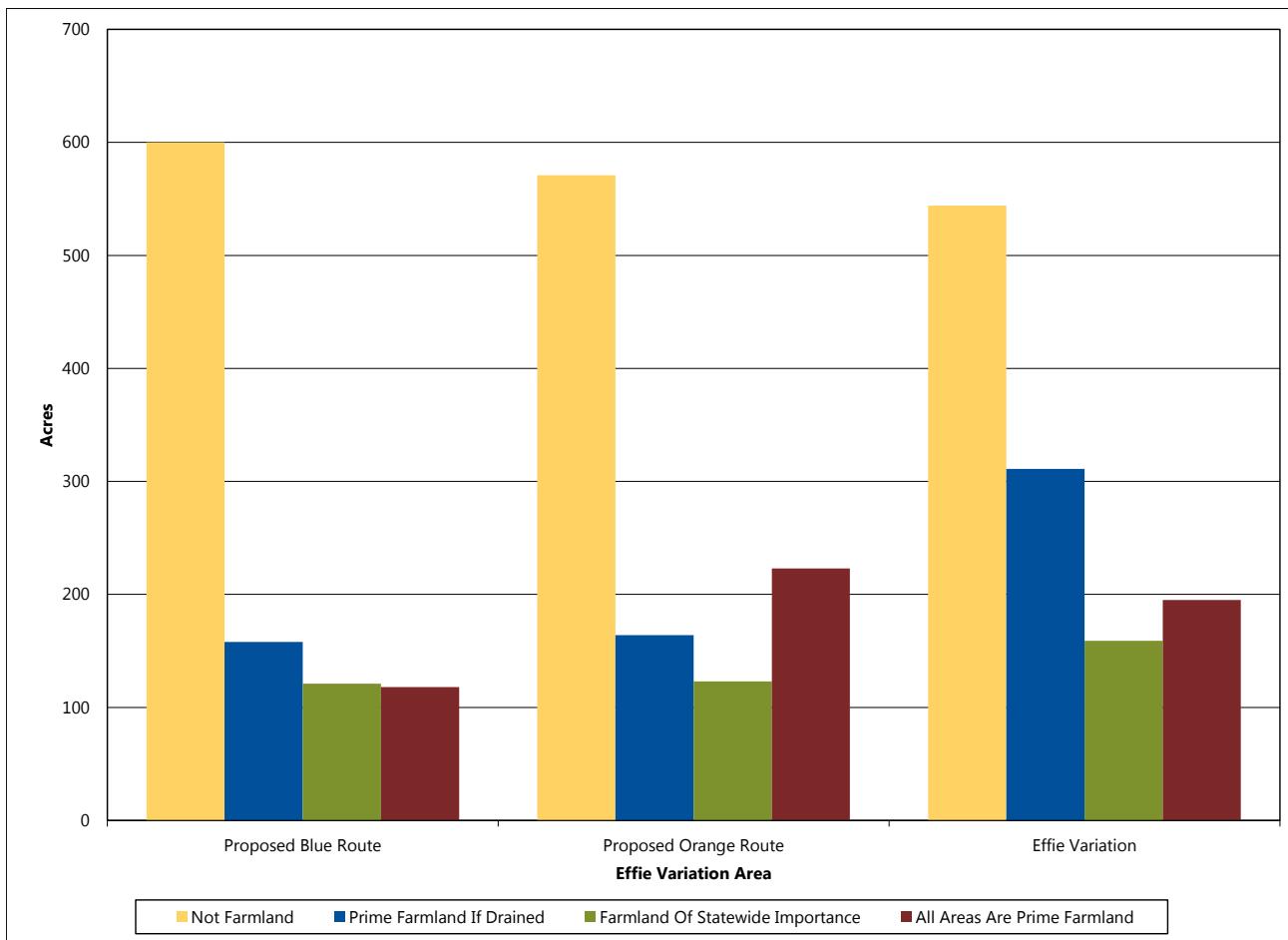
| Resource | Type | Evaluation Parameter | Effie Variation Area | | |
|---|----------------------------------|--|----------------------|-----------------------|-----------------|
| | | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| Transmission Line | -- | Length (mi) | 41.1 | 44.6 | 49.8 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 0 | 0 | 80 |
| Farmland | Not Farmland | Acres within ROW | 600 | 571 | 544 |
| | Prime Farmland if Drained | Acres within ROW | 158 | 164 | 311 |
| | Farmland of Statewide Importance | Acres within ROW | 121 | 123 | 159 |
| | All Areas are Prime Farmland | Acres within ROW | 118 | 223 | 195 |
| State Forest | -- | Acres within ROW | 909 | 958 | 1,086 |
| State Mineral Leases (active and/or expired/terminated) | -- | Acres within ROW | 647 | 819 | 824 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-101 Acres of Farmland by Type within the Anticipated ROW in the Effie Variation Area

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

Source(s): USDA NRCS 2014, reference (154)

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-163 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Blue Route, Proposed Orange Route, and the Effie Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue Route, Proposed Orange Route, nor the Effie Variation in the Effie Variation Area.

The Effie Variation, which has the longest length, would pass through the most acres of state forest lands — the Koochiching and George Washington State Forests (Figure 6-102, Map 6-53). The Proposed Blue Route, which has the shortest length, would be expected to have the fewest impacts on timber activities in these state forests.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction,

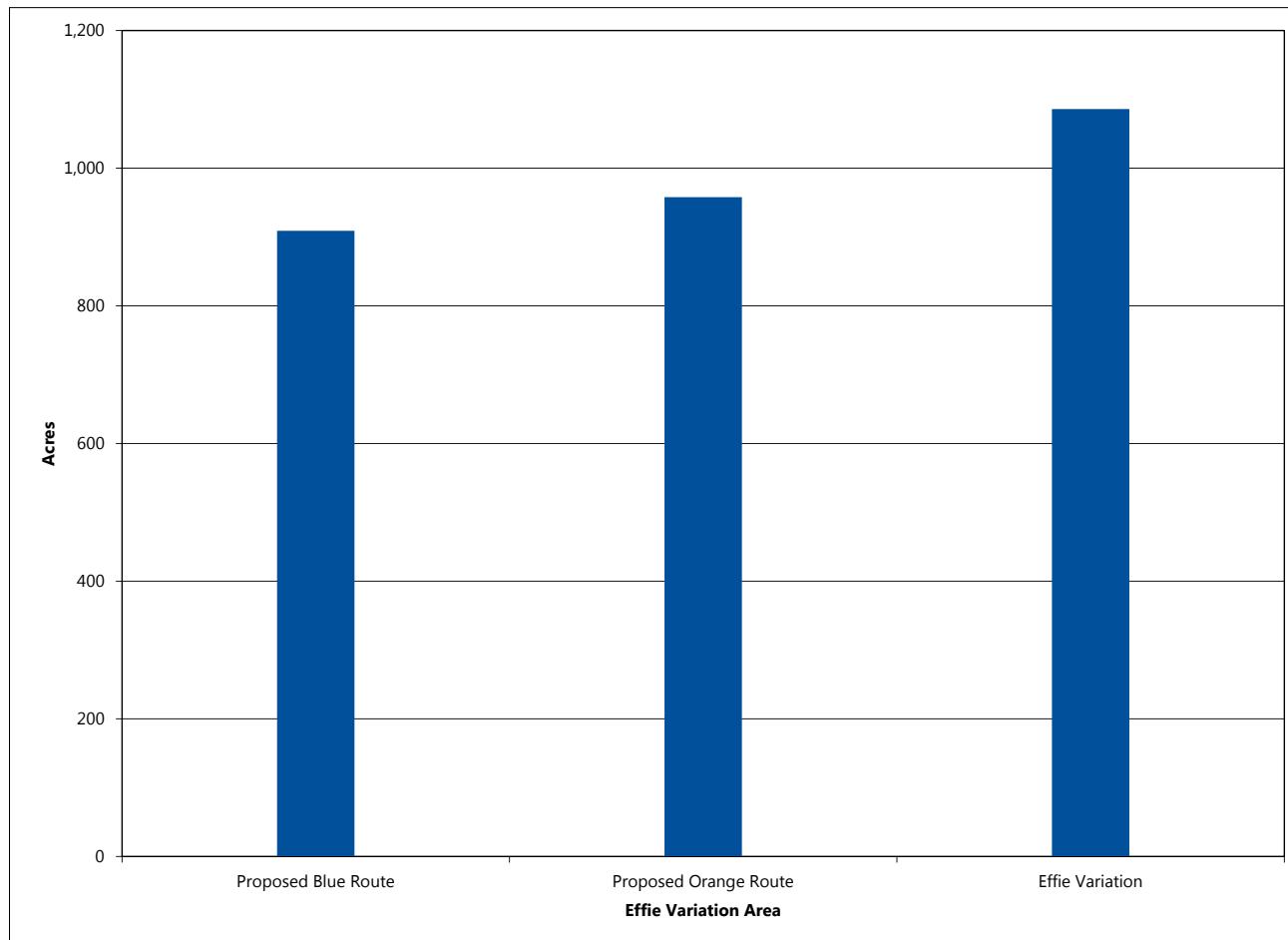
damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency-repair short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-163, Figure 6-103, and Map 6-51 identify the acreage of mining lands with

Figure 6-102 Acres of State Forest Land within the Anticipated ROW in the Effie Variation Area



Source(s): MnDNR 2003, reference (148)

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

state mineral leases that may be impacted in the Effie Variation Area. There are no known aggregate resources in the ROI of either the proposed routes or Effie Variation.

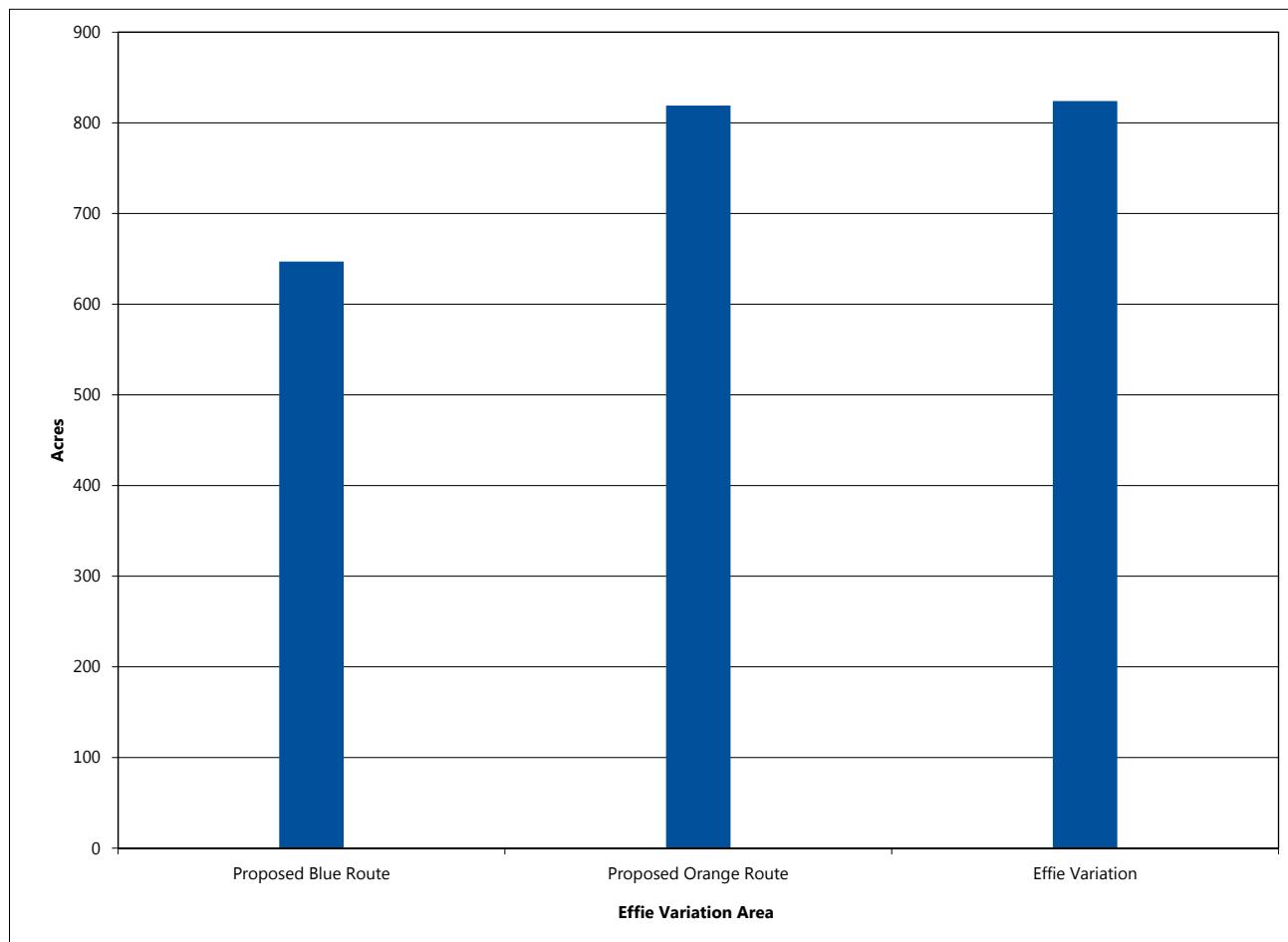
Both of the proposed routes and the Effie Variation would traverse several acres of mining lands with active and terminated/expired state mineral leases (Table 6-163, Figure 6-103, and Map 6-51). The Effie Variation traverses the most state mineral lease lands; however, it does so adjacent to an existing transmission line corridor, while both of the proposed routes would require the creation of a new corridor through state mineral lease lands (Map 6-51).

A volcanic belt with known metallic mineral occurrences (gold, copper-zinc-lead, iron) is located in the vicinity of Effie, and approximately 25 miles southeast of Effie. Zones of high mineral potential generally extend southwest to the Chippewa National Forest and northeast into the Lake Vermilion area. The proposed routes and the Effie

Variation would require crossing this volcanic belt. The MnDNR provided comments during the scoping process regarding concerns about the proposed routes and variations crossing these mineral resources. These concerns have been reflected in this EIS, via the consideration of the routing alternatives in this variation area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Figure 6-103 Acres of State Mineral Leases within the Anticipated ROW in the Effie Variation Area

Source(s): MnDNR 2014, reference (179)

6.4.1.3 Archaeology and Historic Architectural Sites

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic resources includes the ROW of the proposed transmission line; however, potential indirect impacts to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites.

Table 6-164 provides a summary of the previously recorded archaeological sites and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Blue Route, Proposed Orange Route, and the Effie Variation in the Effie Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route, Proposed Orange Route, and Effie Variation in the Effie Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Effie Variation Area, there are no previously recorded archaeological sites or historic architectural resources located within the ROW of the Proposed Blue Route and Proposed Orange Route; however, an archaeological site is present within the ROW of the Effie Variation (Map 6-52). Site 21KCo is an artifact scatter with an unknown NRHP-eligibility status. In addition to the archaeological site within the ROW, the Effie Variation also has a higher number of previously recorded historic architectural sites in the indirect APE when compared to either of the indirect APEs for the Proposed Blue Route

Table 6-164 Archaeological and Historic Resources within the Effie Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Effie Variation Area | | |
|------------------------------|-------------------------------------|----------------------|-----------------------|-----------------|
| | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| Historic Architectural Sites | Count within ROW | 0 | 0 | 0 |
| | Count within 0–1,500 ft | 1 | 1 | 0 |
| | Count within 0–5,280 ft | 1 | 1 | 3 |
| Archaeological Sites | Count within ROW | 0 | 0 | 1 |
| | Count within 0–1,500 ft | 0 | 0 | 2 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

and Proposed Orange Route (Map 6-52). Two of the three historic architectural sites within the Effie Variation (IC-BEA-009 and IC-BEA-008) have not been evaluated for NRHP eligibility, while the remaining site (IC-CAR-008) has been recommended not NRHP-eligible. For Effie Proposed Blue Route and Orange Route, the one identified historic architectural site in the indirect APE (IC-CAR-009) has not been evaluated for NRHP eligibility.

There is currently potential for direct, long-term, adverse, **impacts** to the one archaeological site (Site 21KCo) identified within the ROW of the Effie Variation from ground disturbance activities associated with construction of the proposed Project. Indirect, long-term, **adverse visual impacts on three previously recorded historic architectural resources** have the potential to occur for the Proposed Blue Route, Orange Route, and Effie Variation. The indirect impacts are likely to occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since the archaeological and **historic** architectural resources within the direct and indirect APEs of the routes and variation have not been evaluated for NRHP-eligibility, the proposed Project may result in direct impacts to the archaeological feature for the Effie Variation and indirect impacts resulting from changes to the setting of the historic architectural sites in the indirect APE for the Proposed Blue Route, Orange Route, and Effie Variation that could be considered an adverse impact under Section 106 of the NHPA if these archaeological and historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

The Proposed Blue Route, Proposed Orange Route, and Effie Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resources investigations will be implemented as part of the DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the direct and indirect APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential adverse impacts to cultural resources from and operation construction of the proposed Project.

Potential short-term and long-term adverse impacts from construction, operation, maintenance, and emergency repair related to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse **impacts** to these resources, including TCPs, from the proposed Project.

6.4.1.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Effie Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Effie Variation Area are summarized in Table 6-165 and shown on Map 6-53. Additional,

Table 6-165 Water Resources within the Anticipated ROW in the Effie Variation Area

| Resource | Evaluation Parameter | Effie Variation Area | | |
|-------------------------------|----------------------|----------------------|-----------------------|-----------------|
| | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| Transmission Line | Length (mi) | 41.1 | 44.6 | 49.8 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 10 | 13 | 13 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 9 | 11 | 15 |
| Floodplains ⁽³⁾ | Acres within ROW | 3 | 3 | 0 |
| NWI Wetlands | Acres within ROW | 443 | 391 | 413 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); Minnesota Power 2014, reference (163)

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

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.
- (3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmissions structures in floodplains and wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ across the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation. The Proposed Blue Route, the Proposed Orange Route, and the Effie Variation would not require crossing impaired waters.

The Proposed Blue Route, the Proposed Orange Route, and the Effie Variation would all require one or more crossings of the Bear River, Prairie River, and tributaries to the Bear River, all of which are PWI watercourses. Additional PWI waters that would be crossed by the Proposed Blue Route include the West Fork of the Prairie River, Deer Creek, Deer Lake, a tributary to the Big Fork River, and an unnamed stream. PWI watercourses that would be crossed by the Proposed Orange Route include the East River (3 crossings), Deer Creek, Day Brook (3 crossings), and a tributary to the Big Fork River. PWI watercourses crossed by the Effie Variation include the East River (3 crossings), Valley River, Venning Creek, and Day Brook. The Proposed Blue Route and Proposed Orange Route would both cross PWI Deer Lake, and the Proposed Orange Route would also cross PWI Klingendiel Lake. As shown in Figure 6-104, the Proposed Orange Route and the Variation would require the most PWI water crossings. The proposed routes and Effie Variation would not cross PWI wetlands.

The Proposed Blue Route, the Proposed Orange Route, and the Effie Variation would all cross several non-PWI watercourses and waterbodies. None

of these routes would cross ditches. As shown in Figure 6-105, the Effie Variation would cross the most non-PWI waters.

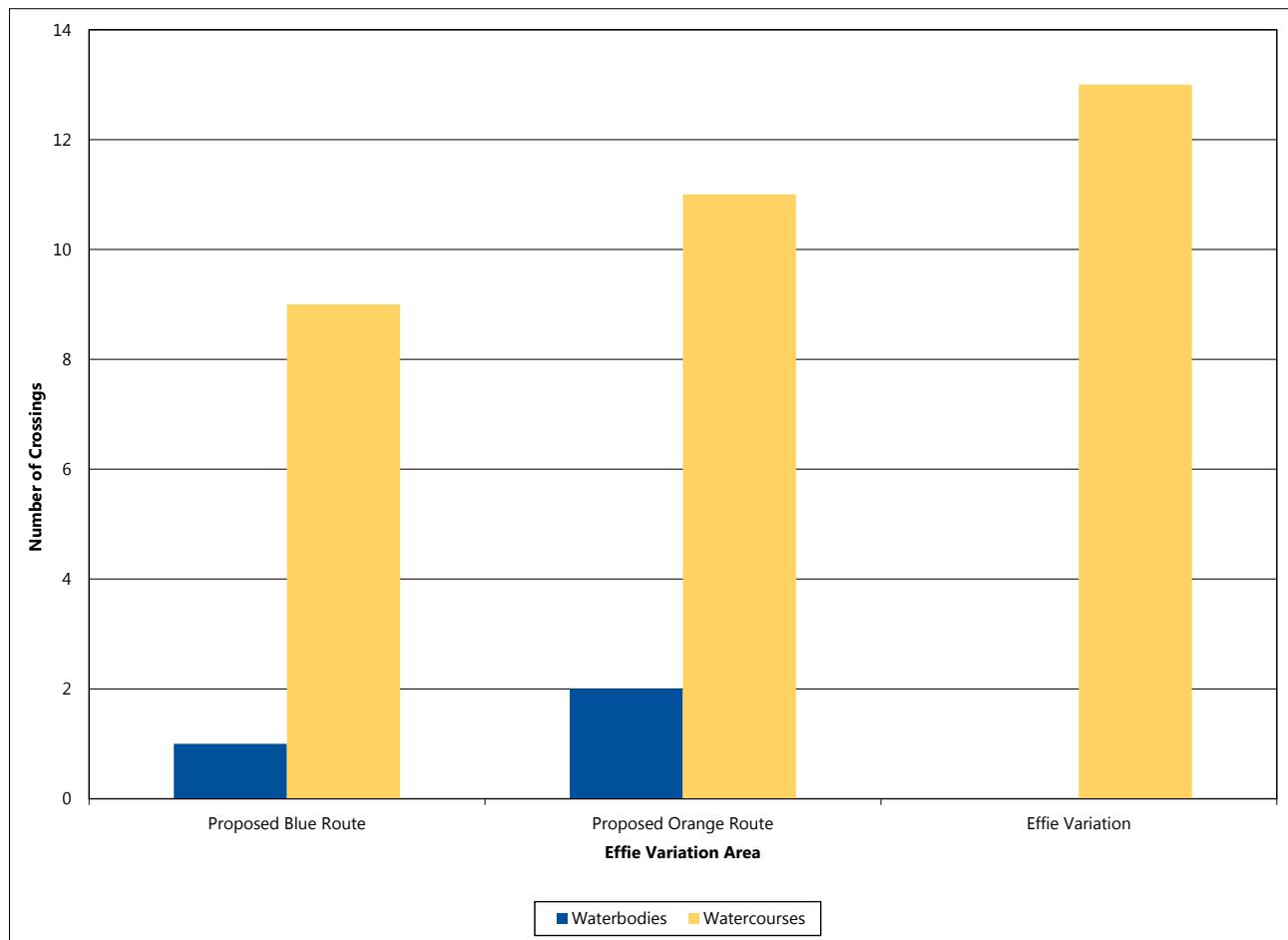
The Effie Variation would cross six MnDNR-designated trout streams: Valley River, Venning Creek, and four unnamed tributaries to the Bear River. Neither the Proposed Blue Route nor the Proposed Orange Route would cross any designated trout streams.

It is anticipated that PWI crossings, non-PWI water crossings, and trout streams are spammable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

The Effie Variation would not traverse a floodplain; however, the Proposed Blue Route and the Proposed Orange Route would cross the Zone A floodplain of an unnamed tributary to the Big Fork River. Though the Proposed Blue Route and the Proposed Orange Route would cross floodplains, 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 within floodplains.

Based on the NWI, the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation would all require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-106, the Proposed Blue Route contains the most combined forested and shrub wetland and would result in the greatest amount of wetland type conversion. While these direct, adverse

Figure 6-104 PWI Water Crossings by Type in the Effie Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

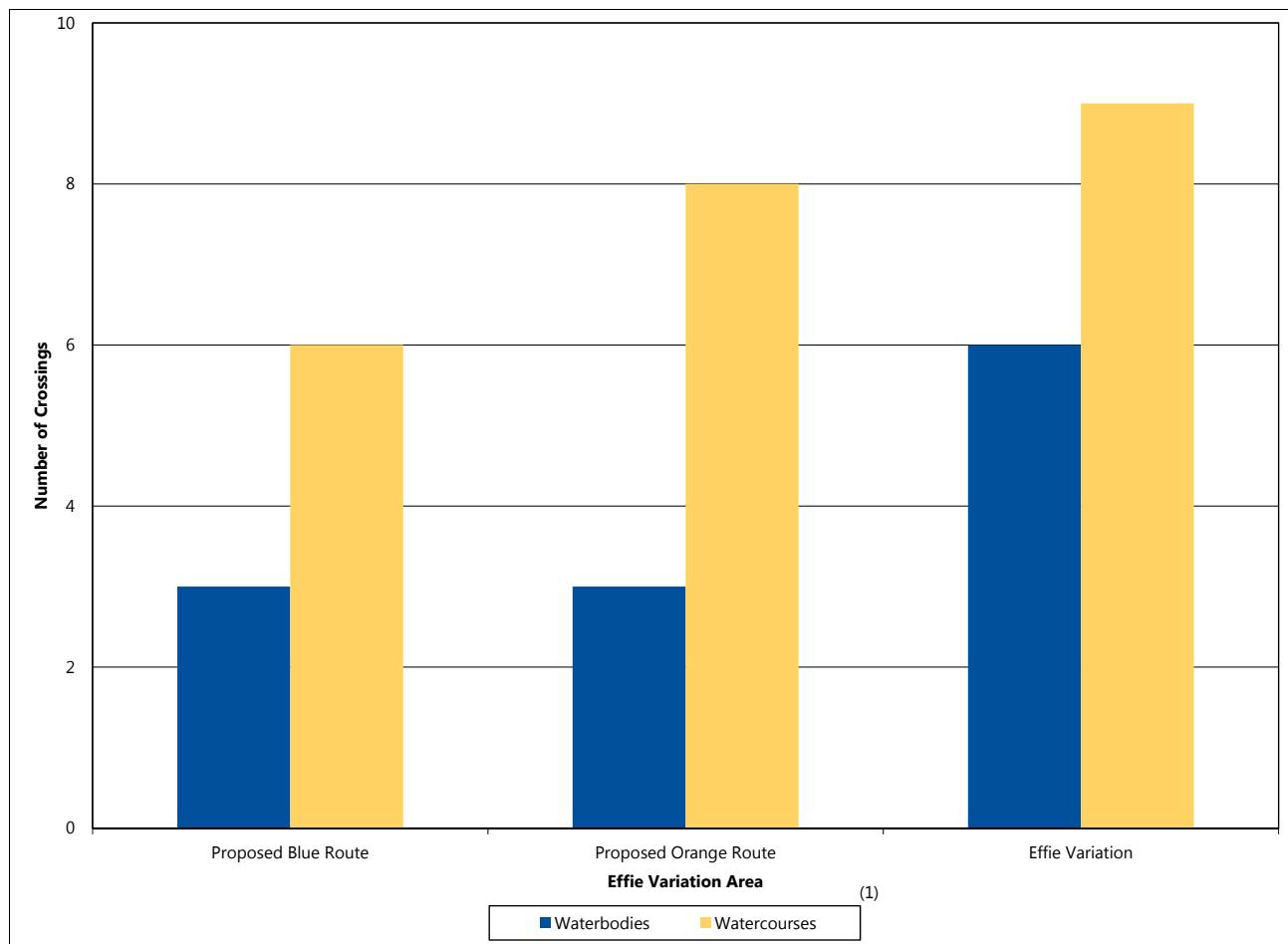
impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts as summarized in Section 5.3.4.1. The Proposed Blue Route, Proposed Orange Route, and the Effie Variation would all require placement of fill in wetlands for construction of transmission structures, but this impact would be expected to be minimal because of its localized extent (33 square feet per structure). Impacts associated with fill would be minimized by spanning wetlands to the extent practical; however, this impact cannot be completely avoided by spanning due to the high number of wetland crossings that would be needed in the East Section. Due to the number of wetland complexes in the area, it would be expected that the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation would all require temporary construction access through wetlands,

which would be expected to be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Effie Variation Area are summarized in Table 6-166 and shown on Maps 5-19 and 6-53. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

Figure 6-105 Non-PWI Water Crossings by Type in the Effie Variation Area

Source(s): : USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

The primary impact on vegetation that would differ across the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2, the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-166 and Figure 6-107, the Effie Variation would pass through more forested land, including state forest land, relative to the Proposed Blue Route and the Proposed Orange Route. Although the Proposed Blue Route and the Proposed Orange Route are shorter in length, they would require creation of new corridor for their entire length, while the Effie Variation would parallel an existing transmission line corridor for the majority of its length (Table 6-166). Because of this, the Effie Variation would likely result in

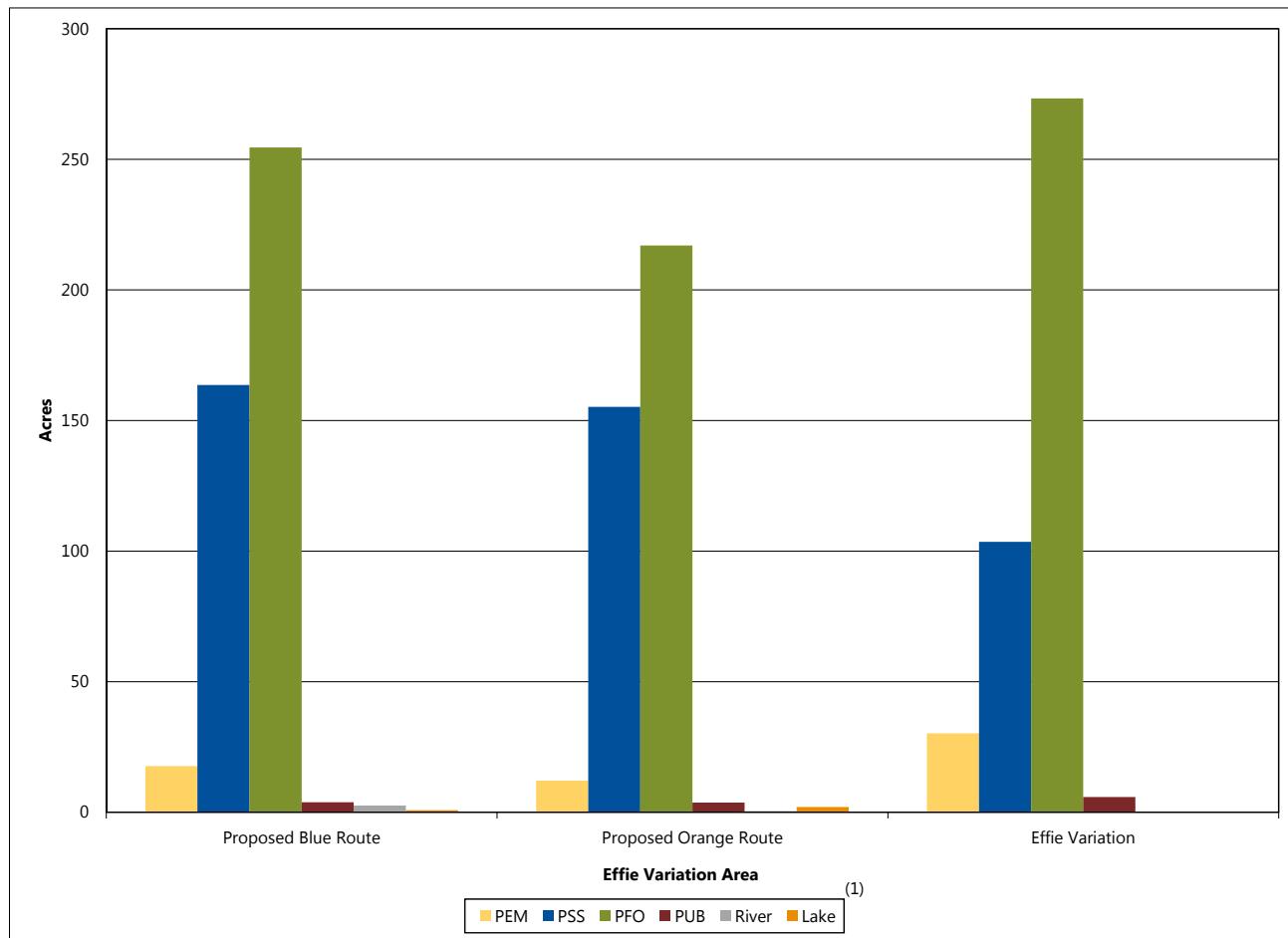
less impact on intact forested areas. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-19).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Effie Variation Area are summarized in Table 6-167 and shown on Map 6-53. Additional,

Figure 6-106 Acres of Wetland by Type within the Anticipated ROW in the Effie Variation Area



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

Source(s): USFWS 1997, reference (157)

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the proposed routes and Variation to these areas. A detailed description of fragmentation is found in Section 5.3.4.3, but, in general, an increase in habitat fragmentation would result in the reduction in habitat connectivity. This reduction would have a greater impact on smaller species, such as turtles, and have less of an impact on larger animals, such as deer. While these indirect, long-term adverse impacts would be greater for the Proposed Blue Route and Proposed Orange Route, they are expected to be minimal because of the available contiguous habitat in the region. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor and/or create

new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.4.1.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation.

The Proposed Blue Route and the Proposed Orange Route would pass through the Chippewa Plains Important Bird Area and require creation of new corridor for their entire length, while the Effie Variation avoids the Chippewa Plains Important Bird Area and would parallel an existing transmission line corridor for the majority of its length (Table 6-167; Map 6-53). Because of this, the Effie Variation would result in less fragmentation of forested habitats, and subsequent displacement of wildlife species associated with those forest communities, such as the birds associated with the Chippewa Plains Important Bird Area.

Table 6-166 Vegetation Resources within the Anticipated ROW in the Effie Variation Area

| Resource | Evaluation Parameter | Effie Variation Area | | |
|--|--|----------------------|-----------------------|-----------------|
| | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| Transmission Line | Length (mi) | 41.1 | 44.6 | 49.8 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 | 80 |
| State Forest | Acres within ROW | 909 | 958 | 1086 |
| Total Forested GAP Land Cover | Acres within ROW | 978 | 1047 | 1164 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | | |
| North American Boreal Forest | Acres within ROW | 473 | 569 | 556 |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 399 | 339 | 364 |
| Eastern North American Cool Temperate Forest | Acres within ROW | 25 | 40 | 35 |
| Eastern North American Flooded and Swamp Forest | Acres within ROW | 81 | 99 | 208 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Creation of a new corridor in the Chippewa Plains Important Bird Area would likely result in both short-term and long-term direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The 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).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.4.1.5 Rare and Unique Natural Resources

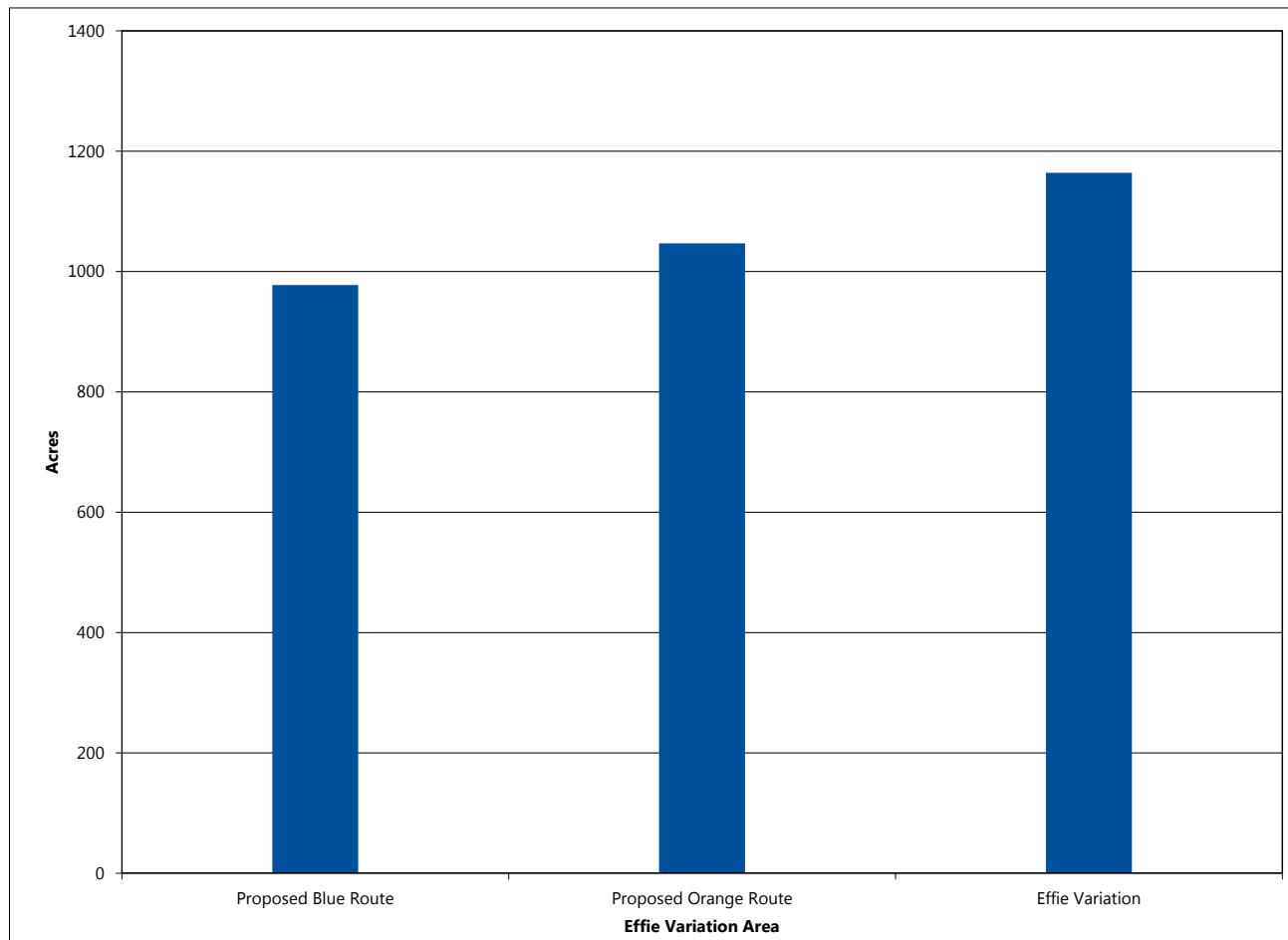
Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Effie Variation Area are summarized in Table 6-168; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species differs between the Proposed Blue

Figure 6-107 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Effie Variation Area



Source(s): USGS 2001, reference (151)

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

Table 6-167 Wildlife Resources within the Vicinity of the Effie Variation Area

| Resource | Evaluation Parameter | Effie Variation Area | | |
|---|--|----------------------|-----------------------|-----------------|
| | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| Transmission Line | Length (mi) | 41.1 | 44.6 | 49.8 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 | 80 |
| Important Bird Areas | Acres within ROW | 69 | 69 | 0 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Audubon Society 2014, reference (181)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Route, the Proposed Orange Route, and the Effie Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation, including critical habitat designated for gray wolf.

As indicated in Table 6-168, more rare species have been documented within one mile of the Proposed Blue Route and the Proposed Orange Route relative to the Effie Variation. Furthermore, the rare species documented within one mile of the Effie Variation are aquatic species; because it is anticipated that all waterbodies and watercourses would be spanned, impacts to these aquatic species are not expected.

Two colonial waterbird nesting sites have been documented within one mile of the Effie Variation, one of which is located within 1,500 feet of the anticipated alignments. Three colonial waterbird nesting sites have been documented within one mile of the Proposed Blue Route and the Proposed Orange Route, two of which are located within 1,500 feet of the anticipated alignments. As discussed under Wildlife in Section 6.4.1.4 (Wildlife), the Proposed Blue Route and the Proposed Orange Route would also pass through the Chippewa Plains Important Bird Area (Map 6-53).

The Proposed Blue Route and the Proposed Orange Route would require establishment of new corridor for their entire length, while the Effie

Variation would parallel an existing transmission line corridor for the majority of its length. Clearing of forested areas to create new corridor could have impacts on rare species associated with forest or shrub communities. Because the Proposed Blue Route and the Proposed Orange Route would require creation of new corridor for their entire length and a higher concentration of rare species has been documented within one mile of them, the Proposed Blue Route and the Proposed Orange Route would likely result in more impacts on rare species relative to the Effie Variation; however, the full extent of potential impacts from the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

The Proposed Blue Route, Proposed Orange Route, and the Effie Variation would cross critical habitat designated for gray wolf. The Proposed Blue Route and Proposed Orange Route would both cross this habitat for approximately 15 miles, along new transmission line corridor, while the Effie Variation would cross this habitat for approximately 25 miles and would parallel an existing transmission line corridor. Although the Effie Variation would cross more critical habitat designated for gray wolf

Table 6-168 Rare Species Documented within One Mile of the Anticipated ROW in the Effie Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | Effie Variation Area | | |
|---|---------------------------------|----------------|-----------------|-------------------|----------------------|-----------------------|-----------------|
| | | | | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| <i>Eleocharis robbinsii</i> | Robbin's Spike-rush | None | Threatened | Vascular Plant | X | | |
| <i>Carex ormostachya</i> | Necklace Spike Sedge | None | Special Concern | Vascular Plant | | X | |
| <i>Lasmigona compressa</i> | Creek Heelsplitter | None | Special Concern | Mussel | X | X | X |
| <i>Ligumia recta</i> | Black Sandshell | None | Special Concern | Mussel | X | X | |
| <i>Najas gracillima</i> | Thread-like Naiad | None | Special Concern | Vascular Plant | | X | X |
| <i>Najas guadalupensis</i> ssp. <i>olivacea</i> | Guadalupe waternymph | None | Special Concern | Vascular Plant | X | X | |
| Colonial Waterbird Nesting Area | Colonial Waterbird Nesting Site | -- | -- | Animal Assemblage | X | X | X |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

than the proposed routes, it would be expected to have less potential impact on this resource because it would cross in an area where critical habitat designated for gray wolf has already been fragmented.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Effie Variation Area are summarized in Table 6-169 and shown on Map 6-54; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ across the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the

Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-54 and in Table 6-169, the Proposed Orange Route would pass through the most MBS Sites of Biodiversity Significance. The Effie Variation would parallel an existing transmission line corridor for much of its length, while the Proposed Blue Route and the Proposed Orange Route would require creation of new corridor for their entire length. Because of this, the Proposed Blue Route and the Proposed Orange Route would result in more fragmentation of intact forest in areas where forest vegetation is present.

The rare communities and resources listed in Table 6-169 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. 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.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Table 6-169 Rare Communities and Resources within the Vicinity of the Effie Variation Area

| Resource | Evaluation Parameter | Effie Variation Area | | |
|---|--|----------------------|-----------------------|-----------------|
| | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| Transmission Line | Length (mi) | 41.1 | 44.6 | 49.8 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 | 80 |
| MBS Sites of Biodiversity Significance ⁽³⁾ | Acres within ROW | 422 | 490 | 427 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

6.4.1.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-55 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Effie Variation Area.

Table 6-170 identifies the percentage of total transmission line length that the Proposed Blue Route, Proposed Orange Route, and Effie Variation parallel an existing corridor or linear feature in the Effie Variation Area.

The Effie Variation would parallel an existing transmission line corridor for over two thirds of its length (Table 6-170 and Figure 6-108). The Proposed Blue Route parallels existing corridors or linear features for less than one-tenth of its length and the Proposed Orange Route would parallel existing corridors or linear features for just under one-fifth of its length (Table 6-170 and Figure 6-108).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on corridor sharing are summarized

in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.4.1.7 Electrical System Reliability

As explained in Section 5.3.7, the ROI for Electrical System Reliability was determined to be the corridors for the existing transmission lines. Data related to electrical system reliability in the Effie Variation Area are shown on Map 6-55.

The Proposed Blue Route and the Proposed Orange Route would not parallel an existing transmission line in the Effie Variation Area. The Effie Variation, however, would parallel the 500 kV and 230 kV transmission lines for 80 percent of its length. (Table 6-170) Therefore, the Effie Variation would result in three parallel high-voltage transmission lines in adjacent corridors in this area.

The configuration of the Effie Variation may decrease the reliability of the proposed Project. When facilities are located in close proximity, there is a greater risk that a single event can take out multiple lines. Additionally, the close proximity of the lines can make repairing the lines more difficult. These difficulties could increase outage times, should an outage occur. Adverse impacts are possible as a result of the operation of three high-voltage transmission lines under one variation in the East Section.

Table 6-170 Corridor Sharing in the Effie Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Effie Variation Area | | |
|--|--|----------------------|-----------------------|-----------------|
| | | Proposed Blue Route | Proposed Orange Route | Effie Variation |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS) | Percent of Total Length ⁽²⁾ | 0 | 0 | 80 |
| Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line) | Percent of Total Length ⁽²⁾ | 4 | 2 | 0 |
| Field Line (other linear features, but not transmission lines or road/trails, may be present within the field line corridor; i.e., PLSS) | Percent of Total Length ⁽²⁾ | 2 | 2 | 0 |
| PLSS Only | Percent of Total Length ⁽²⁾ | 1 | 11 | 0 |
| None | Percent of Total Length ⁽²⁾ | 93 | 85 | 20 |

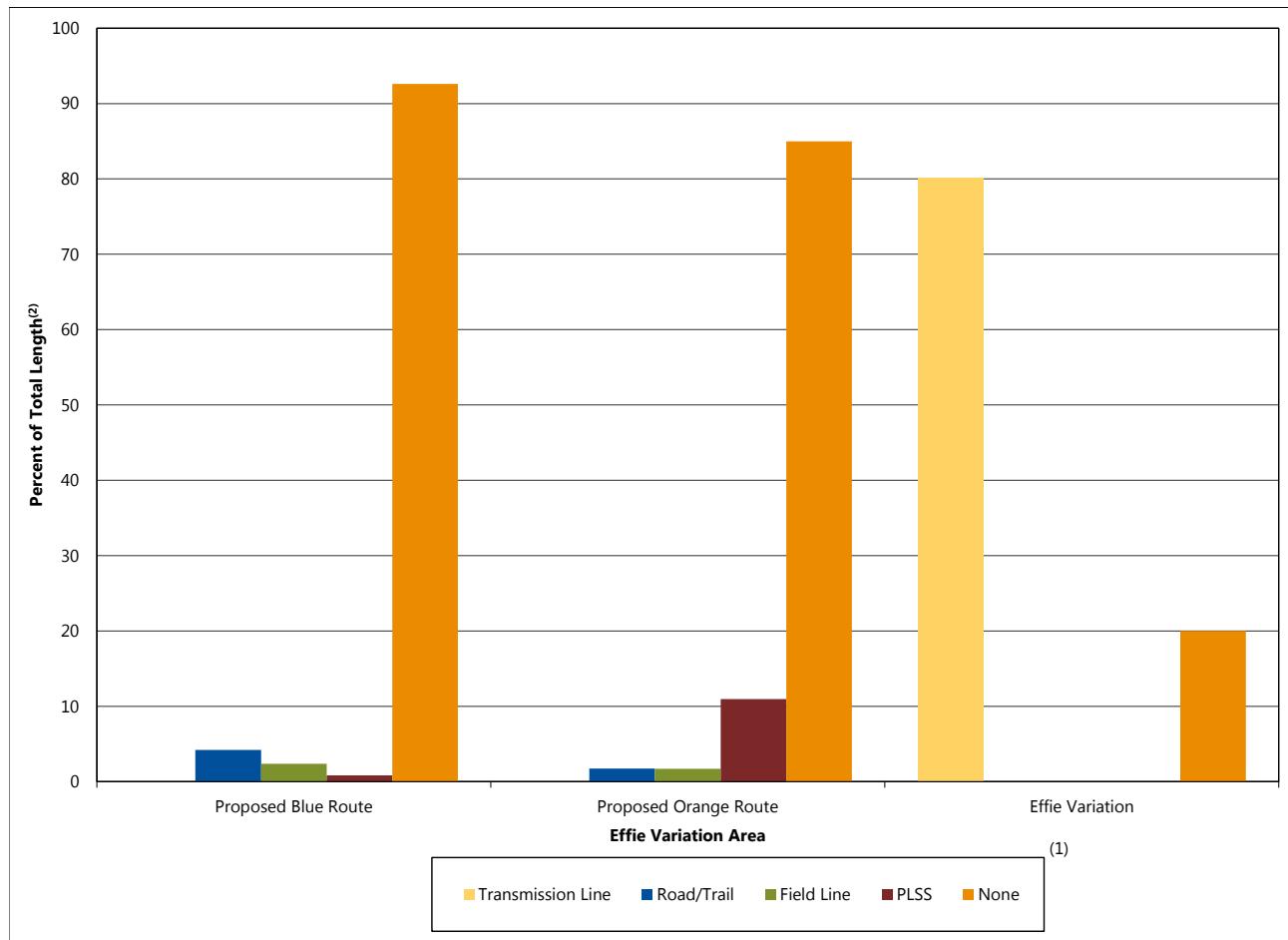
Source(s): : USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

(1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-108 Corridor Sharing in the Effie Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS); Road Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line); Field Line (other linear features, but not transmission lines or roads/trails, may be present within the field line corridor; i.e., PLSS).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on electrical system reliability are summarized in Section 5.3.7. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on electrical system reliability.

6.4.1.8 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-171 summarizes the costs associated with constructing the Proposed Blue Route, Proposed Orange Route, and Effie Variation in the Effie Variation Area. As

indicated in Table 6-171, the Effie Variation would cost the most to construct, while the Proposed Blue Route would cost the least to construct.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$65,000 to \$80,000 annually for these alternatives in the Effie Variation Area.

6.4.2 East Bear Lake Variation Area

The East Bear Lake Variation Area encompasses two route alternatives: the Proposed Orange Route and the East Bear Lake Variation. This section provides a comparison of the potential impacts resulting

from construction, operation, maintenance, and emergency repair of the proposed Project within the East Bear Lake Variation Area, depending on the route or variation considered.

6.4.2.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the East Bear Lake Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Effie Variation Area (see Section 6.4.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the East Bear Lake Variation Area are summarized in Table 6-172 and shown on Maps 6-56, 6-57, 6-58, and 6-60.

As indicated in Table 6-172 for the East Bear Lake Variation Area, the Proposed Orange Route and East Bear Lake Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including snowmobile trails, a state trail, water access point, and a state forest. Both the Proposed Orange Route and East Bear Lake Variation would cross three snowmobile trails, one state trail, and one state forest (Maps 6-58 and 6-60). In addition, the East Bear Lake Variation would cross within 1,500 feet of a water access point for Little Moose Lake (Map 6-58). The Proposed Orange Route and East Bear Lake Variation would affect similar numbers of aesthetic resources. Neither the Proposed Orange Route nor East Bear Lake Variation would be located within 1,500 feet of any residences, which also have high visual sensitivity.

The East Bear Lake Variation is slightly longer (10.5 miles) than the Proposed Orange Route (8.9 miles; Table 6-172). However, the East Bear Lake Variation parallels two existing adjacent large transmission lines (a 500 kV and a 230 kV transmission line) for 42 percent of its length, whereas the Proposed Orange Route does not parallel any existing large transmission lines and would require a new corridor to be cleared. By paralleling two existing large

Table 6-171 Construction Costs in the Effie Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|----------------|-----------------------|--------------|-------------------------|-------------|
| Effie | Proposed Blue Route | \$46,649,600 | \$1,135,027 | 41.1 |
| | Proposed Orange Route | \$49,488,323 | \$1,109,604 | 44.6 |
| | Effie Variation | \$57,353,305 | \$1,149,365 | 49.8 |

Source(s): Minnesota Power 2015, reference (9); Minnesota Power 2015, reference (186)

Table 6-172 Aesthetic Resources within the ROI in the East Bear Lake Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | East Bear Lake Variation Area | |
|---|--|-------------------------------|--------------------------|
| | | Proposed Orange Route | East Bear Lake Variation |
| Transmission Line | Length (mi) | 8.9 | 10.5 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 0 | 42 |
| State Trails | Count within 0–1,500 ft | 1 | 1 |
| State Forests | Count within 0–1,500 ft | 1 | 1 |
| Snowmobile Trails | Count within 0–1,500 ft | 3 | 3 |
| Water Access Points | Count within 0–1,500 ft | 0 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (182); MnDNR 2003, reference (148); MnDNR 2010, reference (150); MnDNR 2003, reference (190)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

(2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

transmission lines, the East Bear Lake Variation would produce substantially less contrast than the Proposed Orange Route.

Although the East Bear Lake Variation would be slightly longer (10.5 miles) and affects one additional aesthetic resource (water access point), it would produce substantially less contrast than the Proposed Orange Route because of the existing transmission lines. By paralleling multiple existing large transmission lines for a large portion of its length that are already visible from many of the aesthetic resources, it is likely that the addition of a third large transmission line adjacent to the existing transmission lines would result in only an incremental increase in contrast for views of the new transmission line. The incremental increase in contrast would be slightly greater where the new transmission line is located between the existing transmission lines and viewers and slightly less where the new transmission line is located on the opposite side of the existing transmission line from viewers. For these reasons, the East Bear Lake Variation would result in less aesthetic impact than the Proposed Orange Route in the East Bear Lake Variation Area.

The Proposed Orange Route does not parallel an existing large transmission line of similar size and design, it is short in length (8.9 miles) and affects no residences and only a few other sensitive visual resources (one state trail, one state forest, and three snowmobile trails). Although the East Bear Lake Variation is longer in length, it parallels an existing large transmission line for 42 percent of its length, and affects no residences, and affects only a few other sensitive visual resources (one state trail, one state forest, three snowmobile trails, and one water access point), potential aesthetic impacts of the East Bear Lake Variation are expected to be minimal.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-173 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Orange Route and East Bear Lake Variation in the East Bear Lake Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the East Bear Lake Variation Area are shown in Map 5-19 and residences, churches, cemeteries, and airports near the Proposed Orange Route and East Bear Lake Variation are shown on Map 6-56.

The Proposed Orange Route and East Bear Lake Variation ROI are both primarily composed of forested and/or swamp land (Table 6-173). The East Bear Lake Variation ROW contains a greater amount of forested/swamp and developed or disturbed land than the Proposed Orange Route.

Land Ownership and Management

Table 6-174 and Figure 6-109 show that the East Bear Lake Variation ROW contains more state forest land and state fee land than the Proposed Orange Route. No impacts to county lands, state conservation easements, or USFWS Interest Lands

Table 6-173 Land Uses within the ROI in the East Bear Lake Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | East Bear Lake Variation Area | |
|--|------------------------|-------------------------------------|-------------------------------|--------------------------|
| | | | Proposed Orange Route | East Bear Lake Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 3,407 | 3,981 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 19 | 58 |
| | Agricultural | Acres within 0–1,500 ft | 0 | 0 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 3,381 | 3,910 |
| | Other | Acres within 0–1,500 ft | 7 | 13 |

Source(s): USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi Natural Vegetation. See detailed summary of all types in Appendix E.

(2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-174 Land Ownership/Management within the Anticipated ROW in the East Bear Lake Variation Area

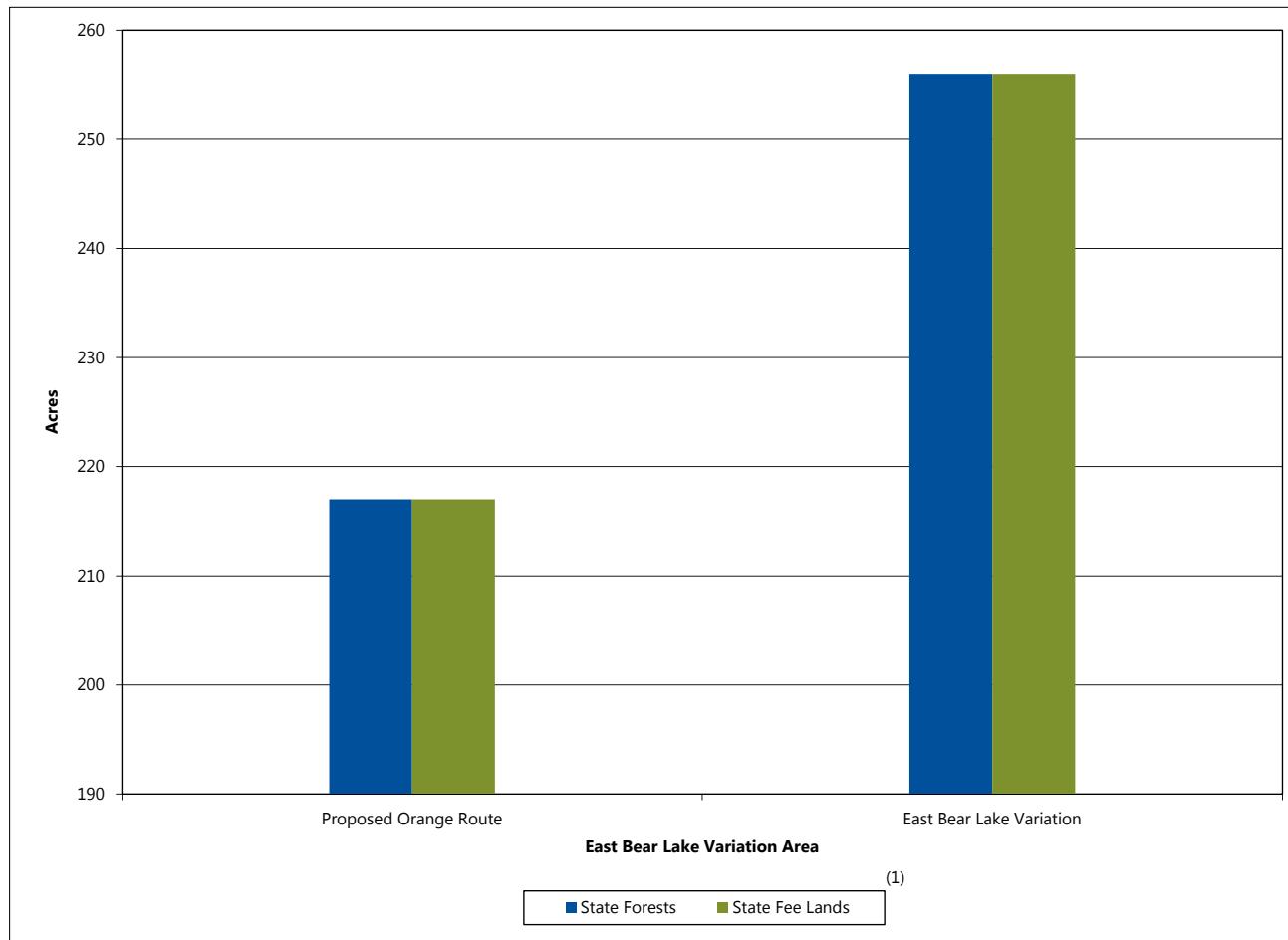
| Resource | Type | Evaluation Parameter | East Bear Lake Variation Area | |
|--|---|----------------------|-------------------------------|--------------------------|
| | | | Proposed Orange Route | East Bear Lake Variation |
| Total Lands | -- | Acres within ROW | 217 | 256 |
| State Forests | -- | Acres within ROW | 217 | 256 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 217 | 256 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 0 | 0 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 164 | 180 |
| | Trust Fund | Acres within ROW | 52 | 76 |
| | Federal - State Lease | Acres within ROW | 0 | 0 |
| Private Lands | -- | Acres within ROW | 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.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-109 Public Land Ownership/Management within the ROI in the East Bear Lake Variation Area



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.

would occur under the Proposed Orange Route or the East Bear Lake Variation Area.

The Proposed Orange Route would not parallel an existing corridor, however, approximately 42 percent of the East Bear Lake Variation would parallel an existing corridor (see Section 6.4.2.6); and therefore would be expected to have less incompatibility with surrounding land uses compared to the Proposed Orange Route.

Impacts to land use from the proposed Project in the East Bear Lake Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Orange Route and East Bear Lake Variation would both 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. The length of the route that would parallel an existing corridor is also important. The Proposed Orange Route avoids a greater amount of state forest and state fee lands than the East Bear Lake Variation thereby avoiding long-term changes to land use. However, the Proposed Orange Route does not parallel an existing corridor, while the East Bear Lake Variation does for approximately 42 percent of its length.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.2.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the East Bear Lake Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the East Bear Lake Variation Area are summarized in Table 6-175.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-175 and Figure 6-110 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Orange Route and East Bear Lake Variation in the ROI.

The East Bear Lake Variation would pass through more acres of farmland, including prime farmland (Figure 6-110). The Proposed Orange Route and East Bear Lake Variation would not impact any acres of statewide importance. The East Bear Lake Variation, because it parallels existing corridors for close to half of its length, may have fewer impacts on farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-175 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Orange Route and the East Bear Lake Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Orange Route or the East Bear Lake Variation in the East Bear Lake Variation Area.

The East Bear Lake Variation would pass through more acres of state forest lands – the George Washington State Forest (Figure 6-111, Map 6-58). The East Bear Lake Variation, because it parallels existing corridors for close to one-half of its length, would be expected to have the fewest impacts on timber activities in the George Washington State Forest.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance,

Table 6-175 Land-Based Economy Resources within the Anticipated ROW in the East Bear Lake Variation Area

| Resource | Type | Evaluation Parameter | East Bear Lake Variation Area | |
|---|----------------------------------|--|-------------------------------|--------------------------|
| | | | Proposed Orange Route | East Bear Lake Variation |
| Transmission Line | -- | Length (mi) | 8.9 | 10.5 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 0 | 42 |
| Farmland | Not Farmland | Acres within ROW | 132 | 95 |
| | Prime Farmland if Drained | Acres within ROW | 1 | 36 |
| | Farmland of Statewide Importance | Acres within ROW | 0 | 0 |
| | All Areas are Prime Farmland | Acres within ROW | 84 | 124 |
| State Forest | -- | Acres within ROW | 217 | 256 |
| State Mineral Leases (active and/or expired/terminated) | -- | Acres within ROW | 96 | 193 |

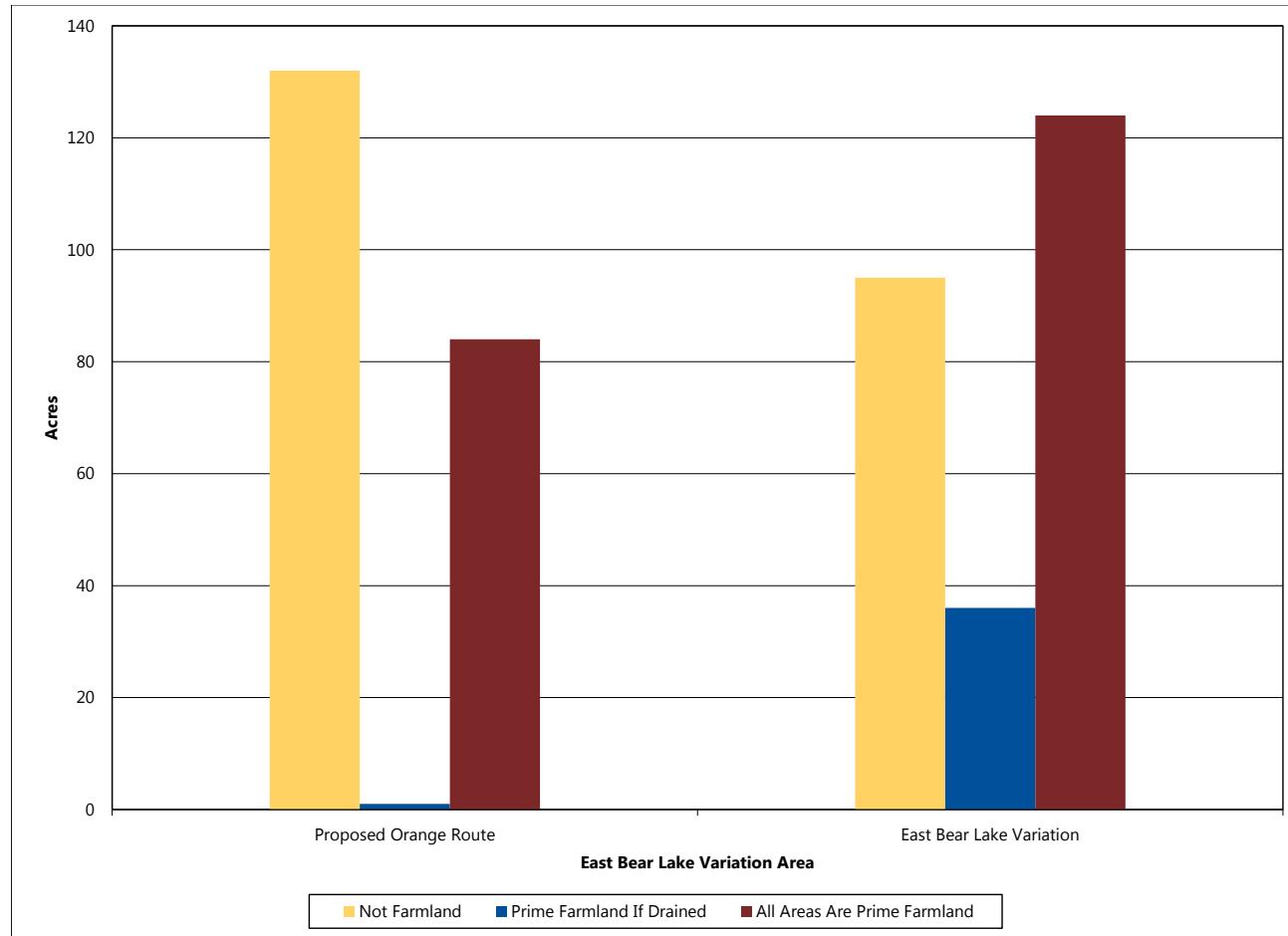
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

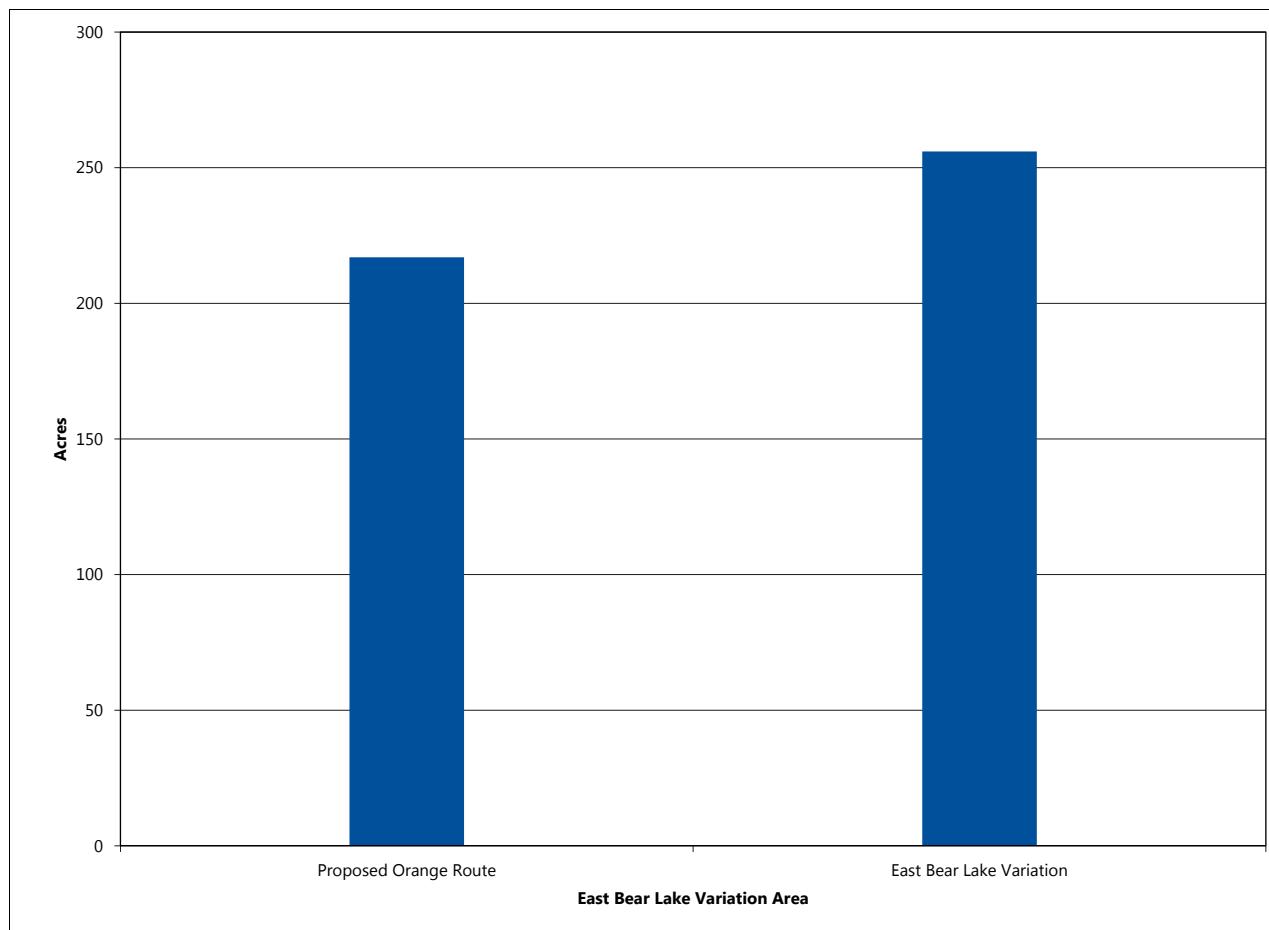
Figure 6-110 Acres of Farmland by Type within the Anticipated ROW in the East Bear Lake Variation Area



Source(s): USDA NRCS 2014, reference (154)

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

Figure 6-111 Acres of State Forest Land within the Anticipated ROW in the East Bear Lake Variation Area



Source(s): MnDNR 2003, reference (148)

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

and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

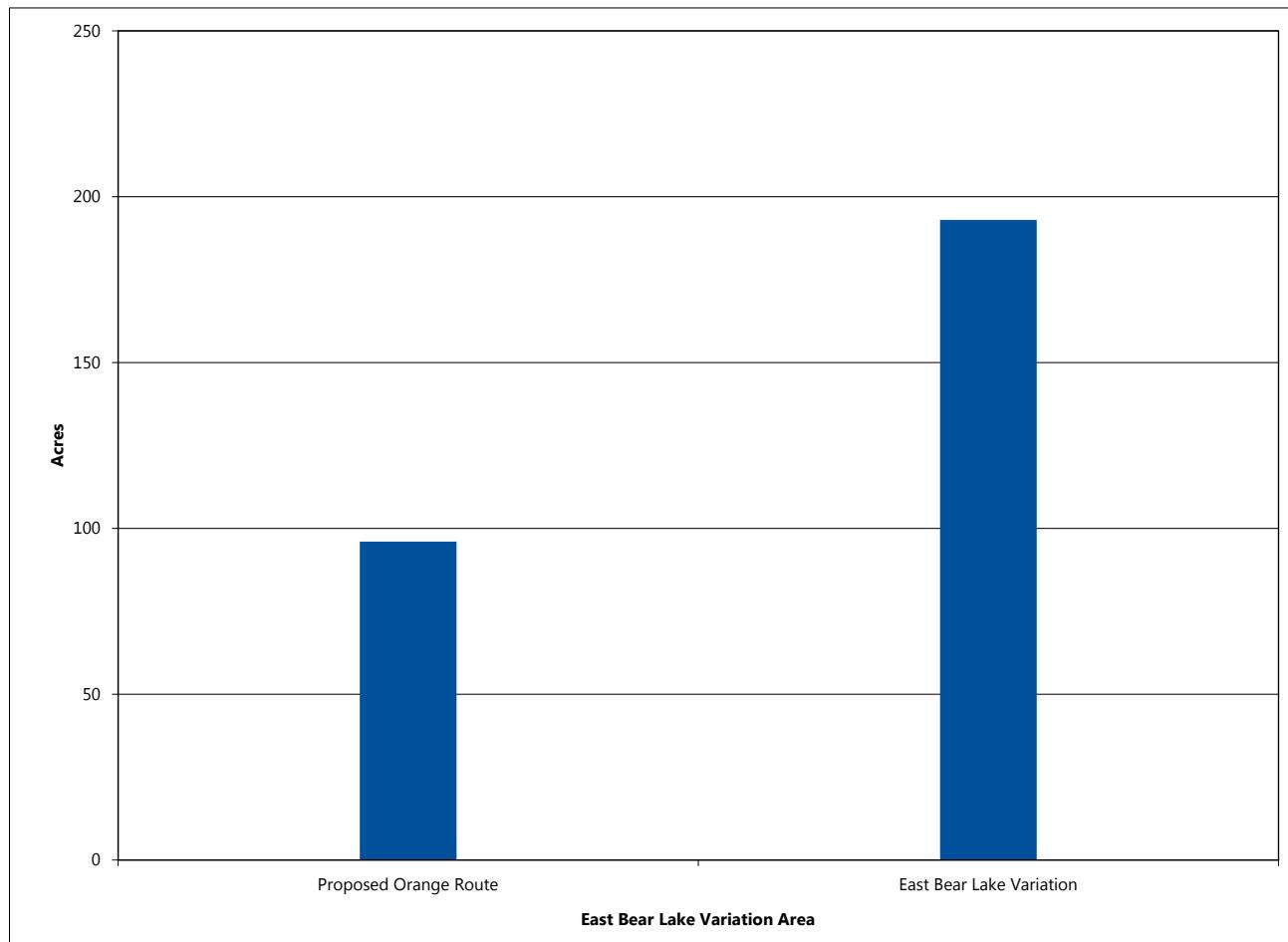
As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-175, Figure 6-112, and Map 6-56 identify the acreage of mining lands with **active and terminated/expired state mineral leases** that may be impacted in the East Bear Lake Variation Area. There are no known aggregate resources

or current mining lands in the ROI of either the Proposed Orange Route or the East Bear Lake Variation.

Both the Proposed Orange Route and the East Bear Lake Variation would traverse mining lands with terminated/expired state mineral leases, with the East Bear Lake Variation passing through approximately twice as much **active** state mineral lease land as the Proposed Orange Route (Table 6-175, Figure 6-112, and Map 6-56). However, the East Bear Lake Variation would pass through a large portion of **active** state mineral lease land adjacent to an existing transmission line corridor, while the Proposed Orange Route would require the creation of a new corridor. Both the Proposed Orange Route and the East Bear Lake Variation could potentially interfere with future mining activities in this area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

Figure 6-112 Acres of State Mineral Leases within the Anticipated ROW in the East Bear Lake Variation Area



Source(s): MnDNR 2014, reference (179)

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.2.3 Archaeology and Historic Architectural Sites

Neither the Proposed Orange Route nor the East Bear Lake Variation ROW have previously recorded archaeological or historic resources in the East Bear Lake Variation Area (Map 6-57). Additionally, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Orange Route and the East Bear Lake Variation in the East Bear Lake Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes

to identify Native American resources within the direct and indirect APEs for the proposed Project.

However, since the Proposed Orange Route and East Bear Lake Variation have not been surveyed for cultural resources, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources would be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural properties. These cultural resources investigations would be implemented as part of DOE's Draft PA (**Appendix V**) that would establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse impacts on historic architectural properties as a result of implementation of the proposed Project.

Potential short-term and long-term adverse impacts from construction, operation, maintenance, and emergency repair related activities to historic and

cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.4.2.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the East Bear Lake Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the East Bear Lake Variation Area are summarized in Table 6-176 and shown on Map 6-58. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmission structures in wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Orange Route and East Bear Lake Variation. Neither the Proposed Orange Route nor the East Bear Lake Variation ROWs contain trout streams, impaired waters, or floodplains.

The Proposed Orange Route and East Bear Lake Variation would each cross the Prairie River and Day Brook; however, the Proposed Orange Route would cross Day Brook three times and result in the most PWI watercourse crossings (Table 6-176). Neither the Proposed Orange Route nor the East Bear Lake Variation would cross PWI waterbodies or wetlands.

The East Bear Lake Variation would require crossing three additional, non-PWI, unnamed watercourses,

while the Proposed Orange Route would not cross any additional non-PWI waters.

It is anticipated that PWI crossings and non-PWI watercourse crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Based on the NWI, the Proposed Orange Route and the East Bear Lake Variation would both require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-113, the Proposed Orange Route contains the most combined forested and shrub wetland and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts as summarized in Section 5.3.4.1. The Proposed Orange Route and the East Bear Lake Variation would both require placement of fill in wetlands for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the East Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill would be expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to the number of wetland complexes in the area, it would be expected that the Proposed Orange Route and the East Bear Lake Variation would both require temporary construction access through wetlands, which would be expected to be minimal due to the short-term, localized nature

Table 6-176 Water Resources within the Anticipated ROW in the East Bear Lake Variation Area

| Resource | Evaluation Parameter | East Bear Lake Variation Area | |
|-------------------------------|----------------------|-------------------------------|--------------------------|
| | | Proposed Orange Route | East Bear Lake Variation |
| Transmission Line | Length (mi) | 8.9 | 10.5 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 4 | 2 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 0 | 3 |
| NWI Wetlands | Acres within ROW | 104 | 89 |

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

(1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.

(2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

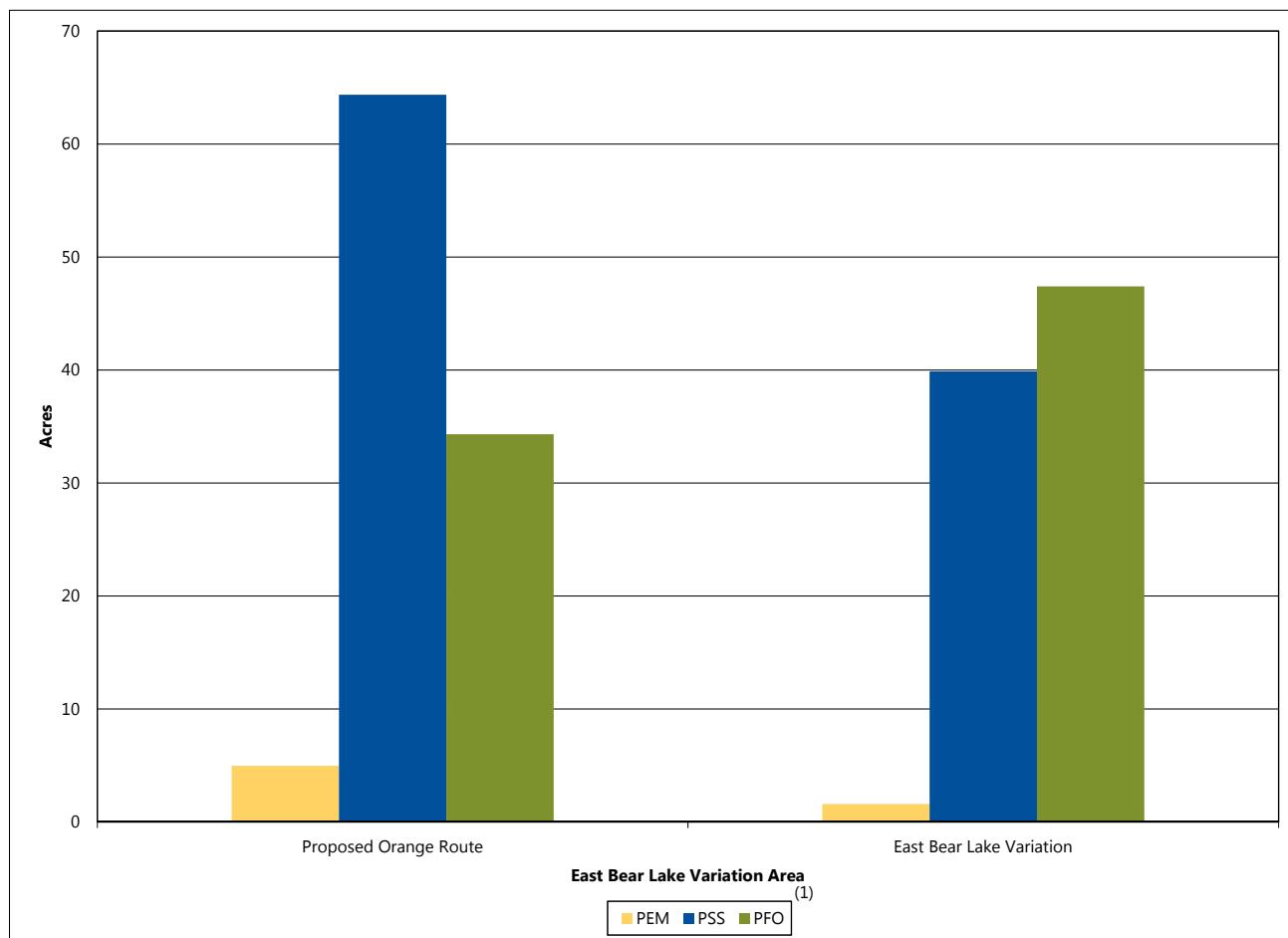
In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the East Bear Variation Area are summarized in Table 6-177 and shown on Maps 5-19 and 6-58. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ between the Proposed Orange Route and East

Bear Lake Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2, the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-177 and Figure 6-114, the East Bear Lake Variation would pass through more forested land, including state forest land, relative to the Proposed Orange Route, therefore resulting in more permanent removal of forested vegetation. Although the Proposed Orange Route is shorter in length, it would require creation of new corridor for its entire length, while the East Bear Lake Variation would parallel an existing transmission line corridor for over 40 percent of its length (Table 6-177). Because of this, the East Bear Lake Variation would likely result in less impact on intact forested areas. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant

Figure 6-113 Acres of Wetland by Type within the Anticipated ROW in the East Bear Lake Variation Area



Source(s): USFWS 1997, reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO).

6.0 Comparative Environmental Consequences

Table 6-177 Vegetation Resources within the Anticipated ROW in the East Bear Lake Variation Area

| Resource | Evaluation Parameter | East Bear Lake Variation Area | |
|--|--|-------------------------------|--------------------------|
| | | Proposed Orange Route | East Bear Lake Variation |
| Transmission Line | Length (mi) | 8.9 | 10.5 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 42 |
| State Forest | Acres within ROW | 217 | 256 |
| Total Forested GAP Land Cover | Acres within ROW | 216 | 251 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | |
| North American Boreal Forest | Acres within ROW | 103 | 140 |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 94 | 77 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

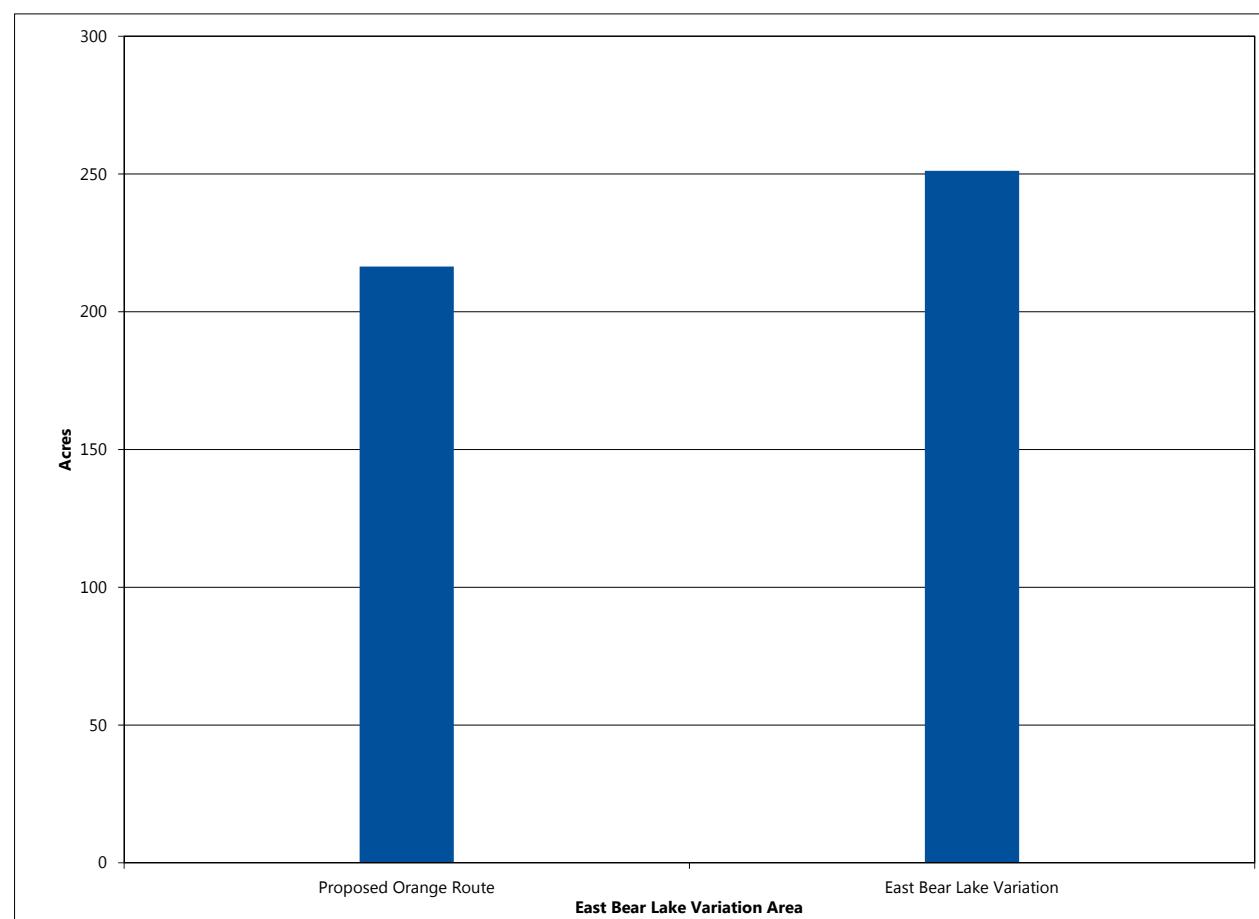
Note(s): Totals may not sum due to rounding

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

(3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Figure 6-114 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the East Bear Lake Variation Area



Source(s): USGS 2001, reference (151)

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

in the region surrounding the proposed Project (Map 5-19).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Wildlife resources in the East Bear Variation Area consist of natural habitat, including forest, wetlands, and open areas (Map 6-58). Data associated with potential impacts on wildlife resources in the East Bear Variation Area are summarized in Table 6-178.

The primary impacts on wildlife resources that would differ between the Proposed Orange Route and East Bear Lake Variation include loss and fragmentation of natural habitat and proximity of the Proposed Orange Route and East Bear Lake Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.4.2.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Orange Route and East Bear Lake Variation.

Although the Proposed Orange Route is shorter in length, it would require creation of new corridor for its entire length, while the East Bear Lake Variation would parallel an existing transmission line corridor for just under half of its length (Table 6-178; Map 6-58). Because of this, the East Bear Lake Variation would result in less fragmentation of forested habitats, and subsequent displacement

of wildlife species associated with those forest communities.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.4.2.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the East Bear Variation Area are summarized in Table 6-179; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species is similar between the Proposed Orange Route and the East Bear Lake Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project

Table 6-178 Information Relevant to Wildlife Resources in the Vicinity of the East Bear Variation Area

| Resource | Evaluation Parameter | East Bear Lake Variation Area | |
|---|--|-------------------------------|--------------------------|
| | | Proposed Orange Route | East Bear Lake Variation |
| Transmission Line | Length (mi) | 8.9 | 10.5 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 42 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

As indicated in Table 6-179, two state-concern mussel species have been documented within one mile of the Proposed Orange Route, one of which was also documented within one mile of the East Bear Lake Variation. Because it is anticipated that all watercourses would be spanned, impacts to these rare mussels are not expected. The state-special concern necklace spike sedge was documented within one mile of both the Proposed Orange Route and East Bear Lake Variation. Although the Proposed Orange Route is shorter in length, it would require establishment of new corridor for its entire length, while the East Bear Lake Variation would parallel an existing transmission line corridor for just under half of its length (Map 6-59). Clearing of forested areas to create new corridor could have impacts on rare species associated with forest or shrub communities, such as the necklace spike sedge. Because the Proposed Orange Route would require creation of new corridor for its entire length it would likely result in more impacts on rare species relative to the East Bear Lake Variation; however, the full extent of potential impacts from either the Proposed Orange Route or East Bear Lake Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment

has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the East Bear Variation Area are summarized in Table 6-180 and shown on Map 6-59; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Orange Route and East Bear Lake Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-59 and in Table 6-180, the East Bear Lake Variation would pass through more MBS Sites of Biodiversity Significance. However, the East Bear Lake Variation would parallel an existing transmission line corridor for over 40 percent of its length, while the Proposed Orange Route would require creation of new corridor for its entire length. Because of this, the Proposed Orange Route would result in more impacts on native vegetation and fragmentation of intact forest in areas where forest vegetation is present.

The rare communities and resources listed in Table 6-180 and detailed above show that the

Table 6-179 Rare Species Documented within One Mile of the Anticipated ROW in the East Bear Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | East Bear Lake Variation Area | |
|--------------------------------|----------------------|----------------|-----------------|----------------|-------------------------------|--------------------------|
| | | | | | Proposed Orange Route | East Bear Lake Variation |
| <i>Carex ormostachya</i> | Necklace Spike Sedge | None | Special Concern | Vascular Plant | X | X |
| <i>Lasmigona compressa</i> | Creek Heelsplitter | None | Special Concern | Mussel | X | X |
| <i>Ligumia recta</i> | Black Sandshell | None | Special Concern | Mussel | X | |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

Table 6-180 Rare Communities and Resources within the Vicinity of the East Bear Lake Variation Area

| Resource | Evaluation Parameter | East Bear Lake Variation Area | |
|---|--|-------------------------------|--------------------------|
| | | Proposed Orange Route | East Bear Lake Variation |
| Transmission Line | Length (mi) | 8.9 | 10.5 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 42 |
| MBS Sites of Biodiversity Significance ⁽³⁾ | Acres within ROW | 217 | 255 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. 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.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.2.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-60 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the East Bear Lake Variation Area.

Table 6-181 identifies the percentage of total transmission line length the Proposed Orange Route and East Bear Lake Variation parallel an existing corridor or linear feature in the East Bear Lake WMA Variation Area.

The Proposed Orange Route would parallel existing corridors for over half of the length (Figure 6-115). The East Bear Lake Variation would parallel existing transmission line corridor for just under half of its length.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.4.2.7 Electrical System Reliability

As explained in Section 5.3.7, the ROI for Electrical System Reliability was determined to be the corridors for the existing transmission lines. Data related to electrical system reliability in the East Bear Lake Variation Area are shown on Map 6-60.

The Proposed Orange Route would not parallel an existing transmission line in the East Bear Lake Variation Area. The East Bear Lake Variation would parallel 230 kV and 500 kV transmission lines for approximately 42 percent of their length in the northern portion of the East Bear Lake Variation Area (Table 6-181); therefore, three transmission lines would be in adjacent corridors.

The configuration may decrease the reliability of the proposed Project. When facilities are located in close proximity, there is a greater risk that a single event can take out multiple lines. Additionally, the close proximity of the lines can make repairing the lines more difficult. These difficulties could increase outage times, should an outage occur. Adverse impacts are possible as a result of the construction of the construction and operation of three high-voltage transmission lines under one variation in the East Section.

6.0 Comparative Environmental Consequences

Table 6-181 Corridor Sharing in the East Bear Lake Variation Area

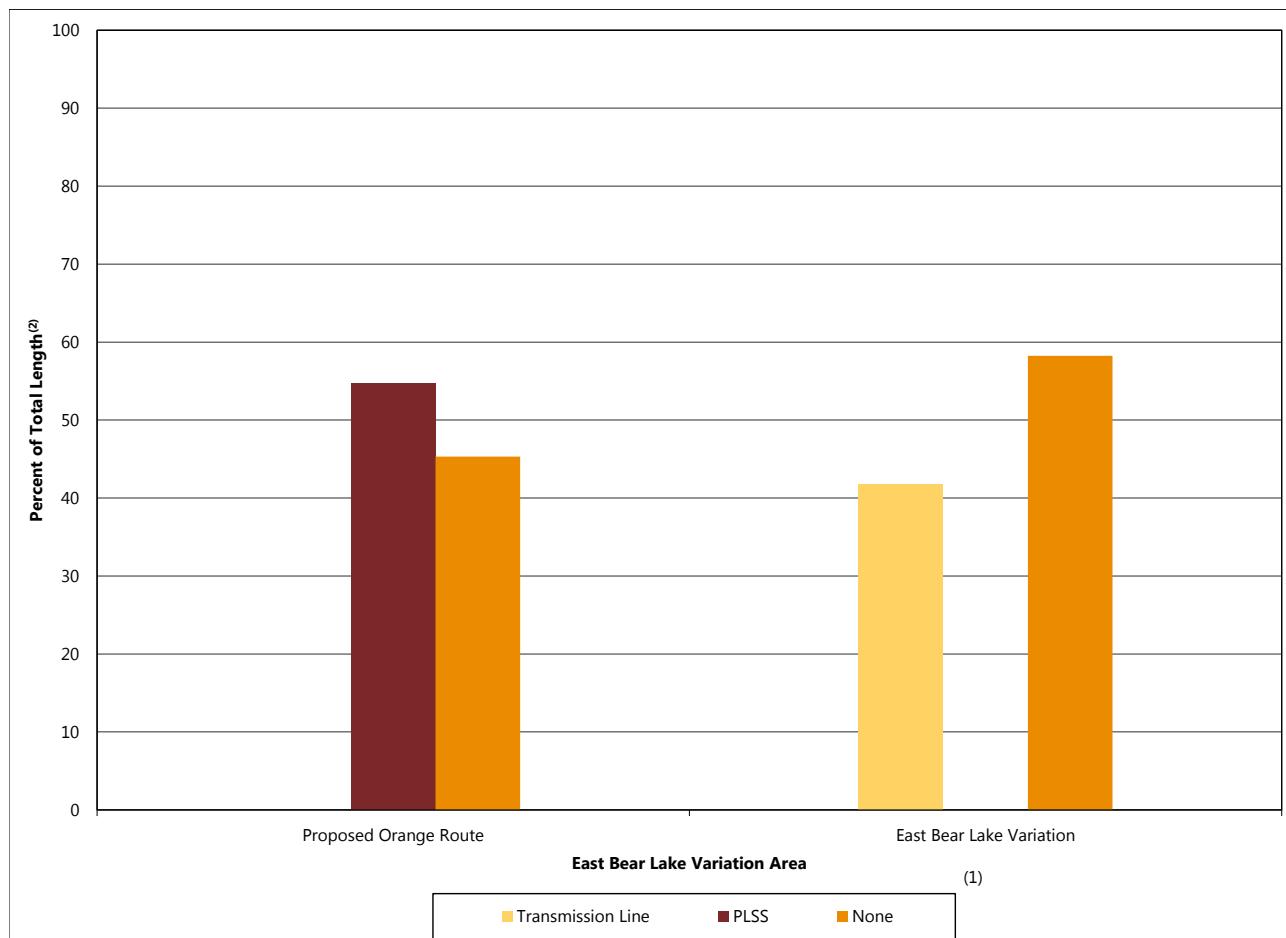
| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | East Bear Lake Variation Area | |
|---|--|-------------------------------|--------------------------|
| | | Proposed Orange Route | East Bear Lake Variation |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS) | Percent of Total Length ⁽²⁾ | 0 | 42 |
| PLSS Only | Percent of Total Length ⁽²⁾ | 55 | 0 |
| None | Percent of Total Length ⁽²⁾ | 45 | 58 |

Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-115 Corridor Sharing in the East Bear Lake Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on electrical system reliability are summarized in Section 5.3.7. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on electrical system reliability.

6.4.2.8 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-182 summarizes the costs associated with constructing the Proposed Orange Route and East Bear Lake Variation in the East Bear Lake Variation Area. As indicated in Table 6-182, the East Bear Lake Variation would cost more to construct relative to the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$14,000 to \$17,000 annually for these alternatives in the East Bear Lake Variation Area.

6.4.3 Balsam Variation Area

The Balsam Variation Area encompasses three route alternatives: the Proposed Blue Route, Proposed Orange Route, and the Balsam Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Balsam Variation Area, depending on the route or variation considered.

6.4.3.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Balsam Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Effie Variation Area (see Section 6.4.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Balsam Variation Area are summarized in Table 6-183 and shown on Maps 6-61, 6-62, 6-63, and 6-65.

As indicated in Table 6-183 for the Balsam Variation Area, the Proposed Blue Route, Proposed Orange Route, and Balsam Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including snowmobile trails and historic architectural sites (Map 6-62 and Map 6-65). The Proposed Blue Route would cross two snowmobile trails and be located within one mile (5,280 ft) of 13 historic architectural sites (Map 6-62 and Map 6-65). The Proposed Orange Route would cross two snowmobile trails and be located within one mile of 24 historic architectural sites (Map 6-62 and Map 6-65). The Balsam Variation would cross three snowmobile trails and be located within one mile of 28 historic architectural sites (Map 6-62 and Map 6-65).

Overall, the Proposed Blue Route would affect fewer aesthetic resources than the other alternatives. The Proposed Orange Route would be located near a reserve with recreation facilities located along the east side of Scenic Highway 7 near Balsam Memorial Hall, to the northeast of Snaptail Lake (6-63). This recreation area has a large fenced ball field, play structures, tennis courts, pavilions, and other recreation and community facilities and is an aesthetic resource with high visual sensitivity. Viewpoint 03 in Appendix N shows the existing view looking east-northeast from a position next to the ball field. Viewpoint 03 in Appendix N shows the existing view looking east-northeast from a position next to the ball field. The first picture for Viewpoint 03 in Appendix N shows the existing view looking east-northeast from a position next to the ball

Table 6-182 Construction Costs in the East Bear Lake Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|----------------|--------------------------|--------------|-------------------------|-------------|
| East Bear Lake | Proposed Orange Route | \$9,736,790 | \$1,090,346 | 8.9 |
| | East Bear Lake Variation | \$13,279,079 | \$1,264,674 | 10.5 |

Source(s): Minnesota Power 2015, reference (9)

Table 6-183 Aesthetic Resources within the ROI in the Balsam Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Balsam Variation Area | | |
|---|--|-----------------------|-----------------------|------------------|
| | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| Transmission Line | Length (mi) | 12.9 | 13.7 | 17.8 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 15 | 14 | 0 |
| Abandoned Transmission Line | Percent of Total Length ⁽³⁾ | 0 | 22 | 66 |
| Residences | Count within 0–500 ft | 0 | 2 | 2 |
| | Count within 0–1,000 ft | 3 | 10 | 6 |
| | Count within 0–1,500 ft | 7 | 21 | 12 |
| Historic Architectural Sites | Count within 0–1,500 ft | 0 | 0 | 4 |
| | Count within 0–5,280 ft | 13 | 24 | 28 |
| Snowmobile Trails | Count within 0–1,500 ft | 2 | 2 | 3 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2010, reference (150)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

field. The second picture shows Viewpoint 03 as a photosimulation of the same view after construction of the Proposed Orange Route. The third figure shows Viewpoint 03c a photosimulation of the same view after construction of the Proposed Orange Route, with the transmission line and structures indicated in yellow. In this view, the Proposed Orange Route would be located approximately 0.25 mile away. As indicated in the photosimulation, the Proposed Orange Route would be screened from view from this viewpoint by dense forest and therefore the visual character and quality of views from this area is not diminished.

The Proposed Blue Route would be located within 1,500 feet of the least number of residences (seven residences, three of which are located within 1,000 feet of the anticipated alignment) which have high visual sensitivity, whereas the Proposed Orange Route could potentially affect the most residences as 21 residences are within 1,500 feet of the anticipated alignment, including 10 within 1,000 feet and two within 500 feet. The Balsam Variation could potentially affect 12 residences, six of which are within 1,000 feet and two are within 500 feet of the anticipated alignment (Figure 6-116). Of the three routes in the Balsam Variation Area, the Proposed Blue Route would affect fewer residences (seven) and snowmobile trails within 1,500 feet (two) and fewer historic architectural sites within one mile (13).

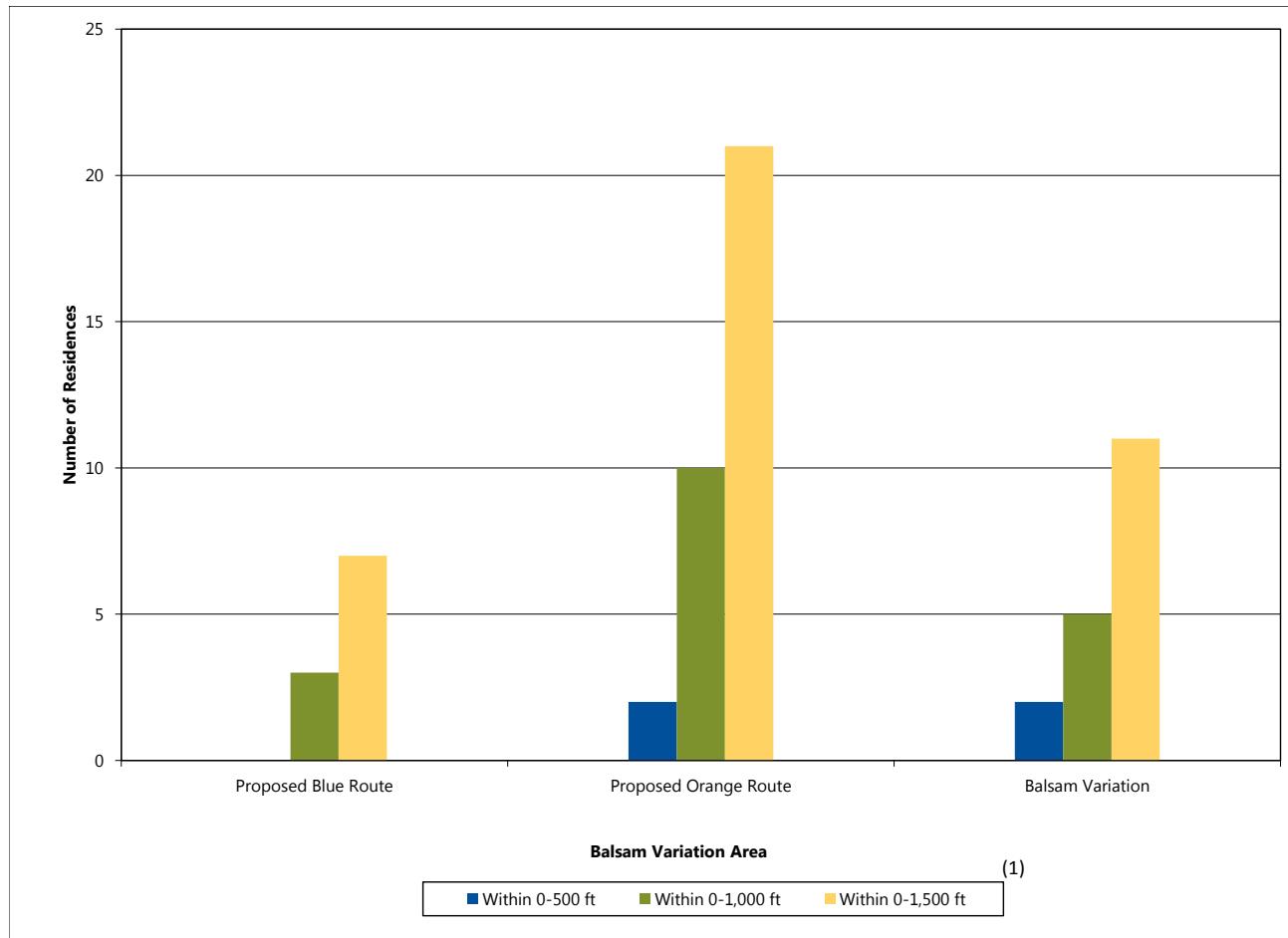
The Balsam Variation is longer (17.8 miles) than either the Proposed Blue Route (12.9 miles) or the

Proposed Orange Route (Table 6-183). In addition, the Balsam Variation does not parallel any existing large transmission lines and would require new corridors to be cleared. The Proposed Blue Route and Proposed Orange Route each parallel an existing 69 kV or 115 kV transmission line for a short distance, 15 and 14 percent, respectively (Table 6-183). By paralleling an existing large transmission line corridor, the Proposed Blue Route and Proposed Orange Route would produce less contrast than the Balsam Variation.

Overall, the Proposed Blue Route and Proposed Orange Route would produce less contrast than the Balsam Variation due to both being shorter and paralleling an existing large transmission line for part of their lengths. However, the Proposed Blue Route also affects fewer aesthetic resources (13 historic architectural sites, two snowmobile trails) and residences (seven) with high viewer sensitivity than either the Balsam Variation or the Proposed Orange Route. For these reasons, the Proposed Blue Route would result in less aesthetic impact than either the Proposed Orange Route or the Balsam Variation in the Balsam Variation Area.

Although the Proposed Blue Route and Proposed Orange Route are moderately short in length, they parallel existing transmission lines for part of their lengths and affect numerous residences and other sensitive visual resources. For these reasons, potential aesthetic impacts of the Proposed Blue Route and Proposed Orange Route are expected

Figure 6-116 Residences within the ROI in the Balsam Variation Area



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

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

Source(s): Minnesota Power 2014, reference (146)

to be significant. Because the Balsam Variation is longer in length, does not parallel an existing large transmission line, and affects numerous residences and other sensitive visual resources, potential aesthetic impacts of the Balsam Variation are also expected to be significant.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-184 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Blue Route, Proposed Orange Route, and Balsam Variation in the Balsam Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the Balsam Variation Area are shown in Map 5-19 and residences, churches, cemeteries, and airports near the Proposed Blue Route, Proposed Orange Route, and Balsam Variation are shown on Map 6-61.

The Proposed Blue Route, Proposed Orange Route, and Balsam Variation ROI are both primarily composed of forested and/or swamp land (Table 6-184). The Balsam Variation ROW contains a greater amount of forested/swamp land, developed or disturbed land, and agricultural land than the Proposed Blue Route and the Proposed Orange Route.

6.0 Comparative Environmental Consequences

Table 6-184 Land Uses within the ROI in the Balsam Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Balsam Variation Area | | |
|--|------------------------|-------------------------------------|-----------------------|-----------------------|------------------|
| | | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 4,859 | 5,130 | 6,638 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 169 | 212 | 291 |
| | Agricultural | Acres within 0–1,500 ft | 4 | 70 | 72 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 4,541 | 4,828 | 6,189 |
| | Other | Acres within 0–1,500 ft | 145 | 20 | 86 |

Source(s): USGS 2001, reference (151)

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

- (1) Other category includes: Open water, Great Plains Grassland & Shrubland and Introduced & Semi Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-185 Land Ownership/Management within the Anticipated ROW in the Balsam Variation Area

| Resource | Type | Evaluation Parameter | Balsam Variation Area | | |
|--|---|----------------------|-----------------------|-----------------------|------------------|
| | | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| Total Lands | -- | Acres within ROW | 314 | 332 | 433 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 55 | 38 | 107 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 0 | 0 | 0 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 53 | 38 | 50 |
| | Trust Fund | Acres within ROW | 2 | 0 | 57 |
| | Federal - State Lease | Acres within ROW | 0 | 0 | 0 |
| State Conservation Easements | -- | Acres within ROW | 0 | 3 | 0 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 260 | 294 | 326 |

Source(s): MnDNR 2014, reference (152), MnDNR 2010, reference (184)

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.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

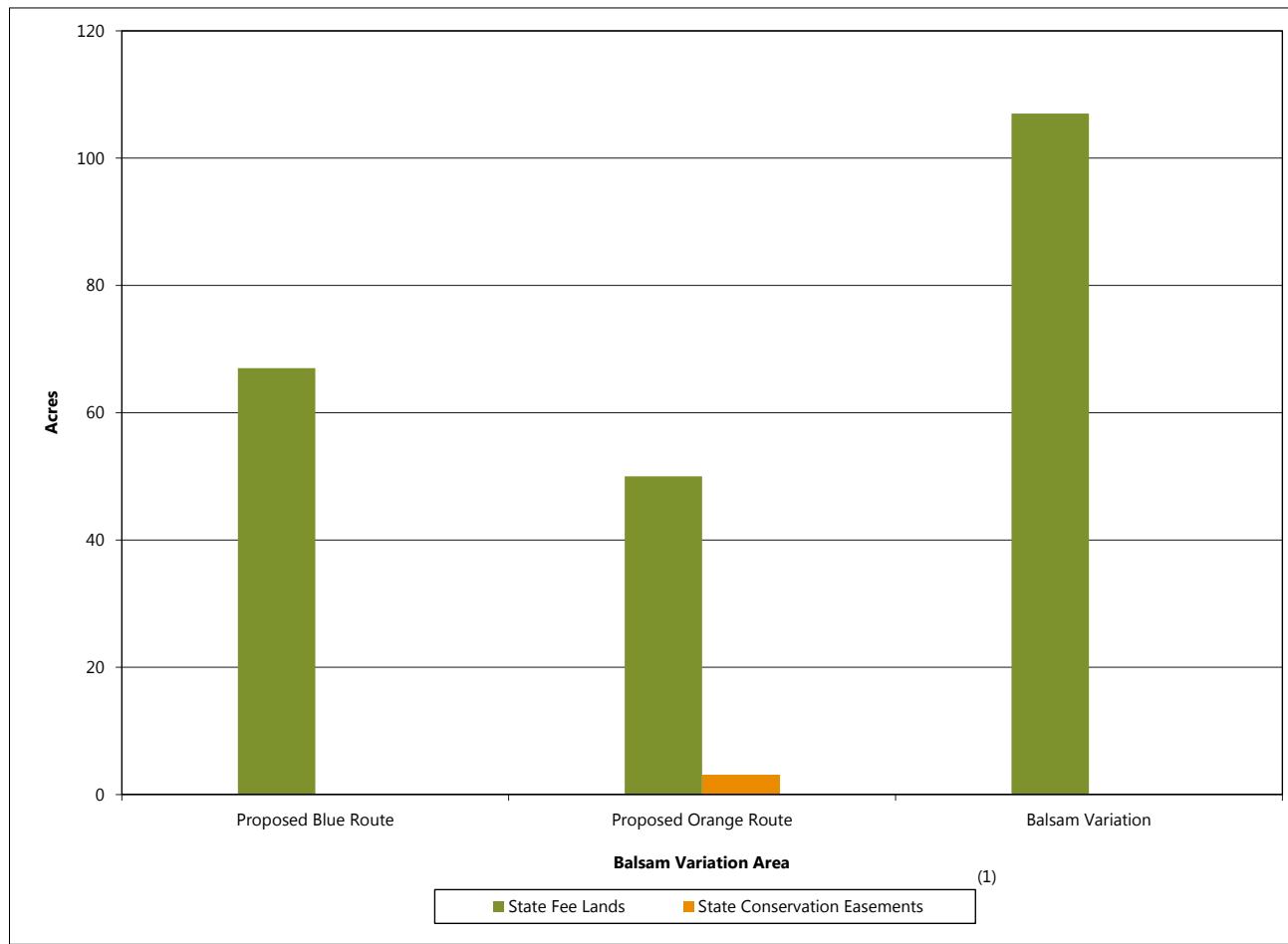
Land Ownership and Management

As shown in Table 6-185 and Figure 6-117, no state forest land would be located in the proposed routes or variation; however, each would contain some state fee land, with the greatest amount located in the Balsam Variation. No impacts to county lands, or USFWS Interest Lands would occur under the Proposed Blue Route, Proposed Orange Route, or Balsam Variation. The Proposed Orange Route would impact a few acres of state conservation land, while the Proposed Blue Route and Balsam Variation would not impact this land type.

The Proposed Blue Route and Proposed Orange Route would both parallel an existing corridor and road/trail for approximately 20 percent of their total length (see Section 6.4.3.6). The Balsam Variation would parallel a road/trail for approximately 36 percent of its length.

Impacts to land use from the proposed Project in the Balsam Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route, Proposed Orange Route, and Balsam Variation would all 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

Figure 6-117 Public Land Ownership/Management within the ROI in the Balsam Variation Area



Source(s): MnDNR 2014, reference (152); MnDNR 2010, reference (184)

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.

lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the route that would parallel an existing corridor is also important. The Proposed Orange Route avoids more state forest and state fee lands than the Proposed Blue Route or the Balsam Variation thereby avoiding long-term changes to land use. However, the Balsam Variation parallel an existing road/trail for a greater percentage of its length than either the Proposed Blue Route or Proposed Orange Route.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.3.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Balsam Lake Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Balsam Variation Area are summarized in Table 6-186.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-186 and Figure 6-118 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route, Proposed Orange Route, and Balsam Variation in the ROI.

6.0 Comparative Environmental Consequences

Table 6-186 Land-Based Economy Resources within the Anticipated ROW in the Balsam Variation Area

| Resource | Type | Evaluation Parameter | Balsam Variation Area | | |
|---|----------------------------------|--|-----------------------|-----------------------|------------------|
| | | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| Transmission Line | -- | Length (mi) | 12.9 | 13.7 | 17.8 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 15 | 14 | 0 |
| Abandon Transmission Line | -- | Percent of Total Length ⁽²⁾ | 0 | 22 | 66 |
| Farmland | Not Farmland | Acres within ROW | 109 | 115 | 230 |
| | Prime Farmland if Drained | Acres within ROW | 50 | 46 | 61 |
| | Farmland of Statewide Importance | Acres within ROW | 0 | 12 | 1 |
| | All Areas are Prime Farmland | Acres within ROW | 156 | 159 | 141 |
| State Mineral Leases (active and/or expired/terminated) | -- | Acres within ROW | 0 | 0 | 89 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR 2014, reference (179)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

The Proposed Orange Route, which would parallel existing corridors for approximately one third of its length, would impact the most acres of farmland (Figure 6-118). While the Proposed Orange Route would have the greatest impact on farmland of statewide importance, the Proposed Blue Route would not have any impact on these farmlands. The Balsam Variation, which would **be located** in an abandoned transmission line corridor for approximately two-thirds of its length, would be expected to have the fewest impacts on farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-

proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

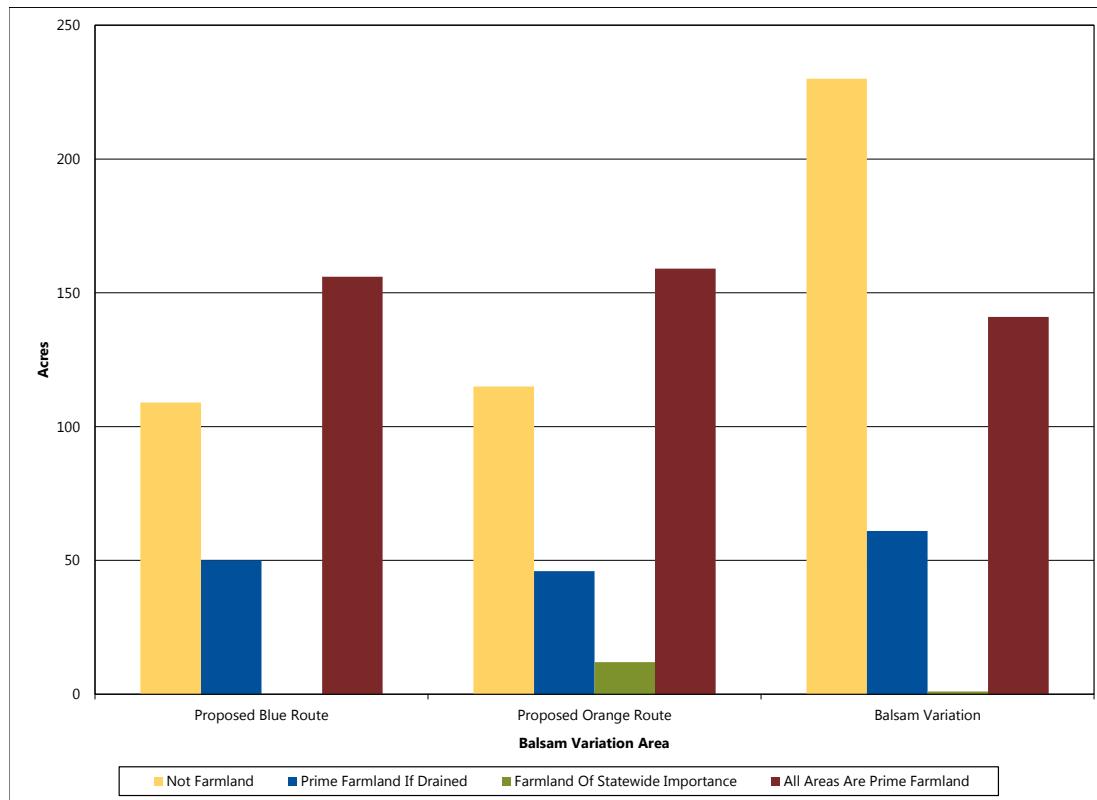
Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-186 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Blue Route, Proposed Orange Route, and Balsam Variation. There are no USDA-USFS national forest lands or state forest lands within the ROI of the Proposed Blue Route, Proposed Orange Route, and Balsam Variation in the Balsam Variation Area.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-186, Figure 6-119, and Map 6-61 identify the acreage of mining lands with **active and** terminated/expired state mineral leases that may be impacted in the Balsam Variation Area. There are no known aggregate resources in the ROI of either the proposed routes or the Balsam Variation. **The southern portion of the Balsam Variation crosses known mineral resources leased by the MnDNR.**

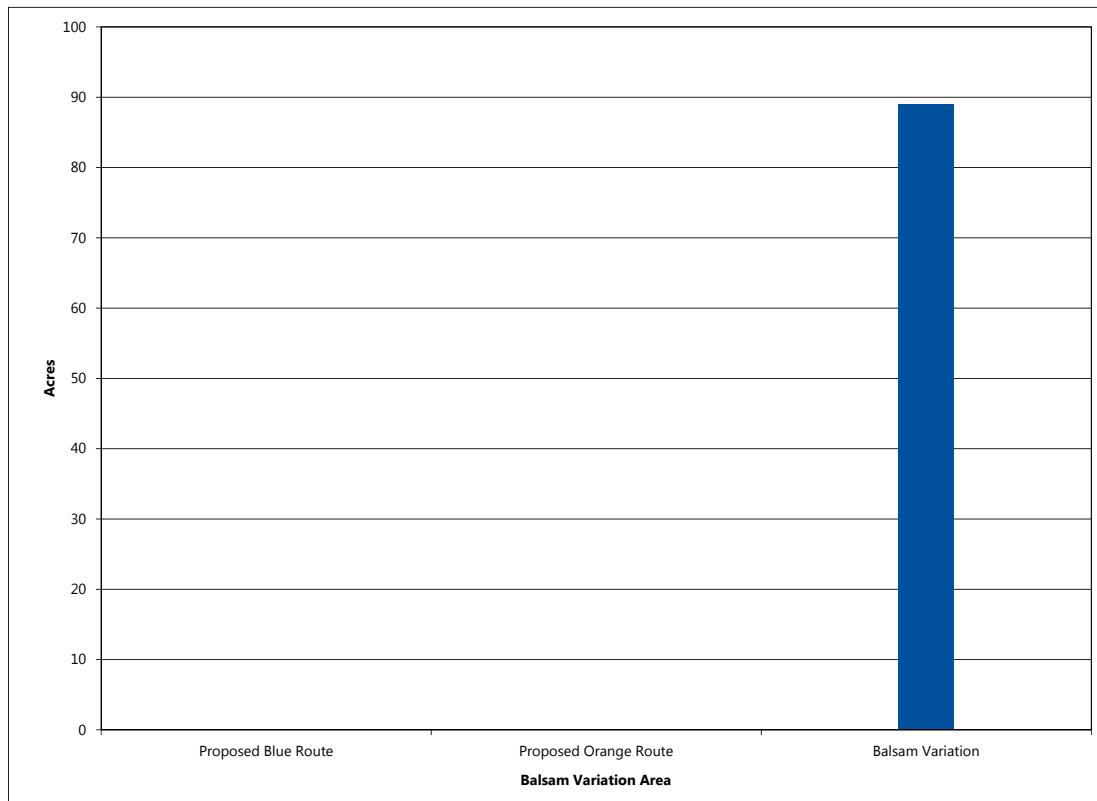
Figure 6-118 Acres of Farmland by Type within the Anticipated ROW in the Balsam Variation Area



Source(s): USDA NRCS 2014, reference (154)

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

Figure 6-119 Acres of State Mineral Leases within the Anticipated ROW in the Balsam Variation Area



Source(s): MnDNR 2014, reference (179)

The Balsam Variation would traverse mining lands with active and terminated/expired state mineral leases associated with the Mesabi Iron Range, while the two proposed routes would not traverse any mining lands with active and terminated/expired state mineral leases (Table 6-186, Figure 6-119, and Map 6-61). The Balsam Variation could potentially interfere with mining activities in this area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures encumber the lease or interfere with access to mineable resources or the ability to remove these resources. If a conflict were to arise, the transmission line and structures would need to be relocated to allow access to the mineral resources.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.3.3 Archaeology and Historic Architectural Sites

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential indirect impacts to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites.

Table 6-187 provides a summary of the previously recorded archaeological sites and historic architectural resources within the ROW and within 1,500 feet and one mile of the anticipated alignments for the Proposed Blue Route, Proposed Orange Route,

and Balsam Variation in the Balsam Variation Area (Map 6-62). A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route, Proposed Orange Route, and Balsam Variation in the Balsam Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Balsam Variation Area, there are no known archaeological or historic architectural resources located within the ROW of the Proposed Blue Route, Proposed Orange Route, or Balsam Variation, although cultural resource investigations have not yet occurred for the Proposed Route or variations. The Balsam Variation has the most sites architectural sites when compared to those potentially present within the Proposed Blue Route and Proposed Orange Route indirect APEs. While several of the historic architectural resources located within the indirect APE of the routes and variation are recommended as not NRHP-eligible, there are numerous properties that have either not been evaluated for NRHP-eligibility or were recommended potentially NRHP eligible, recommended NRHP eligible, or considered NRHP eligible.

There is currently no known potential for direct, long-term adverse impacts from the proposed Project as there are no previously recorded archaeological sites and historic architectural resources within the Balsam Variation Area direct APE. Indirect, long-term, adverse visual impacts to previously recorded historic architectural resources

Table 6-187 Archaeological and Historic Resources within the Balsam Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Balsam Variation Area | | |
|------------------------------|-------------------------------------|-----------------------|-----------------------|------------------|
| | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| Historic Architectural Sites | Count within ROW | 0 | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 | 4 |
| | Count within 0–5,280 ft | 13 | 24 | 28 |
| Archaeological Sites | Count within ROW | 0 | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 | 1 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

within the indirect APEs for the Proposed Blue Route, Orange Route, and Balsam Variation are likely to occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since the indirect APEs for the Proposed Blue Route, Proposed Orange Route, and Balsam Variation contain historic architectural **resources** that have either not been evaluated for **NRHP-eligibility** or **have been previously recommended potentially NRHP eligible, have been previously recommended NRHP eligible, or are considered NRHP eligible**, the proposed Project may result in changes to the setting of these resources that could be considered an adverse impact under Section 106 of the NHPA if these historic architectural **resources** are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

The Proposed Blue Route, Proposed Orange Route, and Balsam Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resources investigations will be implemented as part of the DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse impacts on historic architectural sites as a result of implementation of the proposed Project.

Potential **short-term and long-term** adverse impacts from construction, operation, maintenance, and emergency repair related to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.4.3.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Balsam Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Balsam Variation Area are summarized in Table 6-188 and shown on Map 6-63. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, need to place transmission structures in floodplains and wetlands, and quantity of wetland type conversion are the primary water resources impacts that would differ across the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation. The Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation would not require crossing trout streams or impaired waters.

As shown in Figure 6-120, the Proposed Blue Route would cross the most PWIs, including Sucker Brook, three tributaries to Sucker Brook, two unnamed

Table 6-188 Water Resources within the Anticipated ROW in the Balsam Variation Area

| Resource | Evaluation Parameter | Balsam Variation Area | | |
|-------------------------------|----------------------|-----------------------|-----------------------|------------------|
| | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| Transmission Line | Length (mi) | 12.9 | 13.7 | 17.8 |
| PWI Waters ⁽¹⁾ | Number of Crossings | 7 | 5 | 4 |
| Non-PWI Waters ⁽²⁾ | Number of Crossings | 1 | 4 | 3 |
| Floodplains ⁽³⁾ | Acres within ROW | 0 | 26 | 22 |
| NWI Wetlands | Acres within ROW | 54 | 69 | 96 |

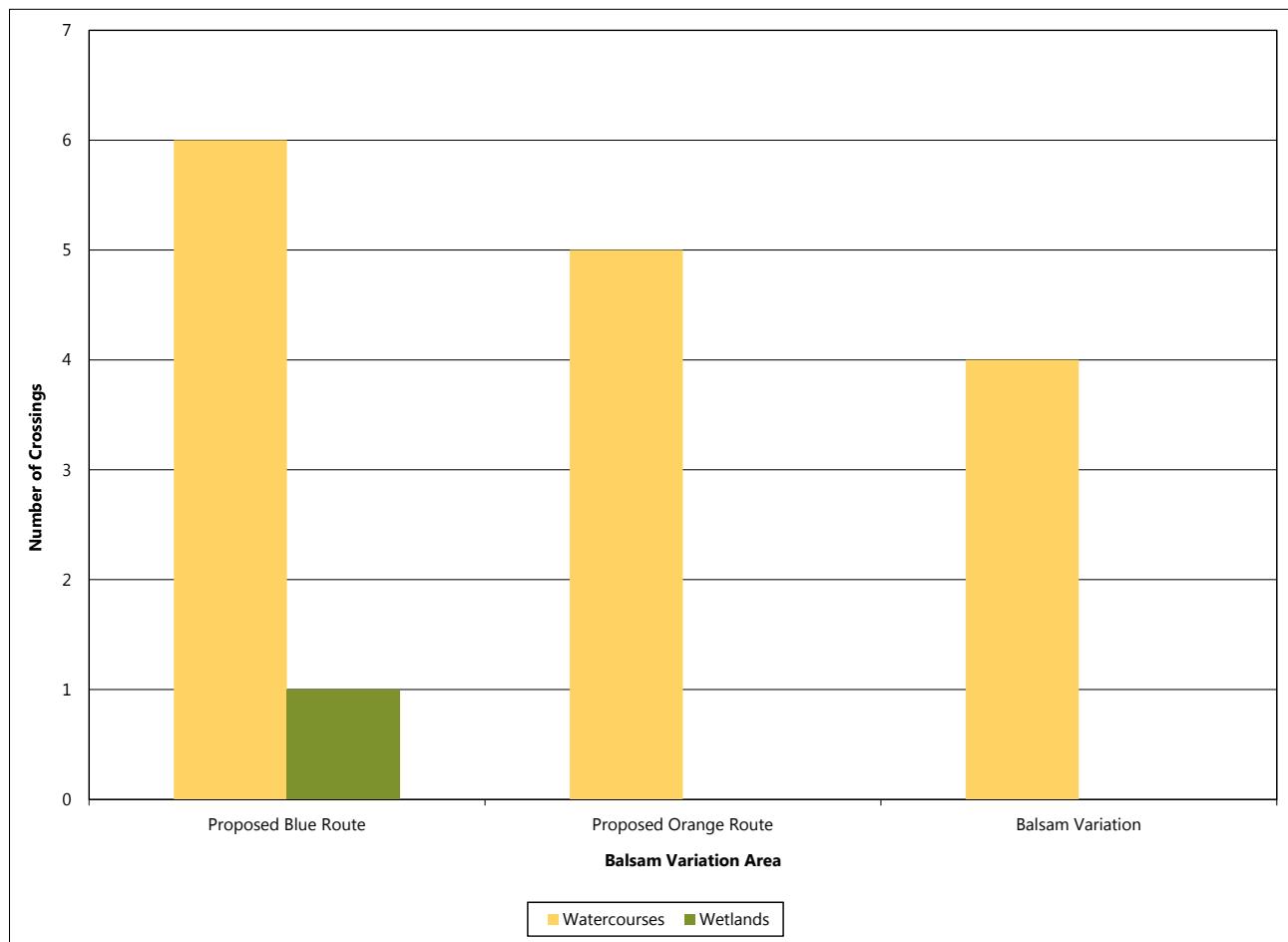
Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); Minnesota Power 2014, reference (163)

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

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.
- (3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

6.0 Comparative Environmental Consequences

Figure 6-120 PWI Water Crossings by Type in the Balsam Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

watercourses, and wetlands of Grass Lake. The Proposed Orange Route's PWI crossings would include two crossings of the Prairie River, Balsam Creek, Sucker Brook, and one tributary to Sucker Brook. The Balsam Variation would also cross the Prairie River twice, as well as Balsam Creek and one tributary to Sucker Brook.

The Proposed Blue Route and the Proposed Orange Route and the Balsam Variation would all require crossing non-PWI waters. As shown in Figure 6-121, the Proposed Orange Route would require the most non-PWI water crossings.

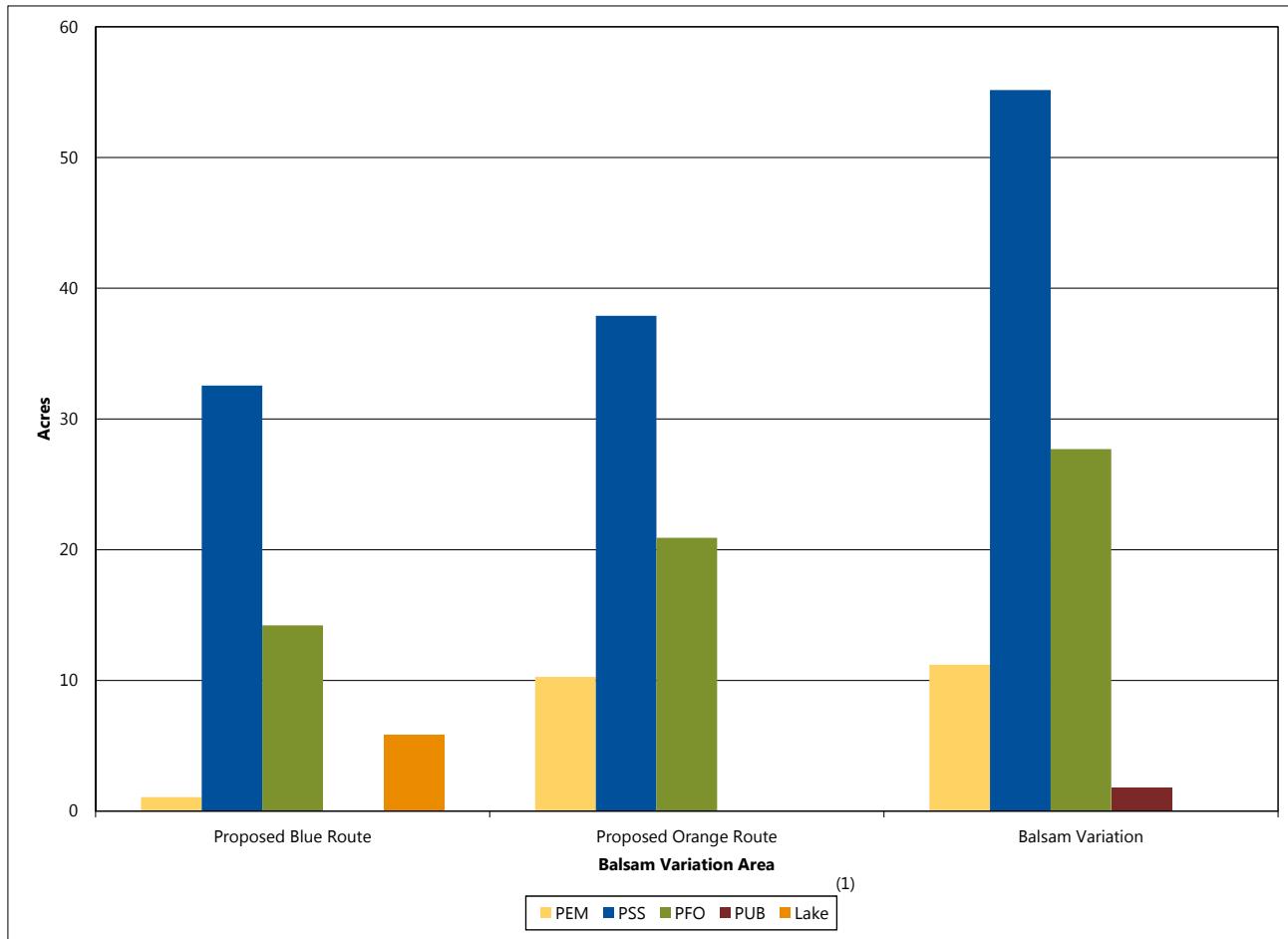
It is anticipated that PWI crossings and non-PWI water crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Though the Proposed Blue Route would not traverse floodplains, both the Proposed Orange Route and the Balsam Variation would require construction and placement of transmission structures in Zone

A floodplain of the Prairie River. Placement of transmission structures in this floodplain could not be avoided by spanning as floodplain crossing distances exceed the average spanning length of 1,250 feet.

Based on the NWI, the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation would all require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-122, the Balsam Variation contains the most forested and shrub wetland and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

Figure 6-122 Acres of Wetland by Type within the Anticipated ROW in the Balsam Variation Area



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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO, palustrine unconsolidated bottom pond (PUB).

Source(s): USFWS 1997, reference (157)

The Applicant would need to mitigate for these impacts as summarized in Section 5.3.4.1. The Proposed Blue Route, Proposed Orange Route, and the Balsam Variation would all require placement of fill in wetlands for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the East Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill would be expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to the number of wetland complexes in the area, it would be expected that the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation would all require temporary construction access through wetlands, which would be expected to be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Balsam Variation Area are summarized in Table 6-189 and shown on Maps 5-19 and 6-63. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ across the Proposed Blue Route, the Proposed Orange Route, and Balsam Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2, the Applicant would permanently

Table 6-189 Vegetation Resources within the Anticipated ROW in the Balsam Variation Area

| Resource | Evaluation Parameter | Balsam Variation Area | | |
|--|--|-----------------------|-----------------------|------------------|
| | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| Transmission Line | Length (mi) | 12.9 | 13.7 | 17.8 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 15 | 14 | 0 |
| Abandoned Transmission Line | Percent of Total Length ⁽²⁾ | 0 | 22 | 66 |
| Total Forested GAP Land Cover | Acres within ROW | 299 | 318 | 401 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | | |
| North American Boreal Forest | Acres within ROW | 205 | 208 | 234 |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 12 | 15 | 40 |
| Eastern North American Cool Temperate Forest | Acres within ROW | 53 | 47 | 60 |
| Eastern North American Flooded and Swamp Forest | Acres within ROW | 29 | 47 | 68 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-189 and Figure 6-123, the Balsam Variation would pass through more forested land, relative to the Proposed Blue Route and the Proposed Orange Route, therefore resulting in more permanent removal of forested vegetation. The Proposed Blue Route and the Proposed Orange Route are shorter in length and would require creation of new corridor for most of their length. The Balsam Variation would **be located in an abandoned transmission line corridor** (Table 6-189; Map 6-65). Because the Balsam Variation would follow the location of an abandoned transmission line for much of its length it would likely result in less impact on intact forested areas. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-19).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

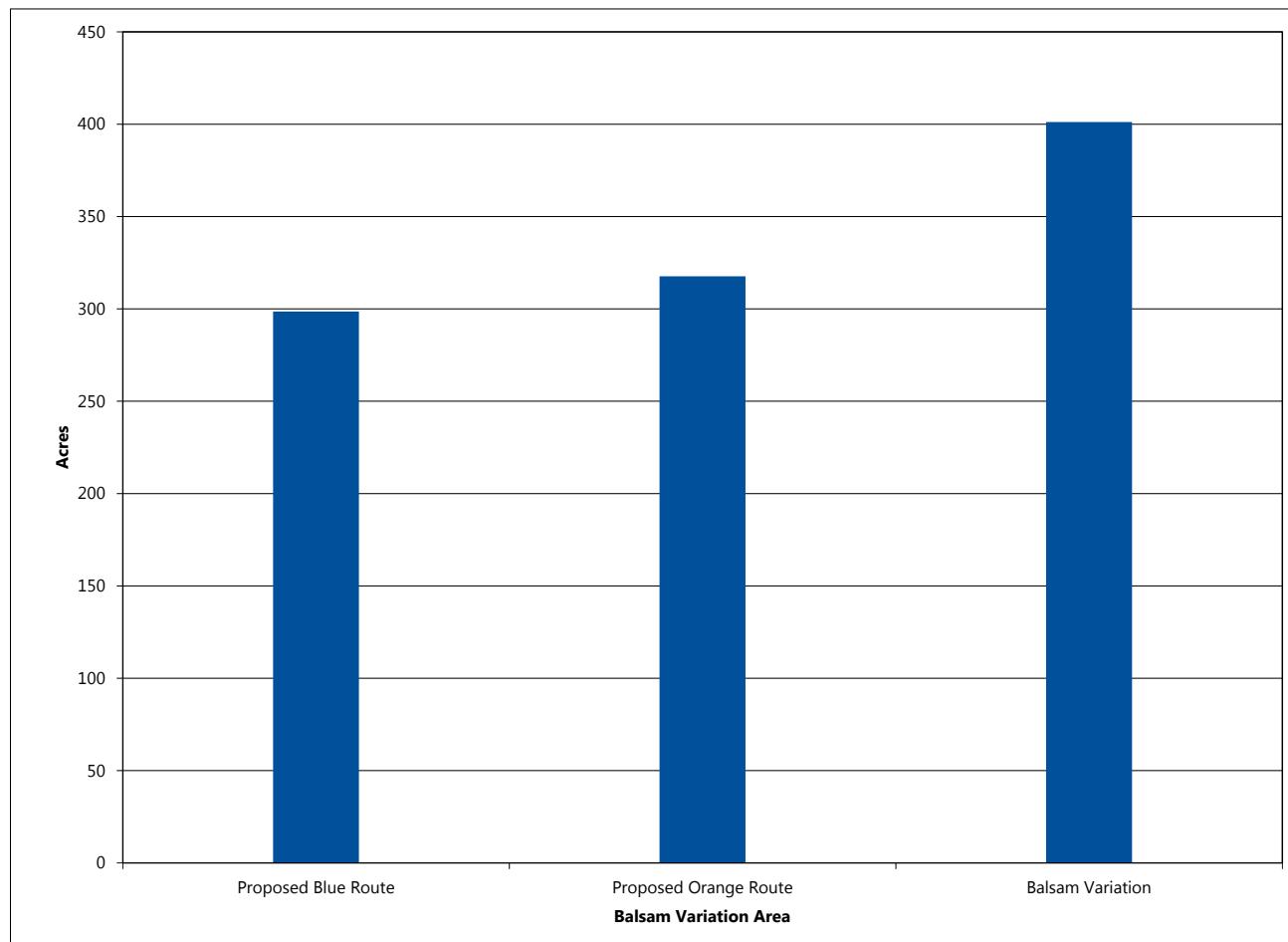
Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Balsam Variation Area are summarized in Table 6-190 and shown on Map 6-63.

The primary impacts on wildlife resources that would differ between the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation include loss and fragmentation of wildlife habitat and proximity of the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.4.3.4 (Vegetation) summarizes potential impacts on forested vegetation from the proposed routes and Balsam Variation.

As indicated in Table 6-190, the Proposed Blue Route and the Proposed Orange Route are shorter in length and would require creation of new corridor for most of their length. The Balsam Variation would **be located in an abandoned transmission line corridor** for over half of its length (Table 6-190; Map 6-65). Because the Balsam Variation would **be located in an abandoned**

Figure 6-123 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Balsam Variation Area



Source(s): USGS 2001, reference (151)

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

Table 6-190 Information Relevant to Wildlife Resources in the Vicinity of the Balsam Variation Area

| Resource | Evaluation Parameter | Balsam Variation Area | | |
|---|--|-----------------------|-----------------------|------------------|
| | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| Transmission Line | Length (mi) | 12.9 | 13.7 | 17.8 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 15 | 14 | 0 |
| Abandoned Transmission Line | Percent of Total Length ⁽²⁾ | 0 | 22 | 66 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

transmission line corridor for much of its length it would likely result in less fragmentation of forested habitats, and subsequent displacement of wildlife species associated with those forest communities. However, clearing the location of the abandoned transmission line for the Balsam Variation may impact some wildlife inhabiting the area, resulting in temporary and/or permanent displacement of some wildlife.

The Balsam Variation would run within approximately 500 feet of the Chippewa Plains Important Bird Area and would require a new transmission line corridor at this point and throughout its entire length (Map 5-22 and Map 6-65). The Balsam Variation may result in more impacts on birds and other wildlife associated with the Chippewa Plains Important Bird Area because it would require creation of more corridor in this area.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.4.3.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Balsam Variation Area are summarized in Table 6-191; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species is similar between the proposed routes and Balsam Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

As indicated in Table 6-191, the three state-special concern species documented within one mile of the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation are aquatic species. It is anticipated that all watercourses and waterbodies would be spanned; because of this impacts to these state-special concern species is not expected. As discussed under Wildlife in Section 6.4.3.4, the Balsam Variation would run within approximately 500 feet of the Chippewa Plains Important Bird Area (Map 6-63); because of this, the Balsam Variation may result in more impacts on rare birds and other wildlife associated with the Chippewa Plains Important Bird Area.

The Proposed Blue Route and the Proposed Orange Route would require establishment of new corridor for most of their length, while the Balsam Variation would be located in an abandoned transmission

Table 6-191 Rare Species Documented within One Mile of the Anticipated ROW in the Balsam Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | Balsam Variation Area | | |
|--------------------------------|--------------------|----------------|-----------------|----------------|-----------------------|-----------------------|------------------|
| | | | | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| <i>Lasmigona compressa</i> | Creek Heelsplitter | None | Special Concern | Mussel | | X | X |
| <i>Ligumia recta</i> | Black Sandshell | None | Special Concern | Mussel | X | X | X |
| <i>Najas gracillima</i> | Thread-like Naiad | None | Special Concern | Vascular Plant | X | | |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

line corridor for over half of its length. Because the Balsam Variation would be located in an abandoned transmission line corridor for much of its length, it would likely result in less fragmentation of forested habitats, and subsequent impacts on rare species that may be associated with those forest communities. However, clearing the location of the abandoned transmission line for the Balsam Variation may impact rare species that may inhabit the area. However, the full extent of potential impacts from the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Balsam Variation Area are summarized in Table 6-192 and shown on Map 6-64; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ across the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-64 and in Table 6-192, the Proposed Orange Route would pass through the most MBS Sites of Biodiversity Significance. The Balsam Variation would be located in an abandoned transmission line corridor for over half of its length, while the Proposed Blue Route and the Proposed Orange Route would require creation of new corridor for the majority of their lengths. Because of this, the Proposed Blue Route and the Proposed Orange Route would result in more impacts on native vegetation and fragmentation of intact forest in areas where forest vegetation is present.

The rare communities and resources listed in Table 6-192 and detailed above show that the proposed Project may result in direct, long-term, regional localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional

Table 6-192 Rare Communities and Resources within the Vicinity of the Balsam Variation Area

| Resource | Evaluation Parameter | Balsam Variation Area | | |
|---|--|-----------------------|-----------------------|------------------|
| | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| Transmission Line | Length (mi) | 12.9 | 13.7 | 17.8 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 15 | 14 | 0 |
| Abandoned Transmission Line | Percent of Total Length ⁽²⁾ | 0 | 22 | 66 |
| MBS Sites of Biodiversity Significance ⁽³⁾ | Acres within ROW | 78 | 105 | 95 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities.

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.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.3.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-65 shows areas where the Proposed Blue Route, Proposed Orange Route, and Balsam Variation would parallel corridors with existing transportation, transmission line, or other linear features in the Balsam Variation Area.

Table 6-193 and Figure 6-124 identifies the percentage of total transmission line length that the Proposed Blue Route, Proposed Orange Route, and Balsam Variation parallel an existing corridor or linear feature in the Balsam Variation Area.

The Balsam Variation would be located in an abandoned transmission line corridor for over half of its length (Table 6-193). The Proposed Blue Route and Proposed Orange Route each would parallel an existing corridor for one-quarter of their lengths; however the Proposed Orange Route would be located in an abandoned transmission line corridor for another one-quarter of its length.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.4.3.7 Electrical System Reliability

As explained in Section 5.3.7, the ROI for Electrical System Reliability was determined to be the corridors for the existing transmission lines. Data related to electrical system reliability in the Balsam Variation Area are shown on Map 6-65.

The Balsam Variation would not parallel an existing transmission line in the Balsam Variation Area. The Proposed Blue Route and Proposed Orange Route would parallel two 115 kV transmission lines for approximately 15 percent of their length in the southern portion of the Balsam Variation Area (Table 6-193); therefore, three transmission lines would be in adjacent corridors.

The configuration may decrease the reliability of the proposed Project. When facilities are located in close proximity, there is a greater risk that a single event can take out multiple lines. Additionally, the close proximity of the lines can make repairing the

Table 6-193 Corridor Sharing in the Balsam Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Balsam Variation Area | | |
|---|--|-----------------------|-----------------------|------------------|
| | | Proposed Blue Route | Proposed Orange Route | Balsam Variation |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field, line, PLSS) | Percent of Total Length ⁽²⁾ | 15 | 14 | 0 |
| Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line) | Percent of Total Length ⁽²⁾ | 6 | 3 | 36 |
| None | Percent of Total Length ⁽²⁾ | 79 | 83 | 64 |

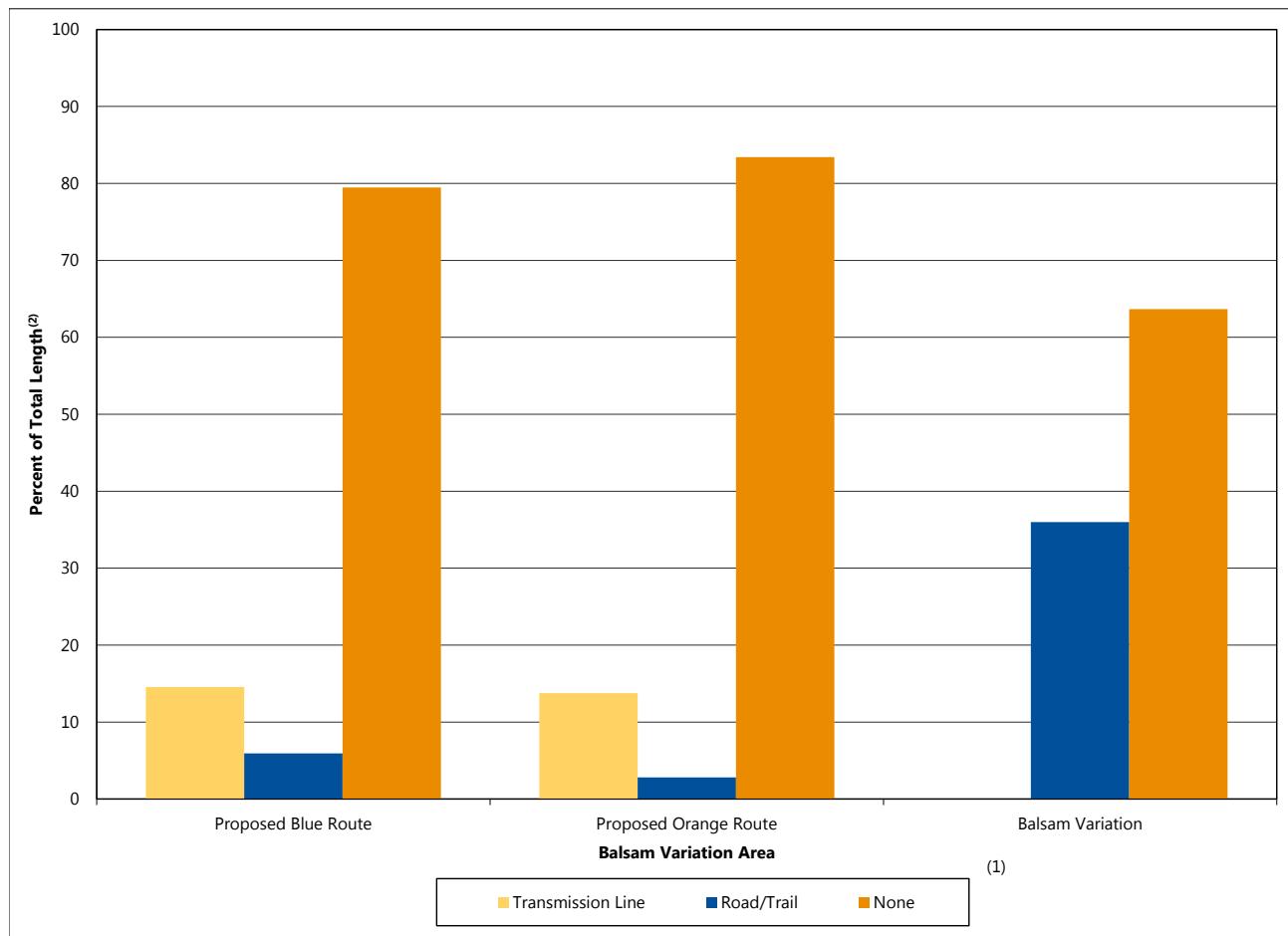
Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

(1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-124 Corridor Sharing in the Balsam Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS); Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor, i.e., PLSS, field line).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

lines more difficult. These difficulties could increase outage times, should an outage occur. Adverse impacts are possible as a result of the construction of the construction and operation of three high-voltage transmission lines under one variation in the East Section.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on electrical system reliability are summarized in Section 5.3.7. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on electrical system reliability.

6.4.3.8 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-194 summarizes the costs associated with constructing the Proposed Blue Route, Proposed Orange Route, and Balsam Variation in the Balsam Variation Area. As indicated in Table 6-194, the Balsam Variation would cost the most to construct, while the Proposed Blue Route would cost the least to construct.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using

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Table 6-194 Construction Costs in the Balsam Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|----------------|-----------------------|--------------|-------------------------|-------------|
| Balsam | Proposed Blue Route | \$15,121,621 | \$1,172,219 | 12.9 |
| | Proposed Orange Route | \$16,018,490 | \$1,169,233 | 13.7 |
| | Balsam Variation | \$19,502,472 | \$1,095,644 | 17.8 |

Source(s): Minnesota Power 2015, reference (9)

the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$20,000 to \$29,000 annually for these alternatives in the Balsam Variation Area.

6.4.4 Dead Man's Pond Variation Area

The Dead Man's Pond Variation Area encompasses two route alternatives: the Proposed Blue Route and the Dead Man's Pond Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Dead Man's Pond Variation Area, depending on the route or variation considered.

6.4.4.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Dead Man's Pond Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Effie Variation Area (see Section 6.4.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Dead Man's Pond Variation Area are summarized in Table 6-195 and shown on Maps 6-61, 6-62, 6-63, and 6-65.

As indicated in Table 6-195 for the Dead Man's Pond Variation Area, the Proposed Blue Route and Dead Man's Pond Variation would both be located within one mile of a historic architectural site, an aesthetic resource with high visual sensitivity. In addition, both routes would be located within 1,500 feet of residences, which also have high visual sensitivity (Figure 6-125). The Proposed Blue Route would be located within 1,500 feet of two residences, one of which is within 1,000 feet of the transmission

line, and the Dead Man's Pond Variation would be located within 1,500 feet of four residences, one of which is within 1,000 feet of the transmission line. Therefore, Dead Man's Pond Variation could affect more residences with high visual sensitivity.

Both the Proposed Blue Route and Dead Man's Pond Variation are approximately the same length, with the Dead Man's Pond Variation slightly longer (2.3 miles) than the Proposed Blue Route (2.2 miles; Table 6-195). Neither the Proposed Blue Route nor Dead Man's Variation parallel an existing large transmission line. Therefore, contrast for both routes would be similar, with the Dead Man's Pond Variation producing slightly more contrast due to its slightly greater length.

Because the Proposed Blue Route would produce slightly less contrast and affect fewer residences (two) than the Dead Man's Pond Variation (four), the Proposed Blue Route would result in less aesthetic impact than the Dead Man's Pond Variation in the Dead Man's Pond Variation Area.

Although the Proposed Blue Route and Dead Man's Pond Variation do not parallel an existing large transmission line of similar size and design, they are short in length and affect few residences (two and four, respectively) and very few other sensitive visual resources (one historic architectural site).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-196 identifies the amount of each type of land cover within 1,500 feet of the anticipated

Table 6-195 Aesthetic Resources within the ROI in the Dead Man's Pond Variation Area

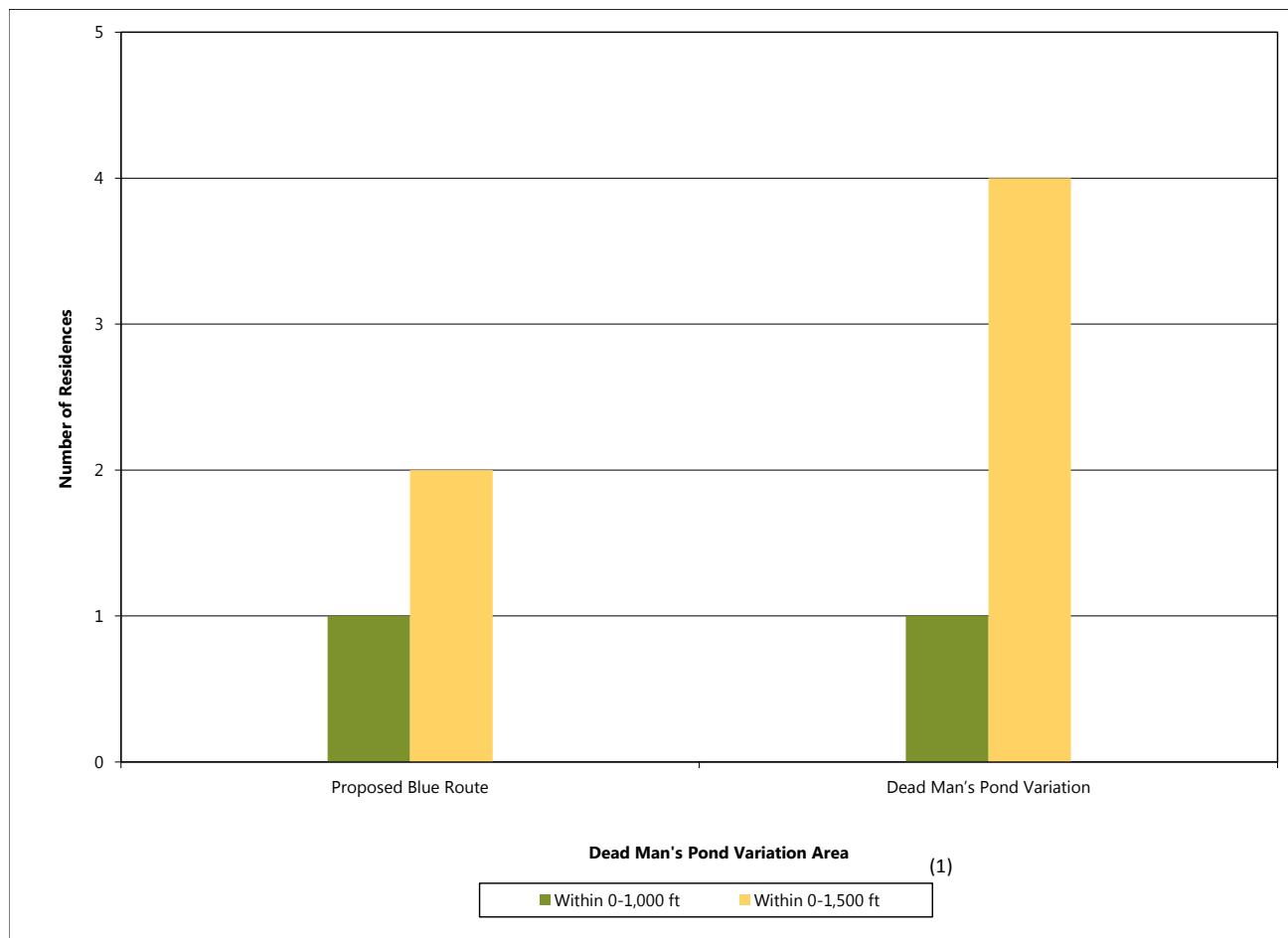
| Resource | Evaluation Parameter ⁽¹⁾ | Dead Man's Pond Variation Area | |
|---|--|--------------------------------|---------------------------|
| | | Proposed Blue Route | Dead Man's Pond Variation |
| Transmission Line | Length (mi) | 2.2 | 2.3 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 0 | 0 |
| Residences | Count within 0-500 ft | 0 | 0 |
| | Count within 0-1,000 ft | 1 | 1 |
| | Count within 0-1,500 ft | 2 | 4 |
| Historic Architectural Sites | Count within 0-1,500 ft | 0 | 0 |
| | Count within 0-5,280 ft | 1 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-125 Residences within the ROI in the Dead Man's Pond Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

alignments of the Proposed Blue Route and Dead Man's Pond Variation in the Dead Man's Pond Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the Dead Man's Pond Variation Area are shown in Map 5-19 and residences, churches, cemeteries, and airports near the Proposed Blue Route and Dead Man's Pond Variation are shown on Map 6-61.

The Proposed Blue Route and Dead Man's Pond Variation ROI are both primarily composed of forested and/or swamp land (Table 6-196). The Dead Man's Pond Variation ROI contains a greater amount of forested/swamp land than the Proposed Blue Route, and both would contain a similar amount of developed or disturbed land.

Land Ownership and Management

Table 6-197 and Figure 6-126 identify that the Dead Man's Pond Variation contains a greater amount of state fee land than the Proposed Blue Route. None of the land within either ROW is state forest land. No impacts to county lands, state conservation easements or USFWS interest lands would occur under the Proposed Blue Route or Dead Man's Pond Variation.

Neither the Proposed Blue Route nor the Dead Man's Pond Variation would parallel an existing corridor; however, the Proposed Blue Route would follow a road/trail for a portion of its length (see Section 6.4.4.6). Therefore, the Proposed Blue Route would be expected to have slightly less incompatibility with surrounding land uses compared to the Dead Man's Pond Variation.

Impacts to land use from the proposed Project in the Dead Man's Pond Variation Area would

be similar to those described in Section 6.2.1.1. The Proposed Blue Route and Dead Man's Pond Variation would both 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. The length of the route that would parallel an existing corridor is also important. The Proposed Blue Route avoids a greater amount of state forest and state fee lands than the Dead Man's Pond Variation therefore avoiding long-term changes to land use; further, the Proposed Blue Route parallels an existing road/trail for a portion of its length whereas the Dead Man's Pond Variation does not parallel an existing corridor.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.4.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Dead Man's Pond Lake Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Dead Man's Pond Variation Area are summarized in Table 6-198.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-198 and Figure 6-127 show the acreage of USDA-NRCS-classified prime

Table 6-196 Land Uses within the ROI in the Dead Man's Pond Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Dead Man's Pond Variation Area | |
|--|------------------------|-------------------------------------|--------------------------------|---------------------------|
| | | | Proposed Blue Route | Dead Man's Pond Variation |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0–1,500 ft | 961 | 987 |
| | Developed or Disturbed | Acres within 0–1,500 ft | 35 | 33 |
| | Agricultural | Acres within 0–1,500 ft | 0 | 2 |
| | Forested and/or Swamp | Acres within 0–1,500 ft | 905 | 925 |
| | Other | Acres within 0–1,500 ft | 21 | 27 |

Source(s): USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.

(2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-197 Land Ownership/Management within the Anticipated ROW in the Dead Man's Pond Variation Area

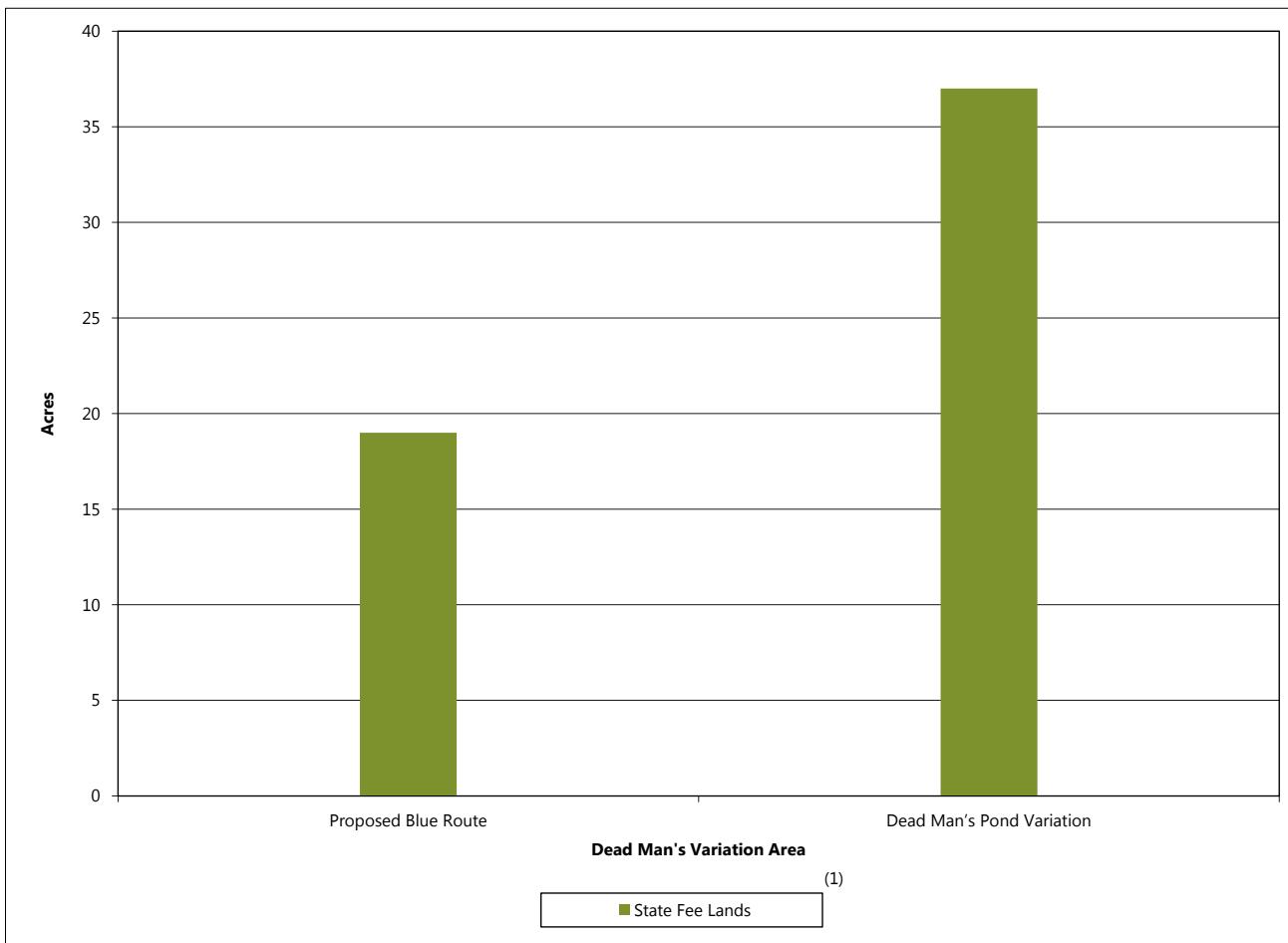
| Resource | Type | Evaluation Parameter | Dead Man's Pond Variation Area | |
|--|---|----------------------|--------------------------------|---------------------------|
| | | | Proposed Blue Route | Dead Man's Pond Variation |
| Total Lands | -- | Acres within ROW | 54 | 56 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 19 | 37 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 0 | 0 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 19 | 37 |
| | Trust Fund | Acres within ROW | 0 | 0 |
| | Federal - State Lease | Acres within ROW | 0 | 0 |
| Private Lands ⁽²⁾ | -- | Acres within ROW | 35 | 19 |

Source(s): 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.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-126 Public Land Ownership/Management within the ROI in the Dead Man's Pond Variation Area



Source(s): 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.

Table 6-198 Land-Based Economy Resources within the Anticipated ROW in the Dead Man's Pond Variation Area

| Resource | Type | Evaluation Parameter | Dead Man's Pond Variation Area | |
|---|----------------------------------|--|--------------------------------|---------------------------|
| | | | Proposed Blue Route | Dead Man's Pond Variation |
| Transmission Line | -- | Length (mi) | 2.2 | 2.3 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 0 | 0 |
| Farmland | Not Farmland | Acres within ROW | 34 | 17 |
| | Prime Farmland if Drained | Acres within ROW | 9 | 1 |
| | Farmland of Statewide Importance | Acres within ROW | 0 | 0 |
| | All Areas are Prime Farmland | Acres within ROW | 11 | 38 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route and Dead Man's Pond Variation in the ROI.

The Dead Man's Pond Variation would pass through more farmland, including prime farmland (Figure 6-127). The Proposed Blue Route and Dead Man's Pond Variation would not impact farmland of statewide importance.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in adverse direct impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. There are no state forests lands or USDA-USFS national forest lands within the ROI of the Proposed Blue Route or Dead Man's Pond Variation in the Dead Man's Pond Variation Area.

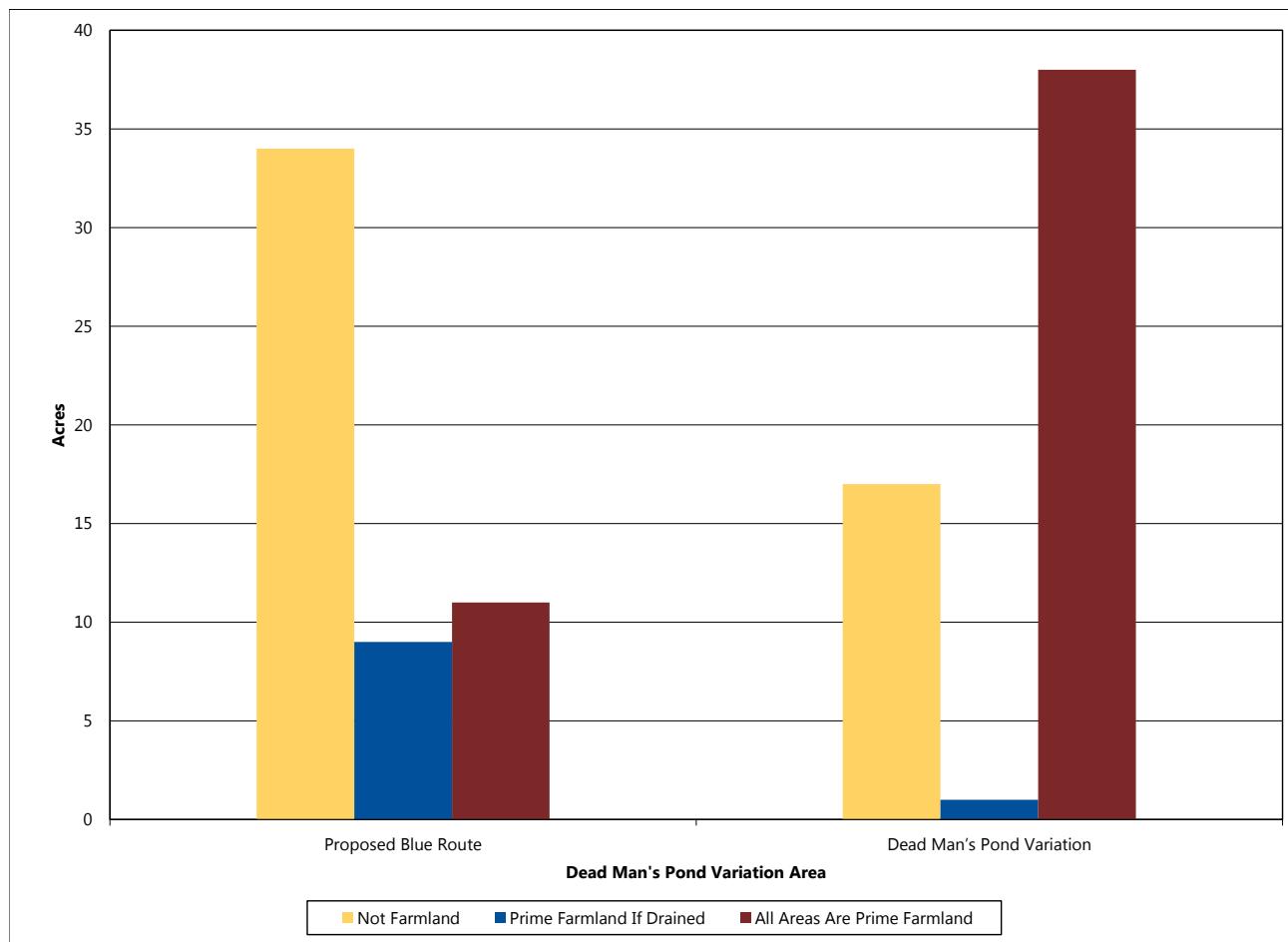
Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. There are no active or expired/terminated state mineral leases, records of current mineral mining, or known aggregate resources that would be impacted by the Proposed Blue Route or Dead Man's Pond Variation within the Dead Man's Pond Variation Area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. However, such impacts are not expected from the proposed Project because such activities do not exist nor are planned in this area.

Potential construction, operation, maintenance, and emergency-repair short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Figure 6-127 Acres of Farmland by Type within the Anticipated ROW in the Dead Man's Pond Variation Area



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

Source(s): USDA NRCS 2014, reference (154)

6.4.4.3 Archaeology and Historic Architectural Sites

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic architectural resources includes the ROW of the proposed transmission line, however, potential indirect impacts to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites. Table 6-199 provides a summary of the previously recorded archaeological sites and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Blue Route and Dead Man's Pond Variation in the Dead Man's Pond Variation Area (Map 6-62). A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW

(direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route and Dead Man's Pond Variation in the Dead Man's Pond Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Dead Man's Pond Variation Area, there are no archaeological sites or historic architectural resources located within the ROW of the Proposed Blue Route or Dead Man's Pond Variation. One historic architectural resource (IC-NWT-003) is located within the indirect APEs of both the Proposed Blue Route and Dead Man's Pond Variation. This site has not been evaluated for NRHP eligibility.

There is currently no known potential for direct, long-term adverse impacts to archaeological and historic resource sites within the Dead Man's Pond Variation Area as none have been identified. Indirect,

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long-term, adverse visual impacts on the historic architectural resources within the indirect APEs for the Proposed Blue Route or Dead Man's Pond Variation are likely to occur wherever the proposed Project is visibly prominent in the landscape or a viewed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since the indirect APEs for both the Proposed Blue Route and Dead Man's Pond Variation contain historic architectural sites that have not been evaluated for NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse impact under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

As the Proposed Blue Route and Dead Man's Pond Variation have not been surveyed for cultural resources, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural properties. These cultural resource investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for

the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse impacts on historic properties as a result of implementation of the proposed Project.

Potential short-term and long-term adverse impacts from construction, operation, maintenance, and emergency-repair related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.4.4.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Dead Man's Pond Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Dead Man's Pond Variation Area are summarized in Table 6-200 and shown on Map 6-63. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

Table 6-199 Archaeological and Historic Resources within the Dead Man's Pond Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Dead Man's Pond Variation Area | |
|------------------------------|-------------------------------------|--------------------------------|---------------------------|
| | | Proposed Blue Route | Dead Man's Pond Variation |
| Historic Architectural Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |
| | Count within 0–5,280 ft | 1 | 1 |
| Archaeological Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-200 Water Resources within the Anticipated ROW in the Dead Man's Pond Variation Area

| Resource | Evaluation Parameter | Dead Man's Pond Variation Area | |
|-------------------|----------------------|--------------------------------|---------------------------|
| | | Proposed Blue Route | Dead Man's Pond Variation |
| Transmission Line | Length (mi) | 2.2 | 2.3 |
| NWI Wetlands | Acres within ROW | 14 | 4 |

Sources: USFWS 1997, reference (157); Minnesota Power 2014, reference (144)

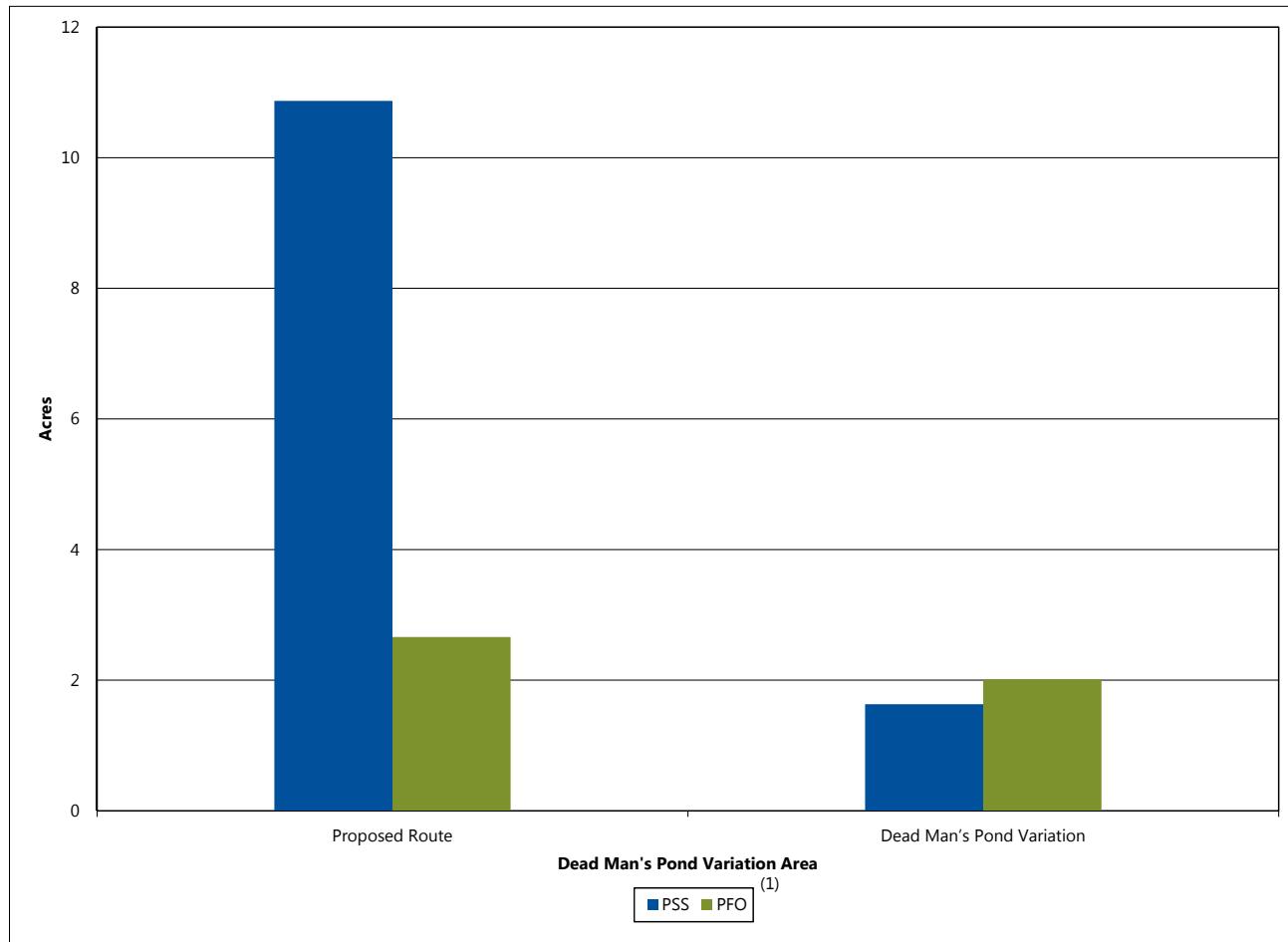
Note(s): Totals may not sum due to rounding

The potential need to place transmission structures in wetlands and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Blue Route and the Dead Man's Pond Variation. Neither the Proposed Blue Route nor the Dead Man's Pond Variation ROWs contain PWIs, non-PWI waters, trout streams, impaired waters, or floodplains.

Based on the NWI, the Proposed Blue Route and the Dead Man's Pond Variation would both require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-128, the Proposed Blue Route contains the most forested and shrub wetland and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub

and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. The Proposed Blue Route would likely require placement of fill in wetlands for construction of transmission structures. Impacts associated with fill would be minimized by spanning wetlands to the extent practical; however, this impact cannot be completely avoided by spanning due to the high number of wetland crossings that would be needed in the East Section. There are fewer wetlands along the Dead Man's Pond Variation and it would be expected that these areas may be spanned, avoiding placement of transmission structures in the wetland areas. Due to the number of wetland complexes in the area, it would be expected that the Proposed Blue Route and the Dead Man's Pond Variation would both require temporary construction access through wetlands, which is also likely be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Figure 6-128 Acres of Wetland by Type within the Anticipated ROW in the Dead Man's Pond Variation Area



Source(s): USFWS 1997, reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO).

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Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Dead Man's Pond Variation Area are summarized in Table 6-201 and shown on Maps 5-19 and 6-63. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

In general, loss or fragmentation of forest would be similar with either the Proposed Blue Route or Dead Man's Pond Variation. As discussed in Section 5.3.4.2, the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-201, the Proposed Blue Route and Dead Man's Pond Variation would pass through a similar amount of forested land. Both the Proposed Blue Route and Dead Man's Pond Variation would require new corridor for their entire lengths. Because of this both the Proposed Blue Route and Dead Man's Pond Variation would result in similar fragmentation of intact forest in areas

where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-19).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Wildlife resources in the Dead Man's Pond Variation Area consist of natural habitat, including forest, wetlands, and Dead Man's Pond (Map 6-63). As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.4.4.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue Route and Dead Man's Pond Variation.

Because the Proposed Blue Route and Dead Man's Pond Variation are similar in length and do not parallel existing transmission line corridors, the impacts related to fragmentation of forested habitats, and subsequent displacement of wildlife species associated with those forest communities would be similar.

Table 6-201 Vegetation Resources within the Anticipated ROW in the Dead Man's Pond Variation Area

| Resource | Evaluation Parameter | Dead Man's Pond Variation Area | |
|--|--|--------------------------------|---------------------------|
| | | Proposed Blue Route | Dead Man's Pond Variation |
| Transmission Line | Length (mi) | 2.2 | 2.3 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 0 | 0 |
| Total Forested GAP Land Cover | Acres within ROW | 50 | 54 |
| GAP Land Cover - Dominant Types ⁽³⁾ | | | |
| North American Boreal Forest | Acres within ROW | 34 | 43 |
| Eastern North American Cool Temperate Forest | Acres within ROW | 14 | 6 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.4.4.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation. One state-threatened fish, the pugnose shiner (*Notropis anogenus*) has been documented within one mile of the Dead Man's Pond Variation. Because it is anticipated that all waterbodies and watercourses would be spanned, impacts to this aquatic species are not expected. However, the full extent of potential impacts from either the Proposed Blue Route or Dead Man's Pond Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. 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.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential

impacts on federally listed species (Appendix R). Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation. While both the Proposed Blue Route and Dead Man's Pond Variation in the Dead Man's Pond Variation Area pass through native vegetation, at present, there are no documented rare communities within either ROW (ROI for rare communities). 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.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.4.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-65 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Dead Man's Pond Variation Area.

Table 6-202 and Figure 6-129 identify the percentage of total transmission line length that the Proposed Blue Route and Dead Man's Pond Variation parallel an existing corridor or linear feature in the Dead Man's Pond Variation Area.

The Proposed Blue Route would parallel existing road/trail corridors for approximately one sixth of its length (Table 6-202). The Dead Man's Pond Variation would not parallel any existing corridors.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-

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Table 6-202 Corridor Sharing in the Dead Man's Pond Variation Area

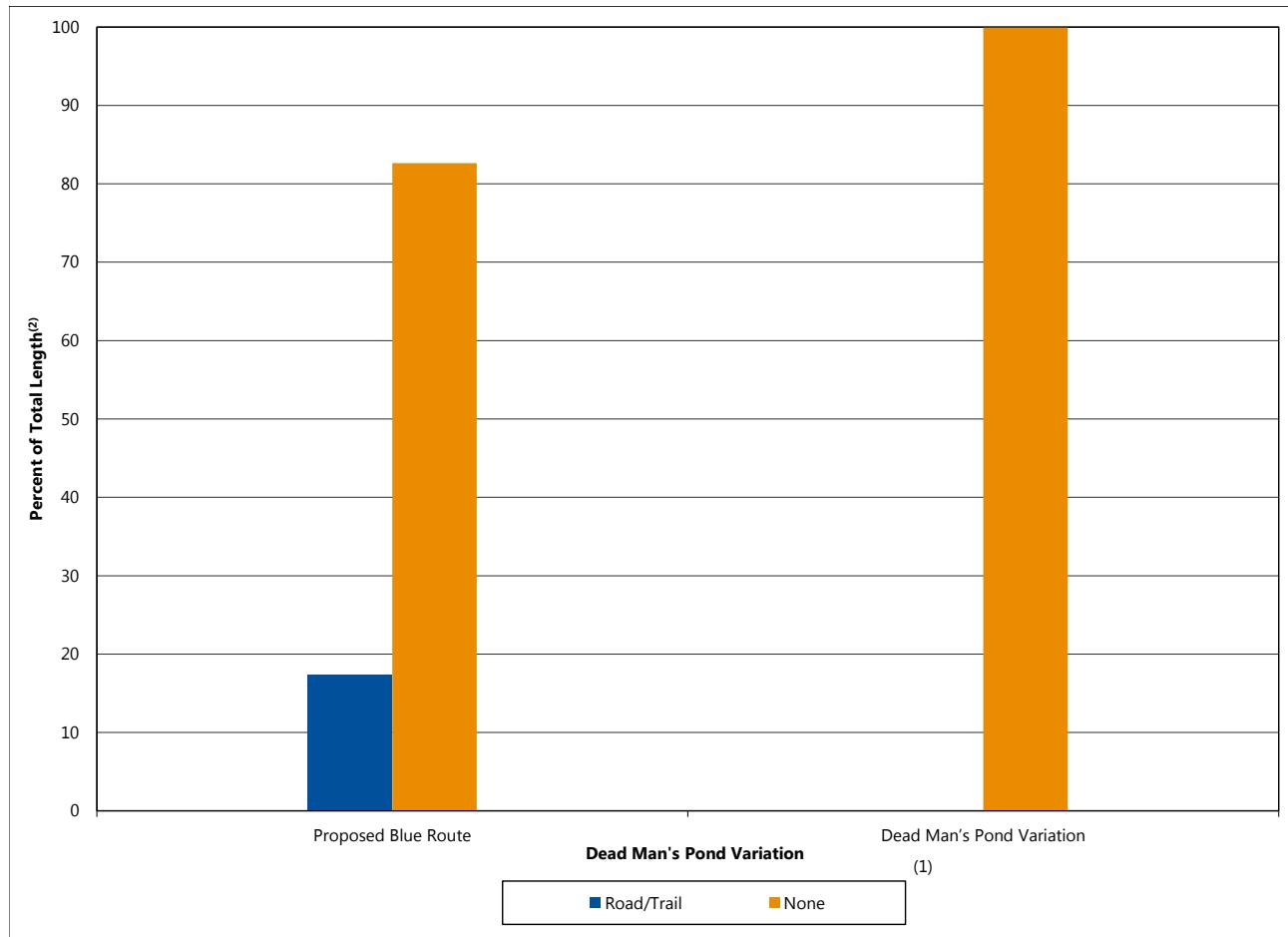
| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Dead Mans's Pond Variation Area | |
|---|--|---------------------------------|---------------------------|
| | | Proposed Blue Route | Dead Man's Pond Variation |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS) | Percent of Total Length ⁽²⁾ | 0 | 0 |
| Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line) | Percent of Total Length ⁽²⁾ | 17 | 0 |
| None | Percent of Total Length ⁽²⁾ | 83 | 100 |

Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-129 Corridor Sharing in the Dead Man's Pond Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.4.4.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-203 summarizes the costs associated with constructing the Proposed Blue Route and Dead Man's Pond Variation in the Dead Man's Pond Variation Area. As indicated in Table 6-203, the Dead Man's Pond Variation would cost more to construct relative to the Proposed Blue Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$3,500 to \$3,700 annually for these alternatives in the Dead Man's Pond Variation Area.

6.4.5 Blackberry Variation Area

The Blackberry Variation Area encompasses two route alternatives: the Proposed Blue Route and the Proposed Orange Route. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Blackberry Variation Area, depending on the route or variation considered.

6.4.5.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Blackberry Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Effie Variation Area (see Section 6.4.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Blackberry Variation Area are summarized in Table 6-204 and shown on Maps 6-61, 6-62, 6-63, and 6-65.

As indicated in Table 6-204 for the Blackberry Variation Area, both the Proposed Blue Route and Proposed Orange Route would cross or be located within 1,500 feet of a snowmobile trail and within one mile of historic architectural sites (Map 6-62 and Map 6-65), which are aesthetic resources with high visual sensitivity. The Proposed Blue Route would be located within one mile of six historic architectural sites, whereas the Proposed Orange Route would be located within one mile of one historic architectural site (Map 6-62). Therefore, the Proposed Orange Route would affect fewer aesthetic resources than the Proposed Blue Route.

In addition, the alternatives would be located within 1,500 feet of a number of residences, which also have high visual sensitivity (Figure 6-130). Of the two proposed routes in the Blackberry Variation Area, the Proposed Blue Route would affect fewer total residences (11) within 1,500 feet than the Proposed Orange Route (22). While there are no residences located within the ROW of the Proposed Blue Route, there are two residences located within 500 feet of the anticipated alignment, which would have high visual sensitivity.

The Proposed Orange Route is slightly longer (6.1 miles) than the Proposed Blue Route (5.4 miles; Table 6-204) and both alternatives parallel existing large transmission lines for a portion of their entire lengths at 37 and 20 percent, respectively. Although the Proposed Orange Route parallels an existing large transmission line for a greater percentage of its length than the Proposed Blue Route (Table 6-204),

Table 6-203 Construction Costs in the Dead Man's Pond Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|-----------------|---------------------------|--------------|-------------------------|-------------|
| Dead Man's Pond | Proposed Blue Route | \$2,873,223 | \$1,306,011 | 2.2 |
| | Dead Man's Pond Variation | \$4,409,841 | \$1,934,141 | 2.3 |

Source(s): Minnesota Power 2015, reference (9)

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Table 6-204 Aesthetic Resources within the ROI in the Blackberry Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Blackberry Variation Area | |
|---|--|---------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | Length (mi) | 5.4 | 6.1 |
| Existing Transmission Line ⁽²⁾ | Percent of Total Length ⁽³⁾ | 20 | 37 |
| Residences | Count within 0–500 ft | 2 | 0 |
| | Count within 0–1,000 ft | 6 | 5 |
| | Count within 0–1,500 ft | 11 | 22 |
| Historic Architectural Sites | Count within 0–1,500 ft | 0 | 0 |
| | Count within 0–5,280 ft | 6 | 1 |
| Snowmobile Trails | Count within 0–1,500 ft | 1 | 1 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2010, reference (150)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

the Proposed Blue Route parallels a 230 kV line with a more similar structure design, while the Proposed Orange Route parallels a 69 kV or 115 kV line which has a somewhat different structure design. By paralleling an existing 230 kV line of more similar design, the Proposed Blue Route is likely to produce slightly less design contrast in terms of its form, line, and scale than the Proposed Orange Route. However, given that the Proposed Orange Route parallels an existing large transmission line for nearly twice the distance as the Proposed Blue Route, the Proposed Orange Route would likely produce less contrast overall than the Proposed Blue Route.

Although the Proposed Orange Route affects more residences within 1,500 feet of it (22) than the Proposed Blue Route (11), it affects slightly fewer other aesthetic resources (one historic architectural site and one snowmobile trail) and would likely produce less contrast by paralleling an existing large transmission line for a greater percentage of its length than the Proposed Blue Route. For these reasons, the Proposed Orange Route is likely to result in slightly less aesthetic impact than the Proposed Blue Route in the Blackberry Variation Area.

The Proposed Blue Route and Proposed Orange Route are short in length, they only parallel existing transmission lines of similar size and design for moderately short portions of their overall lengths, and affect a moderate number of residences and several other sensitive visual resources. For these reasons, potential aesthetic impacts of the Proposed Blue Route and Proposed Orange Route are expected to be significant.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

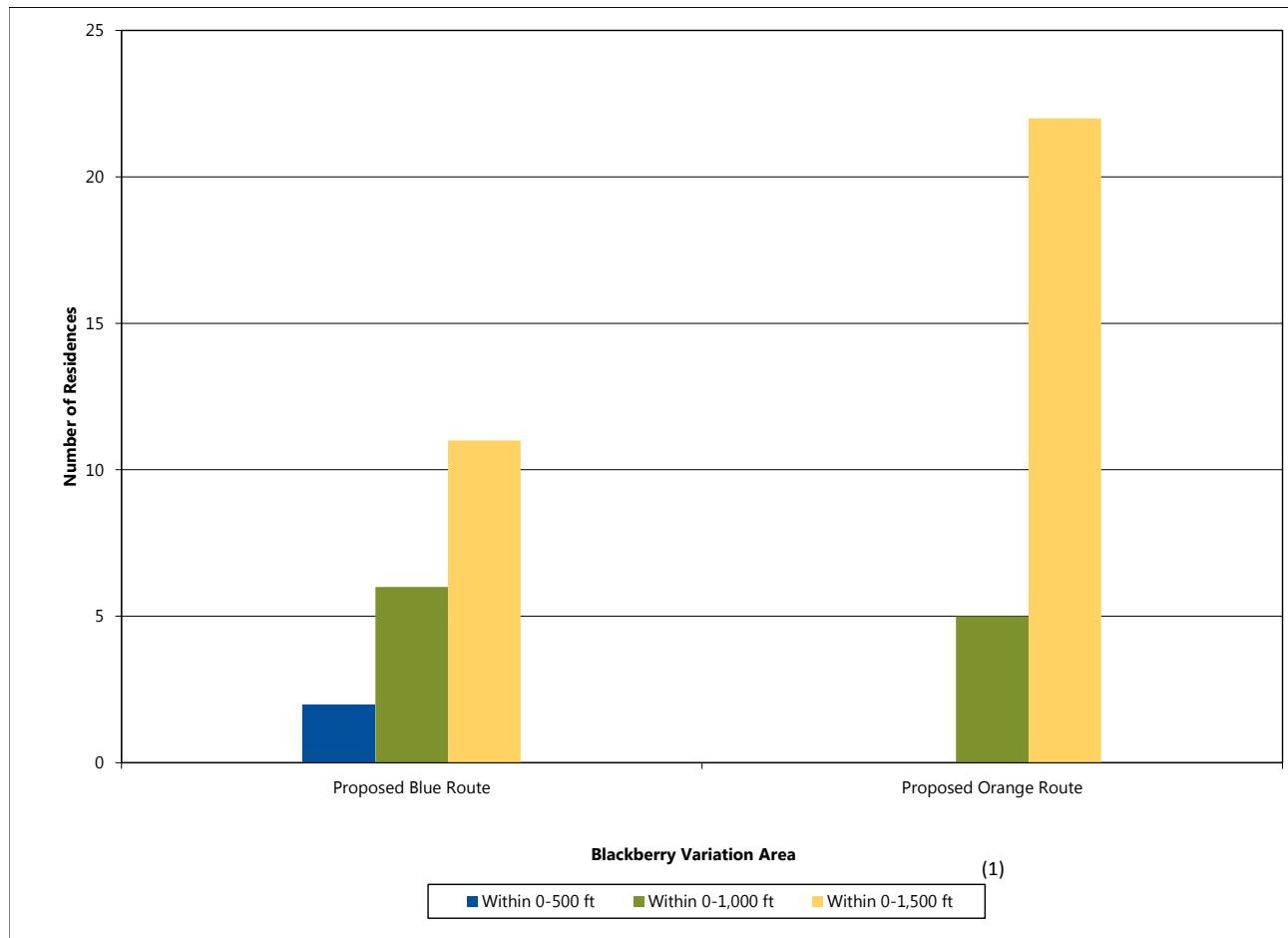
As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-205 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Blue Route and Proposed Orange Route in the Blackberry Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the variation area are shown in Map 5-19 and residences, churches, cemeteries, and airports near the Proposed Blue Route and Proposed Orange Route are shown on Map 6-61.

The Proposed Blue Route and Proposed Orange Routes ROI are both primarily composed of forested and/or swamp land (Table 6-205). The Proposed Orange Route ROI contains slightly less forested/swamp land, agricultural land, and developed or disturbed land compared to the Proposed Blue Route.

Figure 6-130 Residences within the ROI in the Blackberry Variation Area



Source(s): Minnesota Power 2014, reference (146)

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

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-205 Land Uses within the ROI in the Blackberry Variation Area

| Resource | Type ⁽¹⁾ | Evaluation Parameter ⁽²⁾ | Blackberry Variation Area | |
|---|------------------------|-------------------------------------|---------------------------|-----------------------|
| | | | Proposed Blue Route | Proposed Orange Route |
| GAP Land Cover Vegetation Class Level - Division 4 | Total | Acres within 0-1,500 ft | 2,127 | 2,353 |
| | Developed or Disturbed | Acres within 0-1,500 ft | 56 | 78 |
| | Agricultural | Acres within 0-1,500 ft | 50 | 192 |
| | Forested and/or Swamp | Acres within 0-1,500 ft | 2,004 | 1,982 |
| | Other | Acres within 0-1,500 ft | 17 | 101 |

Source(s): USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.

(2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

Land Ownership and Management

Table 6-206 and Figure 6-131 show that the Proposed Orange Route has a slightly greater amount of state fee land compared to the Proposed Blue Route. None of the land within either ROW is state forest land. No impacts to county lands, state conservation easements or USFWS Interest Lands would occur under the Proposed Blue Route or Proposed Orange Route.

Approximately 37 percent of the Proposed Orange Route and 20 percent of the Proposed Blue Route would parallel an existing corridor (see Section 6.4.5.6). Therefore the Proposed Orange Route would be expected to have slightly less incompatibility with surrounding land uses compared to the Proposed Blue Route.

Impacts to land use from the proposed Project in the Blackberry Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route and Proposed Orange Route would both 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. The length of the alternative that would parallel an existing corridor is also important. The Proposed Blue Route avoids a greater amount of state forest and state fee lands than the Proposed Orange Route thereby avoiding long-term changes to land use. However, the Proposed Orange Route parallels an existing corridor for a greater percentage of its length as compared to the Proposed Blue Route.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.5.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Blackberry Lake Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Blackberry Variation Area are summarized in Table 6-207.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the

transmission line. Table 6-207 and Figure 6-132 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route and Proposed Orange Route in the ROI.

The Proposed Orange Route would pass through more farmland, including prime farmland (Figure 6-132). The Proposed Orange Route and Proposed Blue Route would each impact less than 15 acres of farmland of statewide importance. The Proposed Blue Route, which would have the shorter length, would be expected to have fewer impacts on farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. There are no state forest lands or USDA-USFS national forest lands within the ROI of the Proposed Blue Route, Proposed Orange Route in the Blackberry Variation Area.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-207, Figure 6-133, and Map 6-61 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the Blackberry Variation Area. There are no **active mineral leases**, known aggregate resources or current mining lands in the ROI of either of the proposed routes in the Blackberry Variation.

Table 6-206 Land Ownership/Management within the Anticipated ROW in the Blackberry Variation Area

| Resource | Type | Evaluation Parameter | Blackberry Variation Area | |
|--|---|----------------------|---------------------------|-----------------------|
| | | | Proposed Blue Route | Proposed Orange Route |
| Total Lands | -- | Acres within ROW | 133 | 147 |
| State Fee Lands ⁽¹⁾ Total | -- | Acres within ROW | 41 | 54 |
| State Fee Lands ⁽¹⁾ by Type | Consolidated Conservation | Acres within ROW | 0 | 0 |
| | Other - Acquired, Tax Forfeit, Volstead | Acres within ROW | 17 | 49 |
| | Trust Fund | Acres within ROW | 24 | 5 |
| | Federal - State Lease | Acres within ROW | 0 | 0 |
| Private Land ⁽²⁾ | -- | Acres within ROW | 92 | 93 |

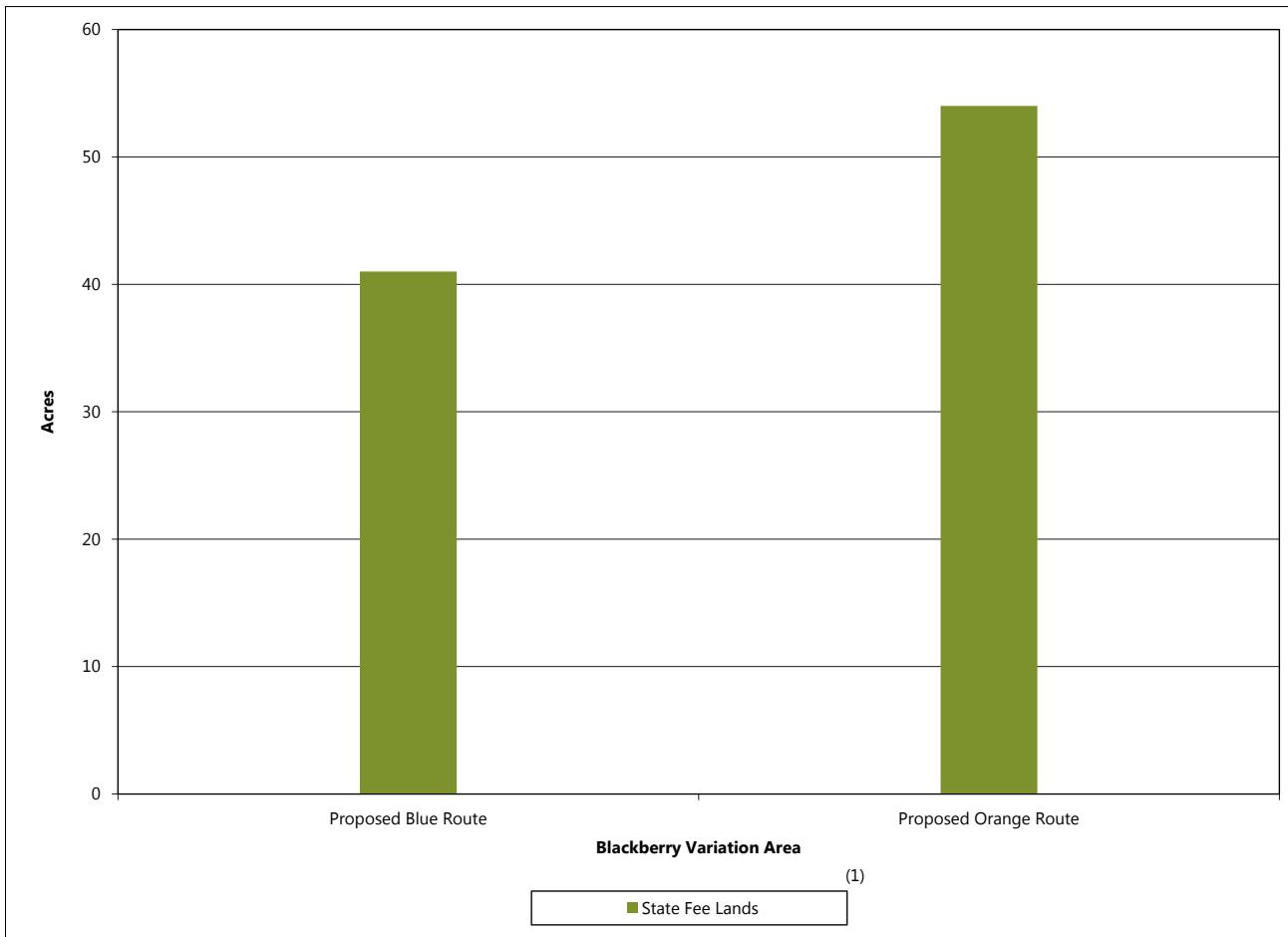
Source(s): MnDNR 2014, reference (152)

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.

(2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-131 Public Land Ownership/Management within the ROI in the Blackberry Variation Area



Source(s): 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.

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Table 6-207 Land-Based Economy Resources within the Anticipated ROW in the Blackberry Variation Area

| Resource | Type | Evaluation Parameter | Blackberry Variation Area | |
|---|----------------------------------|--|---------------------------|-----------------------|
| | | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | -- | Length (mi) | 5.4 | 6.1 |
| Existing Transmission Line ⁽¹⁾ | -- | Percent of Total Length ⁽²⁾ | 20 | 37 |
| Farmland | Not Farmland | Acres within ROW | 51 | 57 |
| | Prime Farmland if Drained | Acres within ROW | 12 | 8 |
| | Farmland of Statewide Importance | Acres within ROW | 11 | 2 |
| | All Areas are Prime Farmland | Acres within ROW | 59 | 80 |
| State Mineral Leases (active/and/or expired/terminated) | -- | Acres within ROW | 37 | 33 |

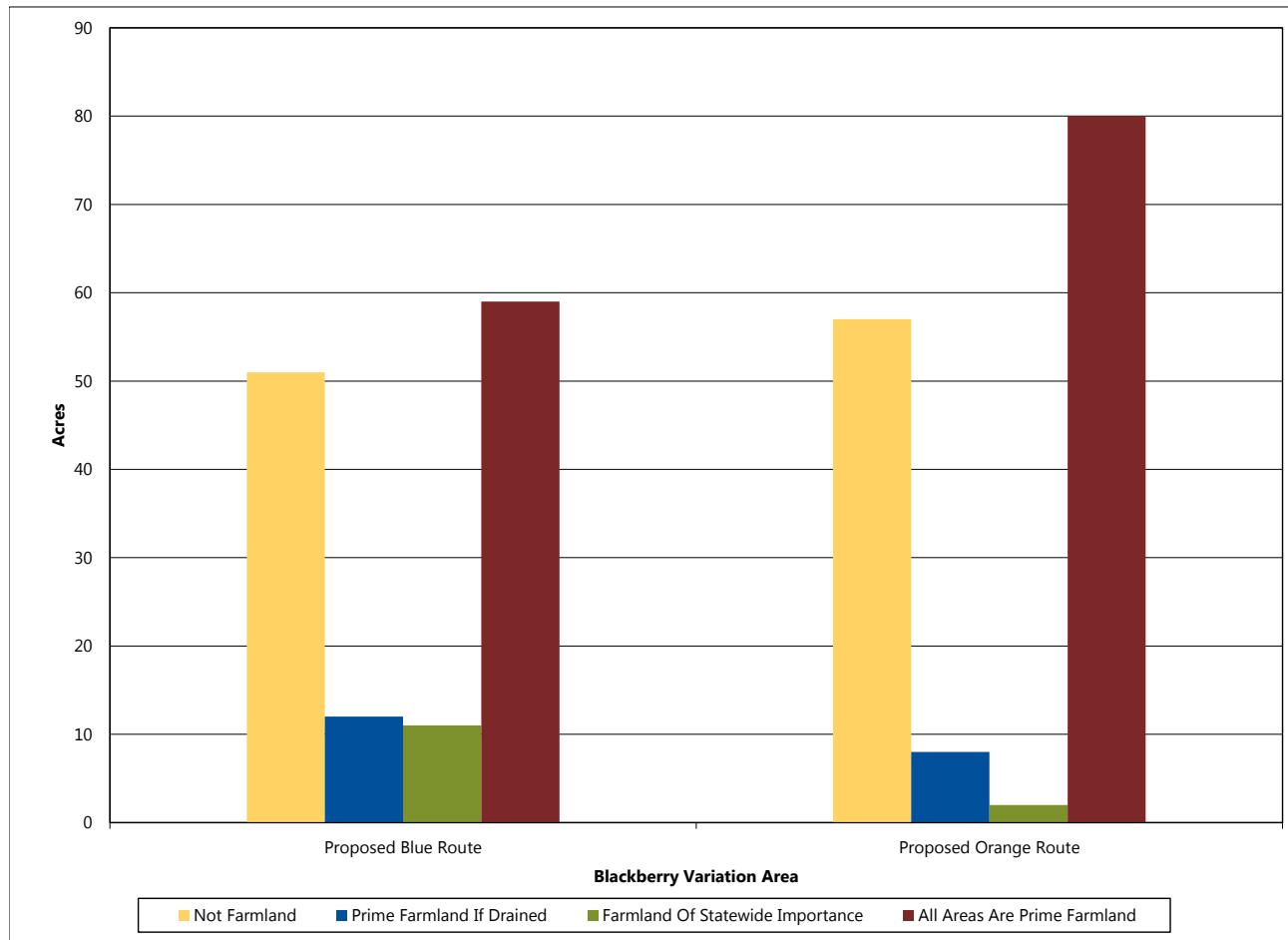
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR 2014, reference (179)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-132 Acres of Farmland by Type within the Anticipated ROW in the Blackberry Variation Area



Source(s): USDA NRCS 2014, reference (154)

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

Both the Proposed Blue Route and the Proposed Orange Route would traverse mining lands with terminated/expired state mineral leases, with the Proposed Blue Route passing through slightly more acres than the Proposed Orange Route (Table 6-207, Figure 6-133, and Map 6-61). Both of the proposed routes in the Blackberry Variation Area could potentially interfere with future mining activities in this area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

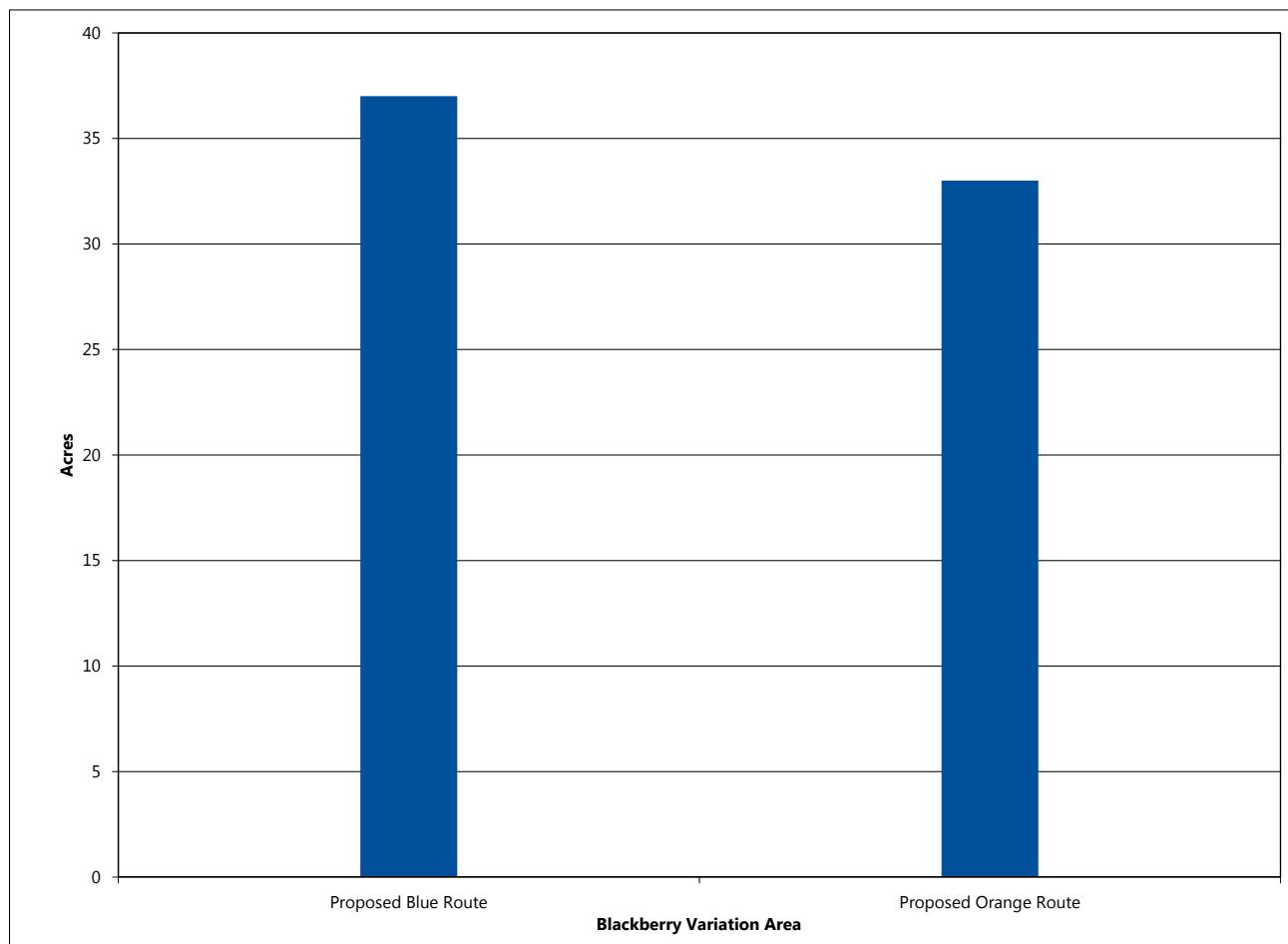
Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.5.3 Archaeology and Historic Architectural Sites

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential indirect impacts to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites.

Table 6-208 provides a summary of the previously recorded archaeological sites and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Blue Route and Proposed Orange Route in the Blackberry Variation Area (Map 6-62). A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

Figure 6-133 Acres of State Mineral Leases within the Anticipated ROW in the Blackberry Variation Area



Source(s): MnDNR 2014, reference (179)

Table 6-208 Archaeological and Historic Resources within the Blackberry Variation Area

| Resource | Evaluation Parameter ⁽¹⁾ | Blackberry Variation Area | |
|------------------------------|-------------------------------------|---------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Historic Architectural Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |
| | Count within 0–5,280 ft | 6 | 1 |
| Archaeological Sites | Count within ROW | 0 | 0 |
| | Count within 0–1,500 ft | 0 | 0 |

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

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

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route and Proposed Orange Route in the Blackberry Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Blackberry Variation Area, there are no archaeological sites or historic architectural resources within the ROW of either the Proposed Blue Route or the Proposed Orange Route. More historic architectural sites are potentially present within the Proposed Blue Route than the indirect APE for the Proposed Orange Route. None of the six previously recorded historic architectural resources located within the Proposed Blue Route indirect APE (IC-UOG-013, IC-TLT-011, IC-TLT-004, IC-TLT-005, IC-TLT-009, and IC-TLT-010) have been evaluated for NRHP eligibility. The Proposed Orange Route also contains IC-TLT-0110 within the indirect APE, which has not been evaluated for NRHP eligibility.

There is currently no known potential for direct, long-term adverse impacts as there are no previously recorded archaeological sites or historic resources located within the ROW of the proposed Blue Route or Orange Route. Indirect, long-term, adverse visual impacts on the previously recorded historic architectural resources within the indirect APE are likely to occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since the indirect APEs for both the Proposed Blue Route and the Proposed Orange Route contain historic architectural sites that have not been evaluated for

NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse impact under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

The Proposed Blue Route and Proposed Orange Route have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resource investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse impacts on historic properties as a result of construction and operation of the proposed Project.

Potential short-term and long-term adverse impacts from construction, operation, maintenance, and emergency-repair related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.4.5.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Blackberry Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Blackberry Variation Area are summarized in Table 6-209 and shown on Map 6-63. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The need to place transmission structures in wetlands, type of water crossings, and quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Blue Route and the Proposed Orange Route in the Blackberry Variation Area. Neither the Proposed Blue Route nor the Proposed Orange Route ROWs contain non-PWI waters, trout streams, or floodplains.

The Proposed Blue Route and the Proposed Orange Route would each cross the Swan River, which is both a PWI water and a MPCA-listed impaired water (Table 5-32). The Proposed Orange Route would also cross a PWI unnamed tributary to the Swan River and Foot Lake (Figure 6-134).

It is anticipated that all PWI crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and that transmission structures would not be placed within them.

Based on the NWI, the Proposed Blue Route and the Proposed Orange Route would both require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-135, the Proposed Blue Route contains the most forested and shrub wetland and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are

expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. The Proposed Blue Route and the Proposed Orange Route would both require placement of fill in wetlands for construction of transmission structures, but this impact would be expected to be minimal because of its localized extent (33 square feet per structure). Impacts associated with fill would be minimized by spanning wetlands to the extent practical; however, this impact cannot be completely avoided by spanning due to the high number of wetland crossings that would be needed in the East Section. Due to the number of wetland complexes in the area, it would be expected that the Proposed Blue Route and the Proposed Orange Route would both require temporary construction access through wetlands, which would be expected to be minimal due to the short-term, localized nature of the impact.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Blackberry Variation Area are summarized in Table 6-210 and shown on Maps 5-19 and 6-63. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

In general, loss or fragmentation of forest would be similar with either of the Proposed Blue Route

Table 6-209 Water Resources within the Anticipated ROW in the Blackberry Variation Area

| Resource | Evaluation Parameter | Blackberry Variation Area | |
|-------------------------------|----------------------|---------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | Length (mi) | 5.4 | 6.1 |
| Non-PWI Waters ⁽¹⁾ | Number of Crossings | 1 | 3 |
| Impaired Waters | Number of Crossings | 1 | 1 |
| NWI Wetlands | Acres within ROW | 51 | 40 |

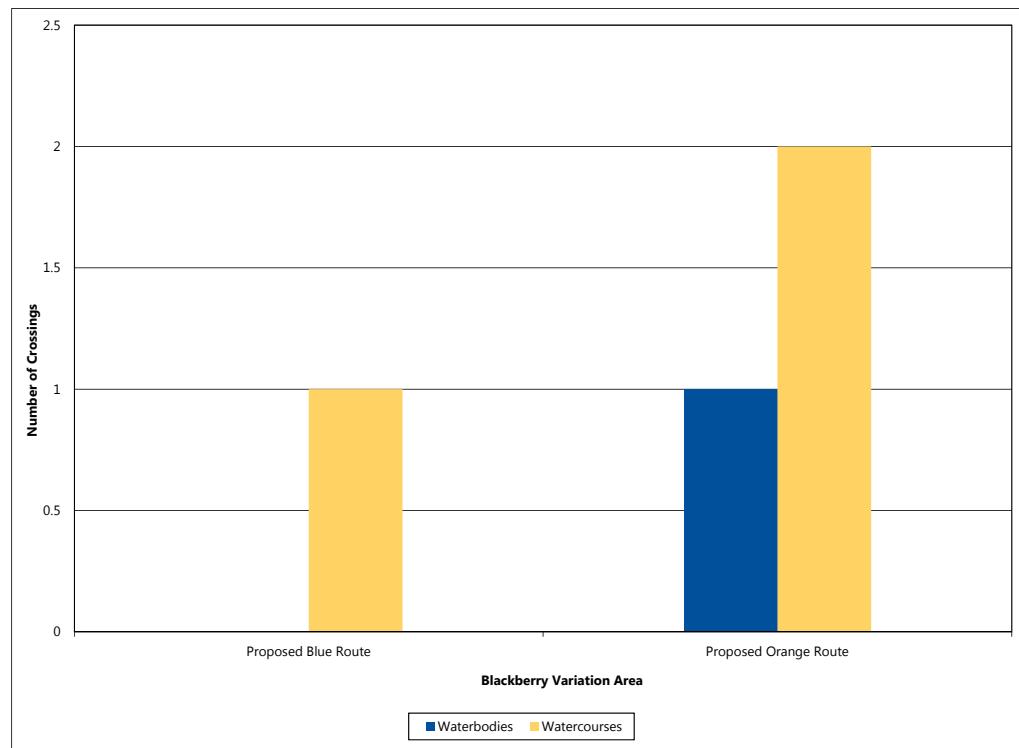
Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); MPCA 2014, reference (119); MPCA 2014, reference (118)

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

(1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water that the Proposed Route and variations would cross are described in the text and Figure 6-134.

6.0 Comparative Environmental Consequences

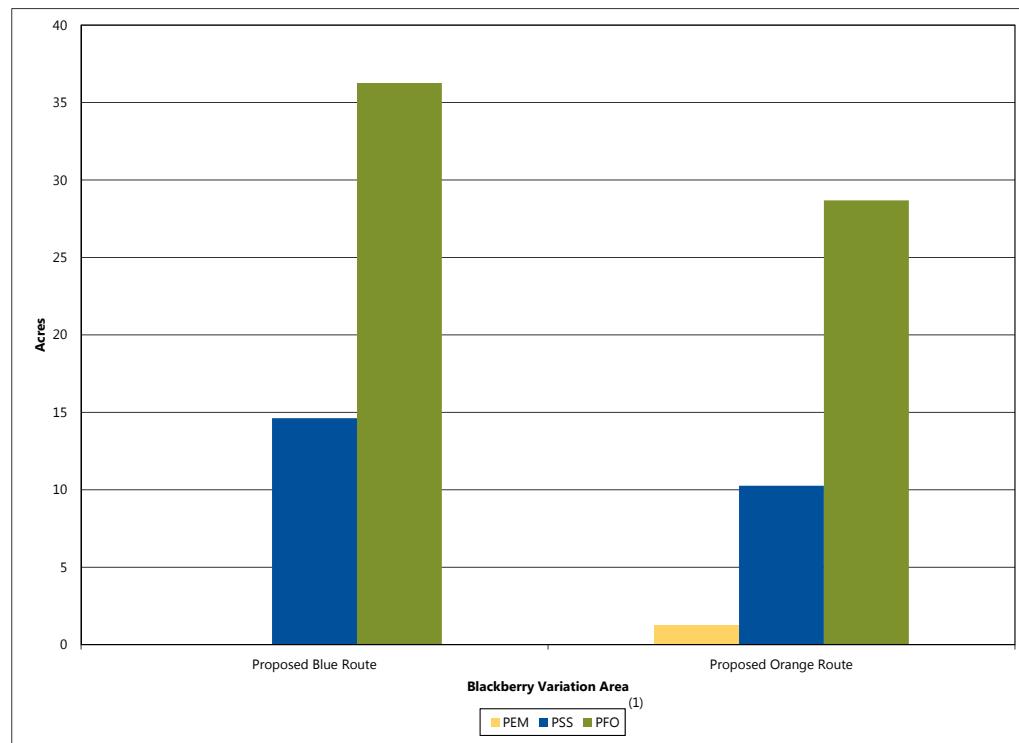
Figure 6-134 PWI Water Crossings by type in the Blackberry Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

Figure 6-135 Acres of Wetland by Type within the Anticipated ROW in the Blackberry Variation Area



Source(s): USFWS 1997, reference (157)

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

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO).

and the Proposed Orange Route in the Blackberry Variation Area. As discussed in Section 5.3.4.2, the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-210, the Proposed Blue Route and the Proposed Orange Route would pass through a similar amount of forested land. The Proposed Blue Route is 0.7 miles shorter than the Proposed Orange Route but it only parallels an existing transmission line corridor for 20 percent of its length, while the Proposed Orange would parallel an existing transmission line for 37 percent of its length. Proposed Blue Route and Proposed Orange Route would likely result in similar fragmentation of intact forest in areas where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-19).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Blackberry Variation Area are summarized in Table 6-211 and shown on Map 6-63. Wildlife resources in the

Blackberry Variation Area consist of natural habitat, including forest, wetlands, and small lakes.

The primary impact on wildlife resources that would differ between the Proposed Blue Route and the Proposed Orange Route in the Blackberry Variation Area includes proximity to wildlife habitat. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.4.5 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue Route and the Proposed Orange Route.

The Proposed Blue Route is just under a mile shorter in length but would require creation of new corridor for a greater portion of its length than the Proposed Orange Route (Table 6-211; Map 6-63). Because of this, the impacts related to fragmentation of forested habitats, and subsequent displacement of wildlife species associated with those forest communities would be similar with either proposed route.

Several small lakes/ponds are present in the Blackberry Variation Area, including a MnDNR designated unnamed shallow lake (Map 6-63). The Proposed Orange Route would traverse an area where these waterbodies are more dominant. Although none of these waterbodies are present within the ROW of either the Proposed Blue Route or the Proposed Orange Route, the proximity of these waterbodies to the Proposed Orange Route could result in greater impacts on wildlife that are associated with these waterbodies.

Table 6-210 Vegetation Resources within the Anticipated ROW in the Blackberry Variation Area

| Resource | Evaluation Parameter | Blackberry Variation Area | |
|--|--|---------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | Length (mi) | 5.4 | 6.1 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 20 | 37 |
| Total Forested GAP Land Cover | Acres within ROW | 129 | 130 |
| GAP Land Cover - Dominant Types⁽³⁾ | | | |
| North American Boreal Forest | Acres within ROW | 60 | 52 |
| North American Boreal Flooded and Swamp Forest | Acres within ROW | 30 | 26 |
| Eastern North American Cool Temperate Forest | Acres within ROW | 33 | 49 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USGS 2001, reference (151)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

6.0 Comparative Environmental Consequences

Table 6-211 Wildlife Resources within the Vicinity of the Blackberry Variation Area

| Resource | Evaluation Parameter | Blackberry Variation Area | |
|---|--|---------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | Length (mi) | 5.4 | 6.1 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 20 | 37 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145)

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

(1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-212 Rare Species Documented within One Mile of the Anticipated ROW in the Blackberry Variation Area

| Scientific Name ⁽¹⁾ | Common Name | Federal Status | State Status | Type | Blackberry Variation Area | |
|---|-------------------------|----------------|-----------------|----------------|---------------------------|-----------------------|
| | | | | | Proposed Blue Route | Proposed Orange Route |
| <i>Platanthera flava var. herbivora</i> | Tuberclped Rein-orchid | None | Threatened | Vascular Plant | X | X |
| <i>Spiranthes casei var. casei</i> | Cases's Ladies'-tresses | None | Threatened | Vascular Plant | X | X |
| <i>Accipiter gentilis</i> | Northern Goshawk | None | Special Concern | Bird | | X |

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.4.5.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Blackberry Variation Area are summarized in Table 6-212; additional data on rare species, such as the

presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

In general, proximity of state endangered, threatened, or special concern species is similar between the Proposed Blue Route and the Proposed Orange Route in the Blackberry Variation Area. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

As indicated in Table 6-212, two state-threatened vascular plants have been documented within one mile of the Proposed Blue Route and the Proposed Orange Route. In addition, the northern goshawk has been documented within one mile of the Proposed Orange Route; however, preferred habitat for the northern goshawk (mature, closed canopy forest) is also likely available within the vicinity of the Proposed Blue Route.

Although the Proposed Blue Route is just under a mile shorter in length than the Proposed Orange Route, it would require creation of new corridor for a greater percentage of its length relative to the

Proposed Orange Route (Table 6-213). Clearing of forested areas to create new corridor could have impacts on rare species associated with forest communities, such as the northern goshawk. However, the full extent of potential impacts on rare species from either the Proposed Blue Route or the Proposed Orange Route cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. 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.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Blackberry Variation Area are summarized in Table 6-213 and shown on Map 6-64; additional, more detailed data on rare communities and resources is provided in Appendix E.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts.

Loss or conversion of native vegetation would likely be similar between the Proposed Blue Route and the Proposed Orange Route in the Blackberry Variation Area. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-64 and in Table 6-213, the Proposed Orange Route would pass through more MBS Sites of Biodiversity Significance. However, both Proposed Blue Route and the Proposed Orange Route would pass through a similar amount of Sites of Biodiversity Significance along new transmission line corridor because the Proposed Orange Route would parallel an existing transmission line corridor through a portion of the Sites of Biodiversity Significance it traverses.

The rare communities and resources listed in Table 6-213 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities may be significant, because localized adverse impacts would result in a broader regional depletion of certain rare communities. 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.

Table 6-213 Rare Communities and Resources within the Vicinity of the Blackberry Variation Area

| Resource | Evaluation Parameter | Blackberry Variation Area | |
|---|--|---------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line | Length (mi) | 5.4 | 6.1 |
| Existing Transmission Line ⁽¹⁾ | Percent of Total Length ⁽²⁾ | 20 | 37 |
| MBS Sites of Biodiversity Significance ⁽³⁾ | Acres within ROW | 57 | 79 |

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.5.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-65 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Blackberry Variation Area.

Table 6-214 identifies the percentage of total transmission line length that the Proposed Blue Route and the Proposed Orange Route parallel an existing corridor or linear feature in the Blackberry Variation Area.

The Proposed Orange Route would parallel an existing transmission line corridor for less than half of the length (Figure 6-136). The Proposed Blue Route would parallel an existing transmission line corridor for one fifth of its length.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.4.5.7 Electrical System Reliability

As explained in Section 5.3.7, the ROI for Electrical System Reliability was determined to be the corridors for the existing transmission lines. Data related to electrical system reliability in the Blackberry Variation Area are shown on Map 6-65.

The Proposed Blue Route would parallel 230 kV and 115 kV transmission lines for approximately 20 percent of its length in the southern portion of the Blackberry Variation Area. The Proposed Orange Route would parallel two 115 kV transmission lines for approximately 40 percent of its length in the southern portion of the Balsam Variation Area (Table 6-214); therefore, for both proposed routes, there are three transmission lines parallel in adjacent corridors.

The configuration may decrease the reliability of the proposed Project. When facilities are located in close proximity, there is a greater risk that a single event can take out multiple lines. Additionally, the close proximity of three lines can make repairing the lines more difficult. These difficulties could increase outage times, should an outage occur. Adverse impacts are possible as a result of the construction of the construction and operation of three high-voltage transmission lines under one variation in the East Section.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on electrical system reliability are summarized in Section 5.3.7. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts to electrical system reliability.

Table 6-214 Corridor Sharing in the Blackberry Variation Area

| Feature Sharing Corridor ⁽¹⁾ | Evaluation Parameter | Blackberry Variation Area | |
|---|--|---------------------------|-----------------------|
| | | Proposed Blue Route | Proposed Orange Route |
| Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS) | Percent of Total Length ⁽²⁾ | 20 | 37 |
| Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS) | Percent of Total Length ⁽²⁾ | 2 | 0 |
| None | Percent of Total Length ⁽²⁾ | 79 | 63 |

Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

(1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.

(2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

6.4.5.8 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

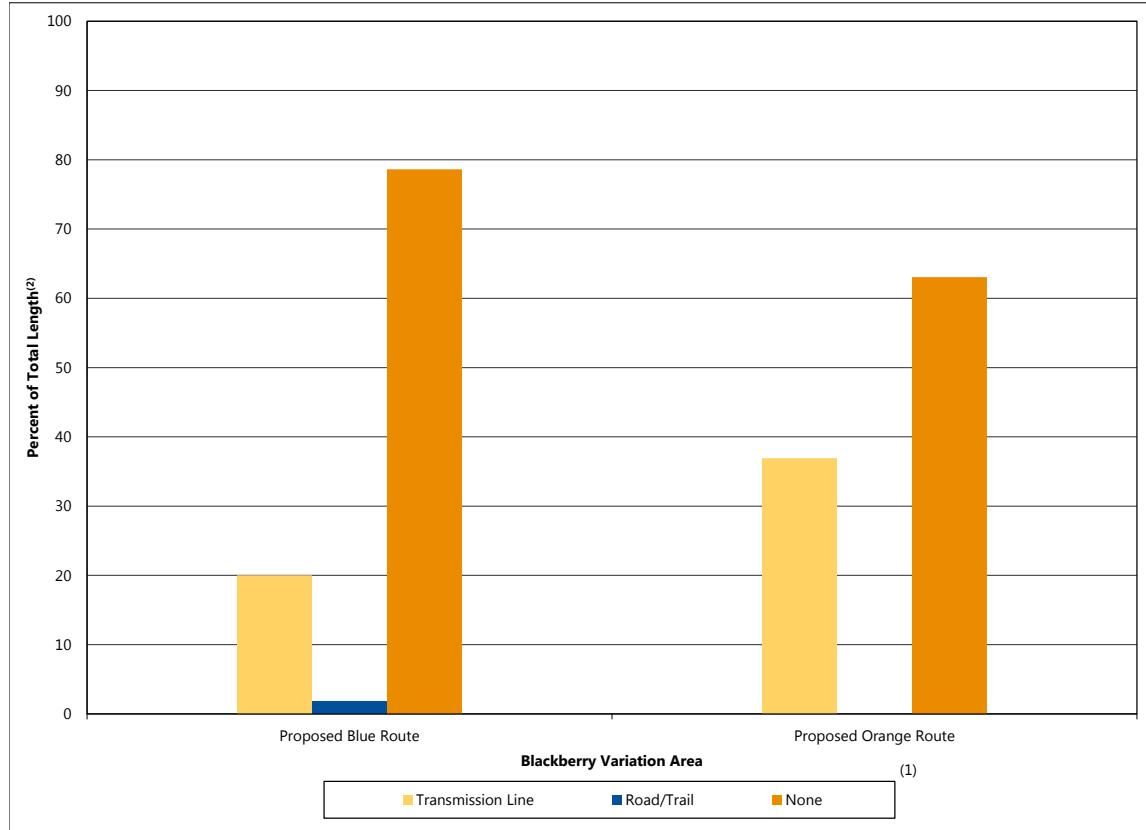
Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-215 summarizes the costs associated with constructing the Proposed Blue Route and Proposed Orange Route in the Blackberry Variation Area. As indicated in Table 6-215, the Proposed Orange Route would cost more to construct relative to the Proposed Blue Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$8,600 to \$9,800 annually for these alternatives in the Blackberry Variation Area.

6.4.6 Relative Merits Summary

As discussed in Section 1.2.1.1, the MN PUC is charged with selecting routes that minimize adverse

Figure 6-136 Corridor Sharing in the Blackberry Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS); Road Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS field line).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-215 Construction Costs in the Blackberry Variation Area

| Variation Area | Name in the EIS | Cost (Total) | Average Cost (per mile) | Length (mi) |
|----------------|-----------------------|--------------|-------------------------|-------------|
| Blackberry | Proposed Blue Route | \$8,380,680 | \$1,540,566 | 5.4 |
| | Proposed Orange Route | \$10,148,060 | \$1,663,616 | 6.1 |

Source(s): Minnesota Power 2015, reference (9)

human and environmental impacts while ensuring continuing electric power system reliability and integrity. MN PUC must take into account the 14 factors identified in Minnesota Rules, part 7850.4100 when making a decision on a Route Permit. See Section 6.2.6 for additional details on the relative merits analysis methodology.

6.4.6.1 Effie Variation Area

The Effie Variation would have the most impacts on the aesthetics element of the human settlement factor because it would pass by the most residences; however, impacts would be moderated to some extent because it would parallel two existing transmission line corridors for most of its length. The Effie Variation may have more impacts on the archaeological and historic architectural resources factor, as it crosses sections identified as containing known archaeological sites and has the most historic architectural sites within one mile. The Effie Variation would have the most impacts on the water resources element of the natural environment factor because it crosses more water courses, including trout streams.

The Proposed Blue Route and the Proposed Orange Route may have more impact on the wildlife element of the natural environment factor because these alternatives would cross an Important Bird Area. These two alternatives may have the most impact on the federal and state listed species element of the rare and unique natural resources factor because they have the most NHIS records within one mile. These two alternatives also parallel minimal existing corridor, while the Effie Variation parallels existing corridor for most of its length. Because of its longer length, the Effie Variation would cost the most to construct.

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

Table 6-216 provides an overview of this relative merits assessment for the alternatives in the Effie Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for

each variation area, see the appropriate sections in Chapter 6.

6.4.6.2 East Bear Lake Variation Area

Similar to the Effie Variation, the East Bear Lake Variation in the East Bear Variation would parallel an existing transmission line corridor **for just under one-half its length**, therefore reducing impacts to the elements of the natural environment factor and the rare communities element of the rare and unique resources factor by avoiding habitat fragmentation, and the MBS Sites of Biodiversity Significance in the Bear Wolf Peatland. Because of its slightly longer length and need for angle structures, the East Bear Lake Variation would be more expensive to construct than the Proposed Orange Route.

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

Table 6-217 provides an overview of this relative merits assessment for the alternatives in the East Bear Lake Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.4.6.3 Balsam Variation Area

The Proposed Blue Route and Balsam Variation avoid impacts to the aesthetics element of human settlement factor as they are located further from communities in Balsam and Lawrence townships and pass by fewer residences than the Proposed Orange Route. The Proposed Orange Route would cost the most to construct.

The Balsam Variation would have more potential impacts to the mining and mineral resources element of the land-based economies factor as it would cross more active and expired/terminated state mineral lease lands. The Balsam Variation may have more impacts on the archaeological and historic architectural resources factor, as it would cross a section identified as containing known archaeological sites and also has the most historic architectural sites within one mile.

The Proposed Orange Route and the Balsam Variation may have the most impacts on the water resources element of the natural environment factor, as they would cross the most FEMA-designated floodplains, most of which are too large to span.

The Balsam Variation may result in fewer impacts to the **vegetation and wildlife** elements of the natural resource factor as it would be located in an abandoned transmission line corridor for much of its length and may result in fewer impacts associated with new habitat fragmentation than the Proposed Blue Route or Proposed Orange Route.

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

Table 6-218 provides an overview of this relative merits assessment for the alternatives in the Balsam Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.4.6.4 Dead Man's Pond Variation Area

Within the Dead Man's Pond Variation Area, the Dead Man's Pond Variation would create more potential impacts to the aesthetics element of the human settlement factor than the Proposed Blue Route by passing closer to more residences. The Proposed Blue Route may have more impacts on the water resources element of the natural environment factor, as it would cross wetlands too large to span and would cross more shrub wetlands, resulting in more wetland type conversion.

The Proposed Blue Route may result in fewer impacts to the **vegetation and wildlife** elements of the natural resource factor as it parallels a corridor for part of its length and may result in fewer impacts associated with new habitat fragmentation than the Dead Man's Pond Variation. Because it would likely require more angle structures, the Dead Man's Pond Variation would also be more expensive to construct.

Table 6-219 provides an overview of this relative merits assessment for the alternatives in the Dead Man's Pond Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.4.6.5 Blackberry Variation Area

In the Blackberry Variation Area, the Proposed Orange Route would result in more impacts to the aesthetics element of the human settlement factor, as it would pass by more residences. In addition, the Proposed Orange Route is a slightly longer route and would likely require more angle structures than the Proposed Blue Route, so it would cost more to construct.

The Proposed Blue Route may have more impact on the archaeological and historic resources factor, as it has more historic architectural sites located within one mile than that the Proposed Orange Route.

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

Table 6-220 provides an overview of this relative merits assessment for the alternatives in the Blackberry Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

Table 6-216 Relative Merits Assessment for the Effie Variation Area

| Relative Merits ⁽¹⁾ | | Effie Variation Area | | | |
|--|----------------------------------|----------------------|-----------------------|-----------------|---|
| Factor | Element | Proposed Blue Route | Proposed Orange Route | Effie Variation | Notes |
| Human settlement | Aesthetics | | | | Effie Variation would pass by the most residences within 1,500 feet of the anticipated alignment. |
| | Land use compatibility | | | | There are no land use compatibility issues identified for the alternatives. All alternatives cross a relatively similar amount of private land. |
| Land-Based economies | Agriculture | | | | All alternatives would cross a relatively similar amount of farmland. Effie Variation parallels an existing transmission line corridor for 80% of its length. The other alternatives parallel minimal existing corridor. |
| | Forestry | | | | All alternatives would cross a relatively similar amount of state forest land. Effie Variation parallels an existing transmission line corridor for 80% of its length. The other alternatives parallel minimal existing corridor. |
| | Mining and mineral resources | | | | All alternatives would cross a relatively similar amount of active and expired/terminated mineral lease lands. |
| Archaeological and historic architectural resources | | | | | Effie Variation would cross sections identified as containing known archaeological sites, while the other alternatives would not. The Effie Variation has more historic architectural sites within 1 mile than the Proposed Blue Route and Proposed Orange Route. |
| Natural environment | Water resources | | | | Effie Variation would cross the most watercourses/waterbodies; including six trout streams. All crossings are expected to be spanned, although clearing vegetation adjacent to trout streams could result in increased water temperature, potentially resulting in less suitable trout habitat. Proposed Blue Route and the Proposed Orange Route would cross FEMA-designated floodplains; however the areas are small and would be spanned. All alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | | | | All alternatives would cross a relatively similar amount of forested land cover. Effie Variation parallels an existing transmission line corridor for 80% of its length. The other alternatives parallel minimal existing corridor. |
| | Wildlife | | | | Proposed Blue Route and Proposed Orange Route would cross the important Bird Area. |
| Rare and unique natural resources | Federal and state-listed species | | | | The alternatives cross critical habitat designated for gray wolf. Proposed Orange Route has the most NHIS records within 1 mile. Proposed Blue Route has more NHIS records than the Effie Variation. Effie Variation would also minimize impacts by paralleling existing corridor. |
| | State rare communities | | | | All alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance. |
| Paralleling of existing ROWs | | | | | Proposed Blue Route and Proposed Orange Route would cross the Important Bird Area. |
| Electrical system reliability | | | | | Effie Variation would parallel existing 500 kV and 230 kV transmission line corridors for the entire length. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | | | | The cost for the Proposed Orange Route is within 20% of the cost of the Proposed Blue Route. The cost of the Effie Variation is more than 20% above the cost of the Proposed Blue Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

Table 6-217 Relative Merits Assessment for the East Bear Lake Variation Area

| Relative Merits ⁽¹⁾ | | East Bear Lake Variation Area | | |
|--|----------------------------------|-------------------------------|-----------------------|---|
| Factor | Element | Proposed Blue Route | Proposed Orange Route | Notes |
| Human settlement | Aesthetics | | | No residences are present within 1,500 feet of the anticipated alignment for either alternative. |
| | Land use compatibility | | | There are no land use compatibility issues identified for the alternatives. Neither alternative would cross private land. |
| Land-Based economies | Agriculture | | | Both alternatives would cross a relatively similar amount of farmland. East Bear Lake Variation would parallel existing corridors for nearly half of its length. |
| | Forestry | | | Both alternatives would cross a relatively similar amount of state forest land. East Bear Lake Variation would parallel existing corridors for nearly half of its length. |
| | Mining and mineral resources | | | Both alternatives would cross a relatively similar amount of active and expired/terminated mineral lease lands. East Bear Lake Variation would parallel existing corridors for nearly half of its length. |
| Archaeological and historic architectural resources | | | | There are no known archaeological and historic architectural resources that would be affected by the alternatives. |
| Natural environment | Water resources | | | Both alternatives would cross relatively similar numbers of watercourses/waterbodies; however, all crossings are expected to be spanned. Neither alternative would cross floodplains. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | | | Both alternatives would cross a relatively similar amount of forested land cover. East Bear Lake Variation would parallel existing corridors for nearly half of its length. |
| | Wildlife | | | Neither alternative would cross designated wildlife resources. |
| Rare and unique natural resources | Federal and state-listed species | | | There are no federally listed species identified for these alternatives. All alternatives would have a relatively similar number of NHIS records within 1 mile. Neither alternative has threatened or endangered NHIS records within 1 mile. |
| | State rare communities | | | Both alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance. |
| Paralleling of existing ROWs | | Yellow | Green | East Bear Lake Variation would parallel existing transmission line, roadway, and/or trail corridor, while the Proposed Orange Route would not parallel these corridors. |
| Electrical system reliability | | Green | Yellow | East Bear Lake Variation would parallel existing 500 kV and 230 kV transmission line corridors for 42% of its length. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Red | The cost of the East Bear Lake Variation is more than 20% above the cost of the Proposed Orange Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.0 Comparative Environmental Consequences

Table 6-21, Relative Merits Assessment for the Balsam Variation Area

| Relative Merits ⁽¹⁾ | | Balsam Variation Area | | | |
|--|----------------------------------|-----------------------|-----------------------|------------------|--|
| Factor | Element | Proposed Blue Route | Proposed Orange Route | Balsam Variation | Notes |
| Human settlement | Aesthetics | Green | Yellow | Green | Proposed Orange Route would pass by the most residences within 1,500 feet of the anticipated alignment. |
| | Land use compatibility | Gray | Gray | Gray | There are no land use compatibility issues identified for the alternatives. All alternatives would cross a relatively similar amount of private land. |
| Land-Based economies | Agriculture | Gray | Gray | Gray | All alternatives cross a relatively similar amount of farmland. |
| | Forestry | Gray | Gray | Gray | None of the alternatives cross state forest land. |
| | Mining and mineral resources | Green | Green | Yellow | Balsam Variation would cross active and expired/terminated mineral lease lands while the proposed routes would not cross any mineral lease lands. |
| Archaeological and historic architectural resources | | Green | Green | Yellow | Balsam Variation would cross a section identified as containing known archaeological sites, while the other alternatives would not. Balsam Variation has the most historic architectural sites within 1 mile. |
| Natural environment | Water resources | Green | Yellow | Yellow | All alternatives would cross relatively similar numbers of watercourses/waterbodies; however, all crossings are expected to be spanned. All alternatives would cross FEMA-designated floodplains large enough that they cannot be spanned; Proposed Orange Route would cross the most floodplain. All alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion. |
| | Vegetation | Gray | Gray | Gray | All alternatives would cross a relatively similar amount of forested land cover. Balsam Variation parallels existing transmission line, roadway, or field corridor for a greater proportion of its length than the proposed routes. |
| | Wildlife | Gray | Gray | Gray | None of the alternatives would cross designated wildlife resources. |
| Rare and unique natural resources | Federal and state-listed species | Gray | Gray | Gray | There are no federally listed species identified for these alternatives. The alternatives have the same number of NHIS records within 1 mile, none of which are threatened or endangered species. |
| | State rare communities | Gray | Gray | Gray | All alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance. |
| Paralleling of existing ROWs | | Gray | Gray | Gray | All alternatives would parallel existing transmission line, roadway, and/or trail corridor. Balsam Variation would be located in an abandoned transmission line corridor for 66% of its length. |
| Electrical system reliability | | Yellow | Yellow | Green | Proposed Blue Route and Proposed Orange Route would parallel two existing 115 kV transmission line corridors for 15% of their lengths. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Yellow | Red | The cost for the Proposed Orange Route is within 20% of the cost of the Proposed Blue Route. The cost of the Balsam Variation is more than 20% above the cost of the Proposed Blue Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

Table 6-219 Relative Merits Assessment for the Dead Man's Pond Variation Area

| Relative Merits ⁽¹⁾ | | Dead Man's Pond Variation Area | | |
|--|----------------------------------|--------------------------------|---------------------------|--|
| Factor | Element | Proposed Blue Route | Dead Man's Pond Variation | Notes |
| Human settlement | Aesthetics | Green | Yellow | Dead Man's Pond Variation would pass by more residences within 1,500 feet of the anticipated alignment. |
| | Land use compatibility | Gray | Gray | There are no land use compatibility issues identified for the alternatives. Both alternatives would cross a relatively similar amount of private land. |
| Land-Based economies | Agriculture | Gray | Gray | Both alternatives would cross a relatively similar amount of farmland. |
| | Forestry | Gray | Gray | Neither alternative would cross state forest land. |
| | Mining and mineral resources | Gray | Gray | No active or expired/terminated mineral lease lands or aggregate resources are present in the ROW of any alternative. |
| Archaeological and historic architectural resources | | Gray | Gray | There are no known archaeological sites that would be affected by the alternatives. Both alternatives have one historic architectural site within 1 mile. |
| Natural environment | Water resources | Yellow | Green | There would be no differences between the alternatives for crossing watercourses, waterbodies, and floodplains. Proposed Blue Route would cross wetlands that are too large to span, while Dead Man's Pond Variation would be able to span wetlands. Both alternatives would result in relatively similar areas of forested wetland type conversion. Proposed Blue Route would have the most shrub wetland; therefore, would require the most shrub wetland type conversion. |
| | Vegetation | Gray | Gray | Both alternatives would cross a relatively similar amount of forested land cover. |
| | Wildlife | Gray | Gray | Neither alternative would cross designated wildlife resources. |
| Rare and unique natural resources | Federal and state-listed species | Gray | Gray | There are no federally listed species identified for these alternatives. There is 1 threatened NHIS record within 1 mile of the Dead Man's Pond Variation. However, this species is a fish and because it is anticipated that all waterbodies and watercourses would be spanned, impacts to this aquatic species are not expected. |
| | State rare communities | Gray | Gray | No known rare and unique natural resources were identified for the alternatives. |
| Paralleling of existing ROWs | | Green | Yellow | Proposed Blue Route parallels some existing transmission line, roadway, and/or trail corridor, while the Dead Man's Pond Variation does not parallel any of these existing corridors. |
| Electrical system reliability | | Gray | Gray | There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Red | The cost of the Dead Man's Pond Variation is more than 20% above the cost of the Proposed Blue Route. |

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.0 Comparative Environmental Consequences

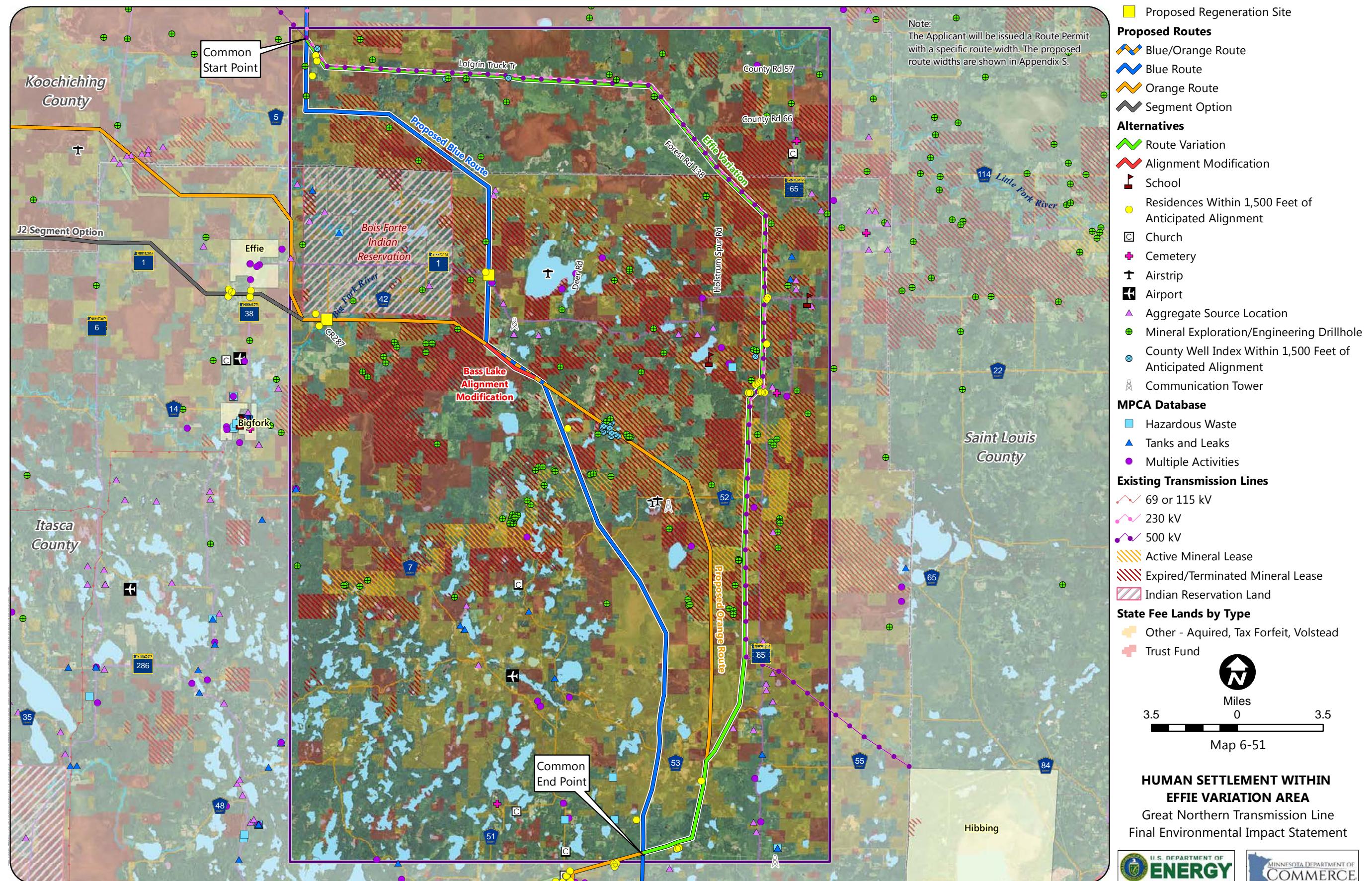
Table 6-220 Relative Merits Assessment for the Blackberry Variation Area

| Relative Merits ⁽¹⁾ | | Blackberry Variation Area | | |
|--|----------------------------------|---------------------------|-----------------------|--|
| Factor | Element | Proposed Blue Route | Proposed Orange Route | Notes |
| Human settlement | Aesthetics | Green | Yellow | Proposed Orange Route would pass by more residences within 1,500 feet of the anticipated alignment. |
| | Land use compatibility | Gray | Gray | There are no land use compatibility issues identified for the alternatives. Both alternatives would cross a relatively similar amount of private land. |
| Land-Based economies | Agriculture | Gray | Gray | Both alternatives would cross a relatively similar amount of farmland. |
| | Forestry | Gray | Gray | Neither alternative would cross state forest land. |
| | Mining and mineral resources | Gray | Gray | Proximity to expired/terminated mineral lease lands are relatively similar between the alternatives. |
| Archaeological and historic architectural resources | | Yellow | Green | There are no known archaeological resources that would be affected by the alternatives. Proposed Blue Route has more historic architectural sites within 1 mile. |
| Natural environment | Water resources | Gray | Gray | Proposed Orange Route would cross the most watercourses/waterbodies; however, all crossings are expected to be spanned. There would be no differences between the alternatives for crossing floodplains. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of forested wetland type conversion. Proposed Blue Route would have the most shrub wetland; therefore, would require the most shrub wetland type conversion. |
| | Vegetation | Gray | Gray | Both alternatives would cross a relatively similar amount of forested land cover. Proposed Orange Route parallels more existing transmission line corridor. |
| | Wildlife | Gray | Gray | Neither alternative would cross designated wildlife resources. |
| Rare and unique natural resources | Federal and state-listed species | Gray | Gray | There are no federally listed species identified for these alternatives. Both alternatives have a relatively similar number of NHIS records, including threatened or endangered NHIS records, within 1 mile. |
| | State rare communities | Gray | Gray | Both alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance. |
| Paralleling of existing ROWs | | Gray | Gray | Both alternatives would parallel a relatively similar amount of transmission line, roadway, and/or trail corridor. |
| Electrical system reliability | | Gray | Gray | Both alternatives would parallel 2 existing high voltage transmission lines for a relatively similar proportion of their length. |
| Costs of constructing, operating, and maintaining the facility which are dependent on design and route | | Green | Red | The cost of the Proposed Orange Route is more than 20% above the cost of the Proposed Blue Route. |

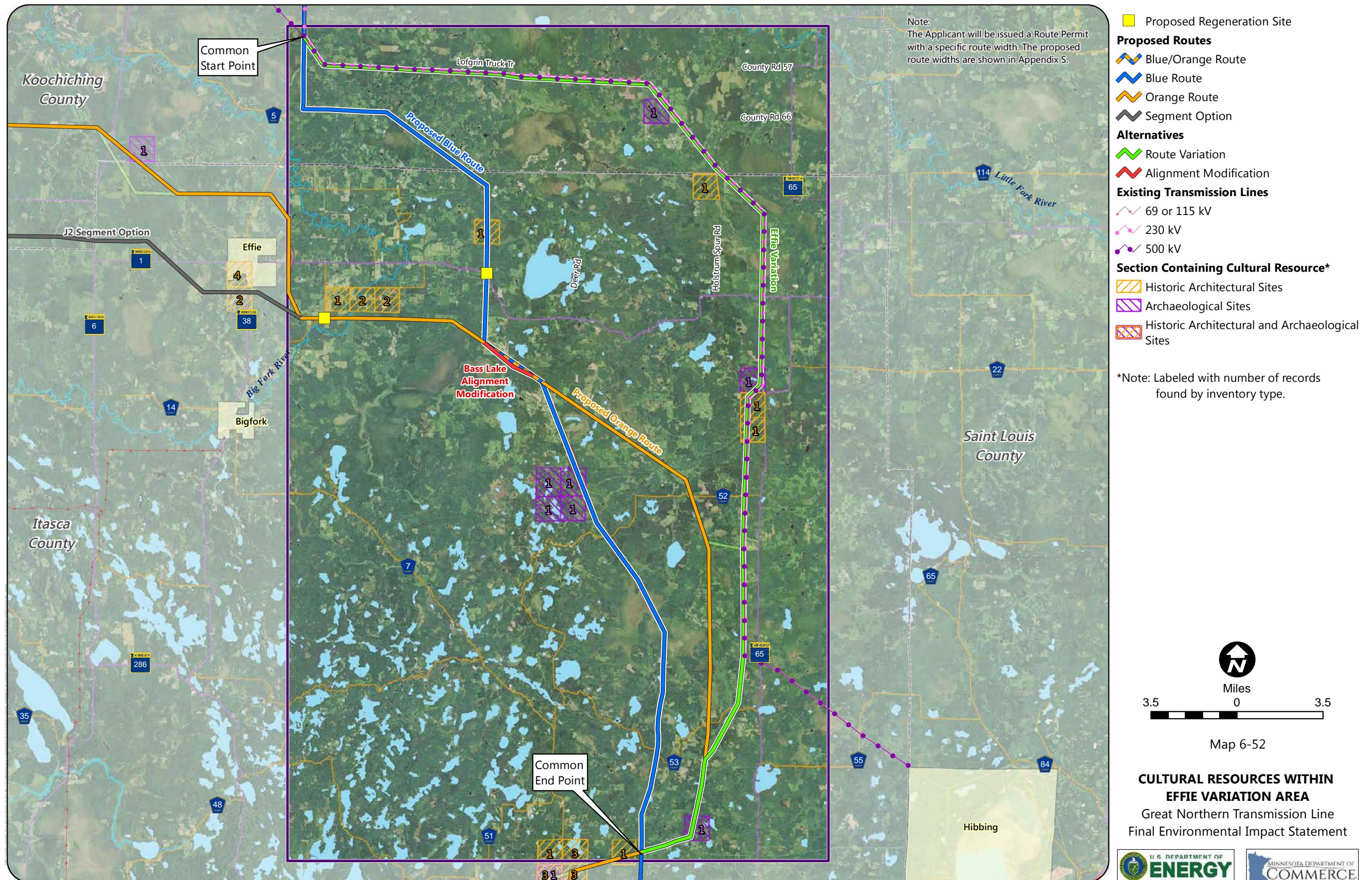
(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

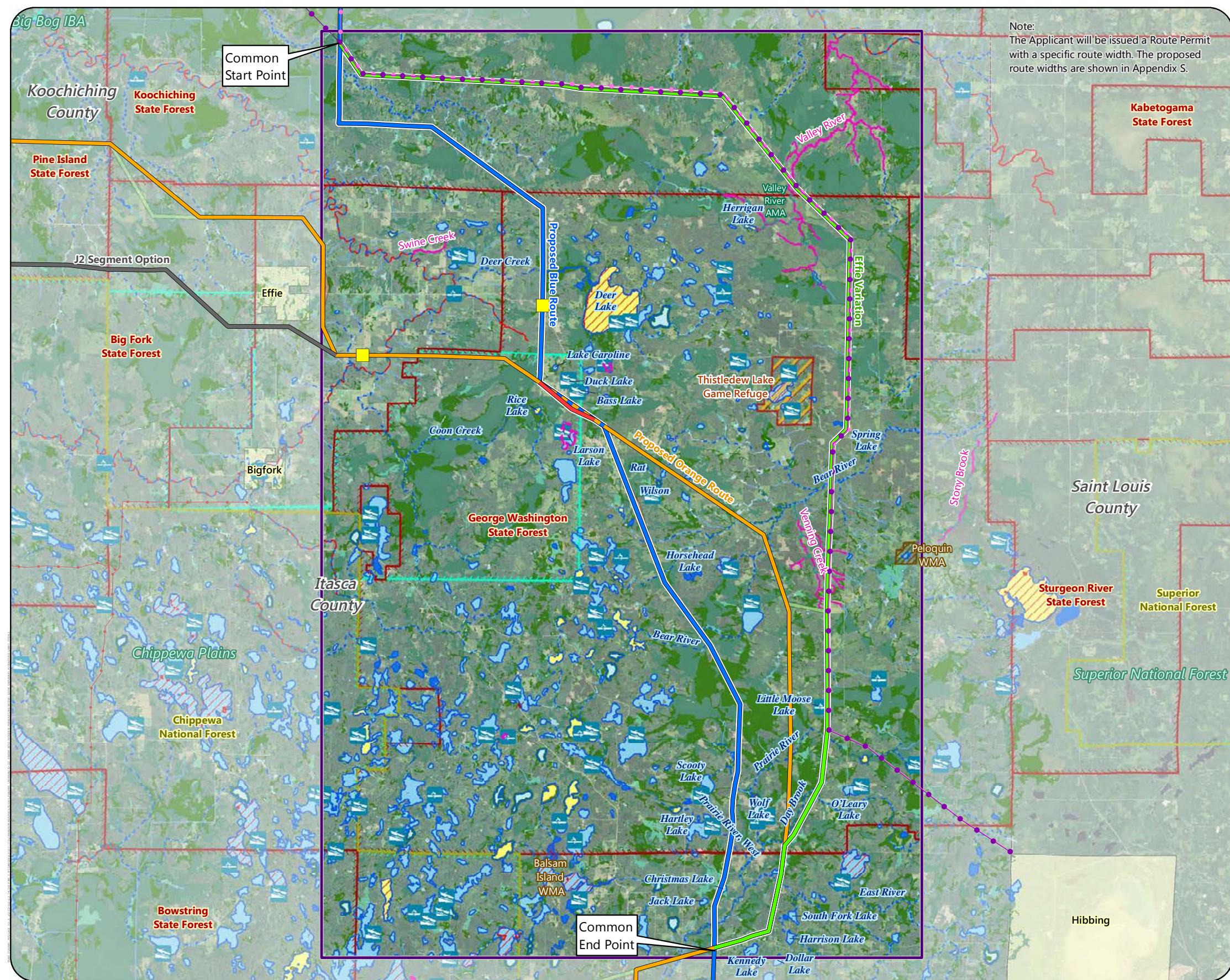
Map 6-51 Human Settlement within Effie Variation Area



Map 6-52 Cultural Resources within Effie Variation Area



Map 6-53 Water and Wildlife Resources within Effie Variation Area

**Proposed Routes**

Blue/Orange Route

Blue Route

Orange Route

Segment Option

Alternatives

Route Variation

Alignment Modification

Existing Transmission Lines

69 or 115 kV

230 kV

500 kV

Carry-In Water Access

Trailer Launch Water Access

NHD Watercourse

PWI Watercourse

Trout Stream

MPCA Impaired Stream

NHD Waterbody

PWI Waterbody

Trout Lake

MPCA Impaired Waterbody

Shallow Lake

DNR Wild Rice Lake

Aquatic Management Area

State Game Refuge

Wildlife Management Area (WMA)

National Forest Boundary

State Forest Boundary

Audubon Society Important Bird Areas

National Wetland Inventory

PAB, Freshwater Pond

PUB, Freshwater Pond & Other

PEM, Freshwater Emergent Wetland

PFO, Freshwater Forested/Shrub Wetland

PSS, Freshwater Forested/Shrub Wetland

Lake

Riverine

Miles

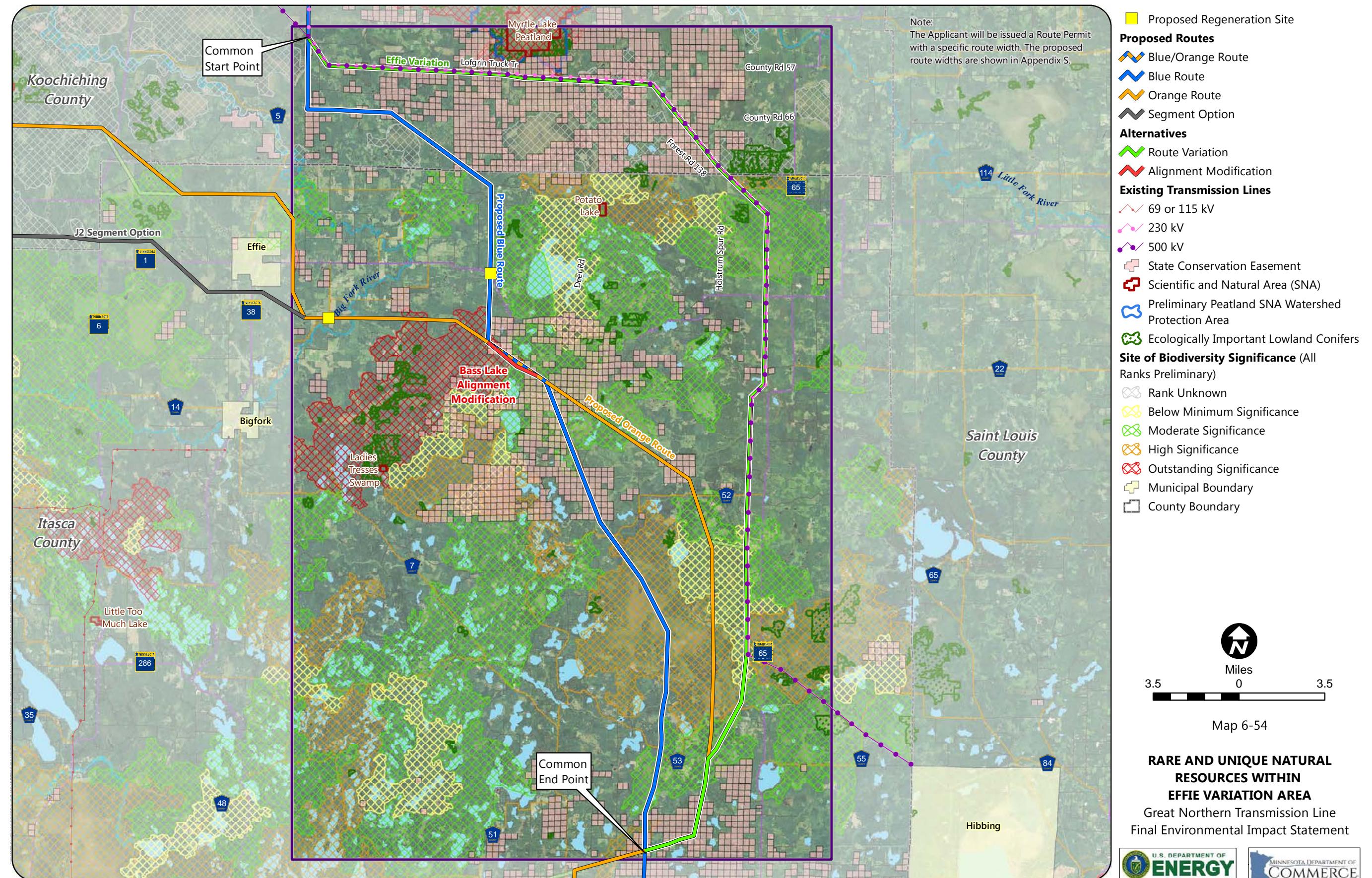
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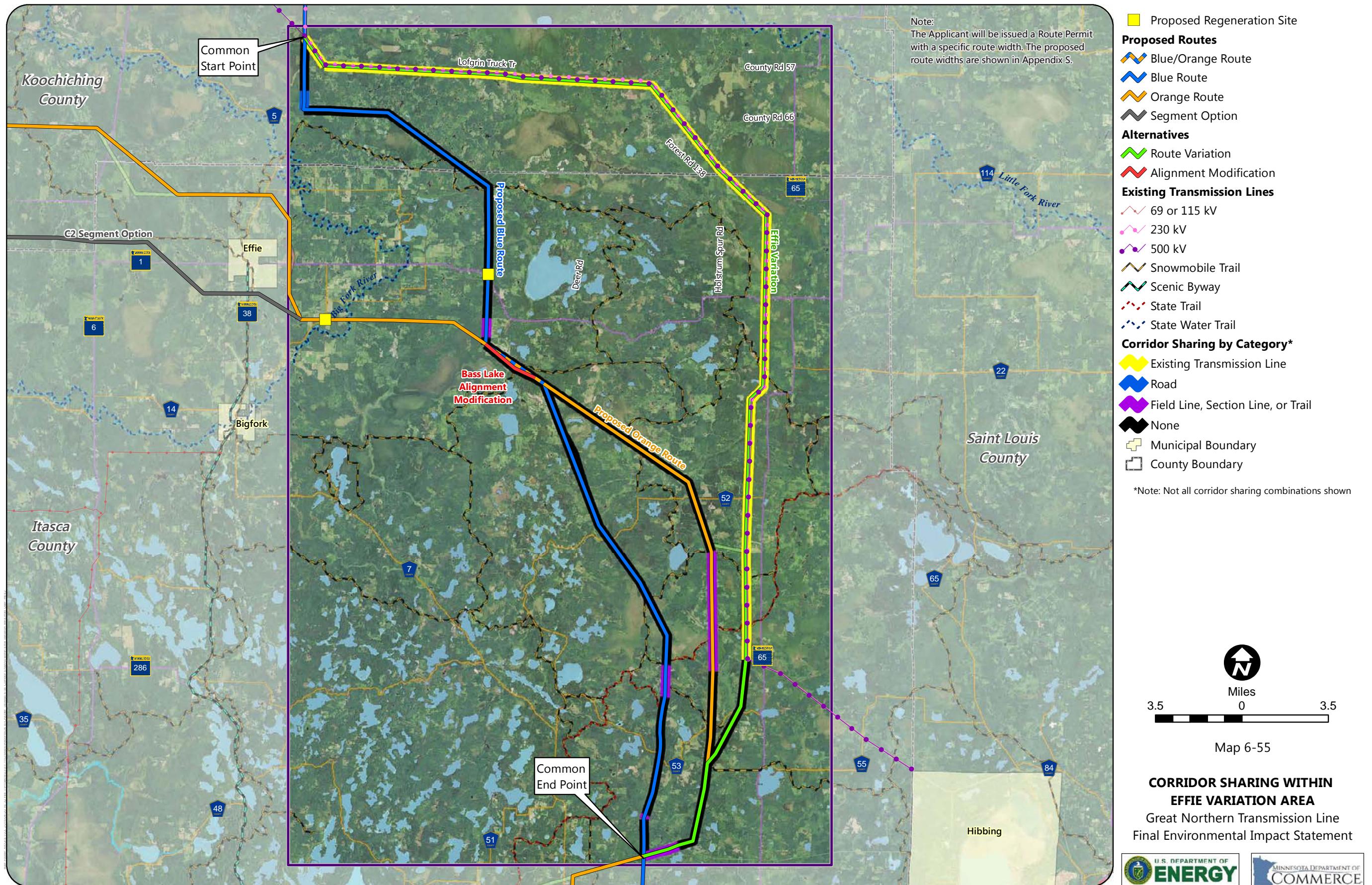
Map 6-53

**WATER AND WILDLIFE RESOURCES
WITHIN EFFIE VARIATION AREA**Great Northern Transmission Line
Final Environmental Impact Statement

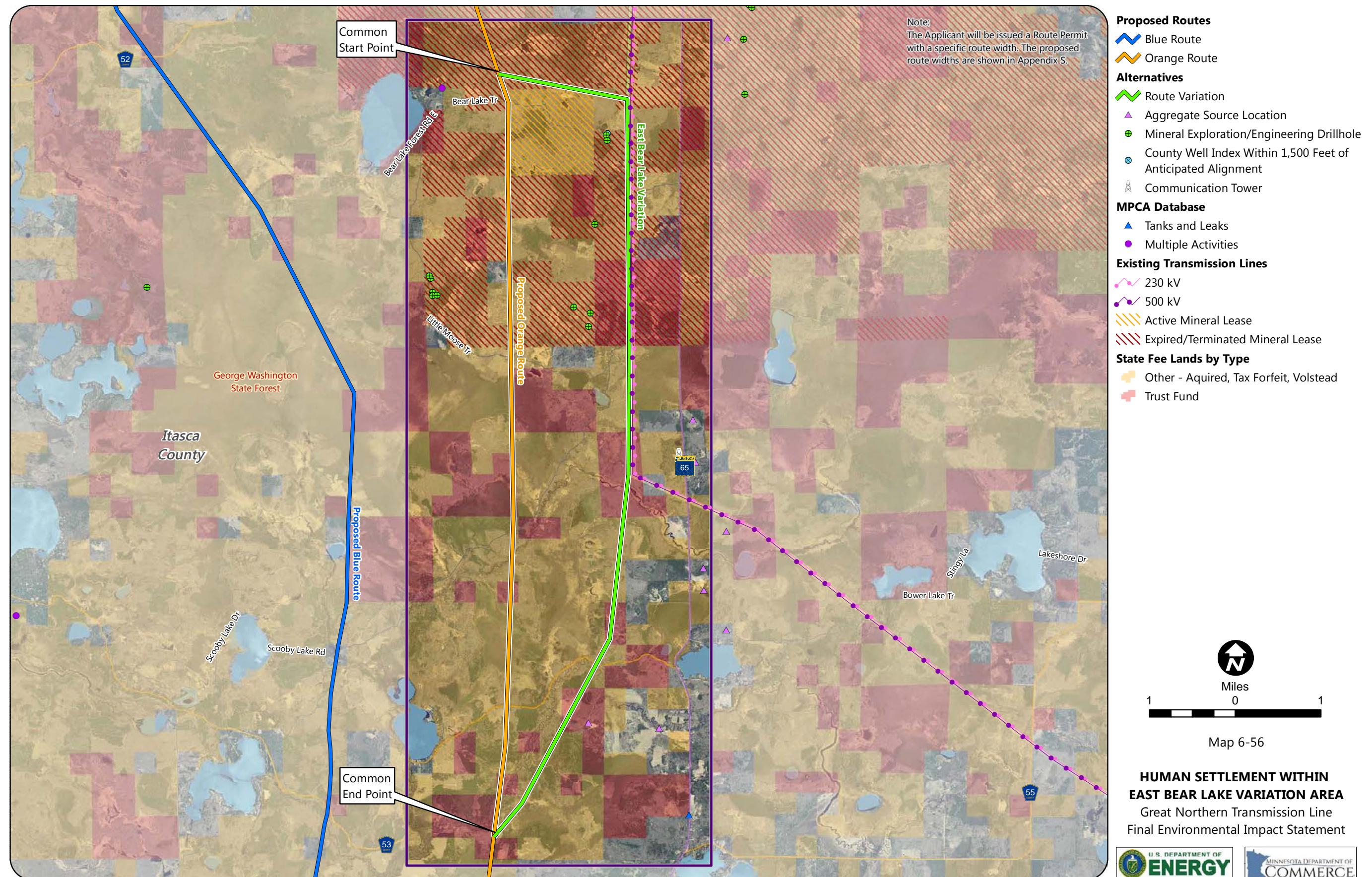
Map 6-54 Rare and Unique Natural Resources within Effie Variation Area



Map 6-55 Corridor Sharing within Effie Variation Area



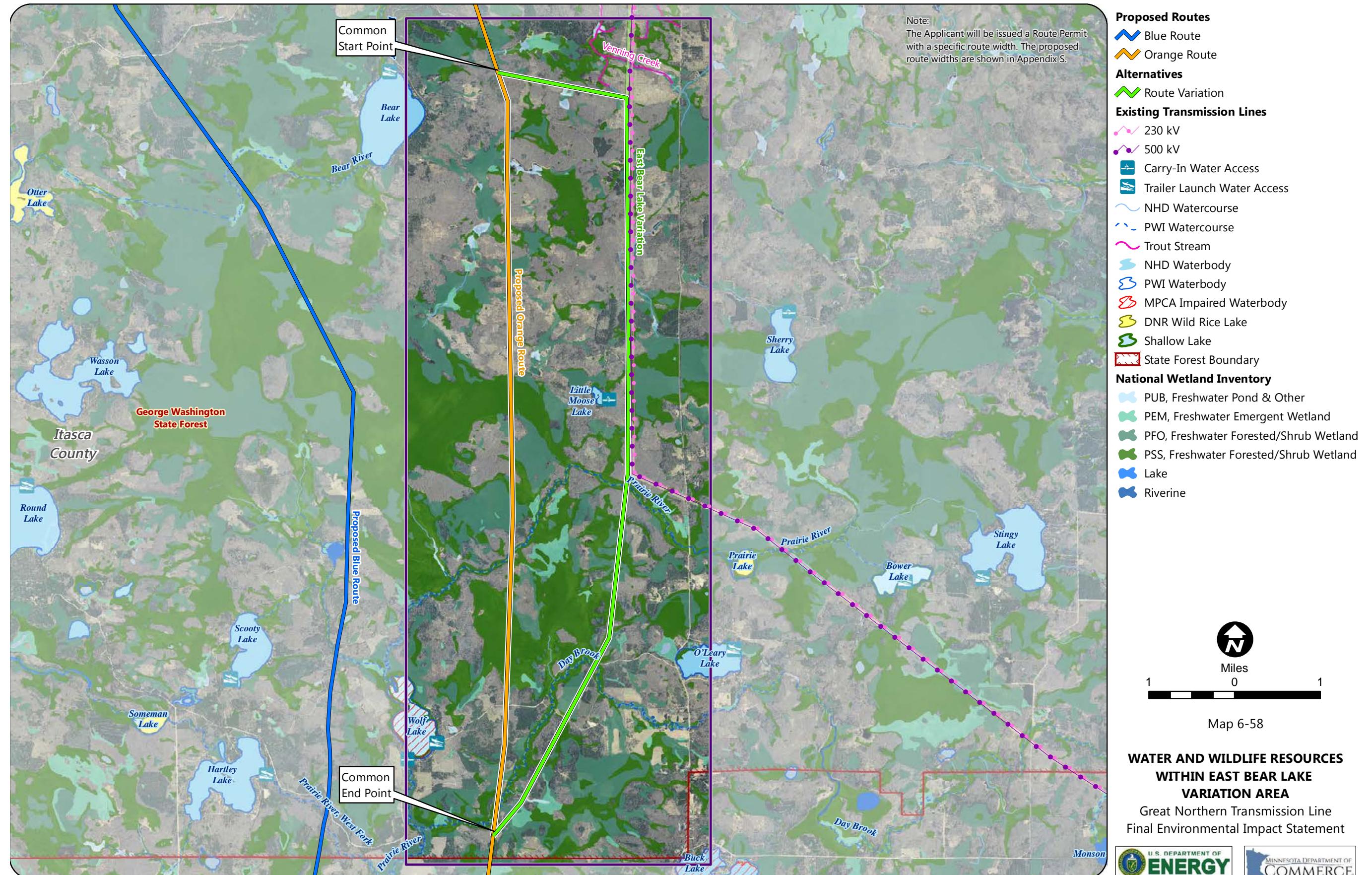
Map 6-56 Human Settlement within East Bear Lake Variation Area



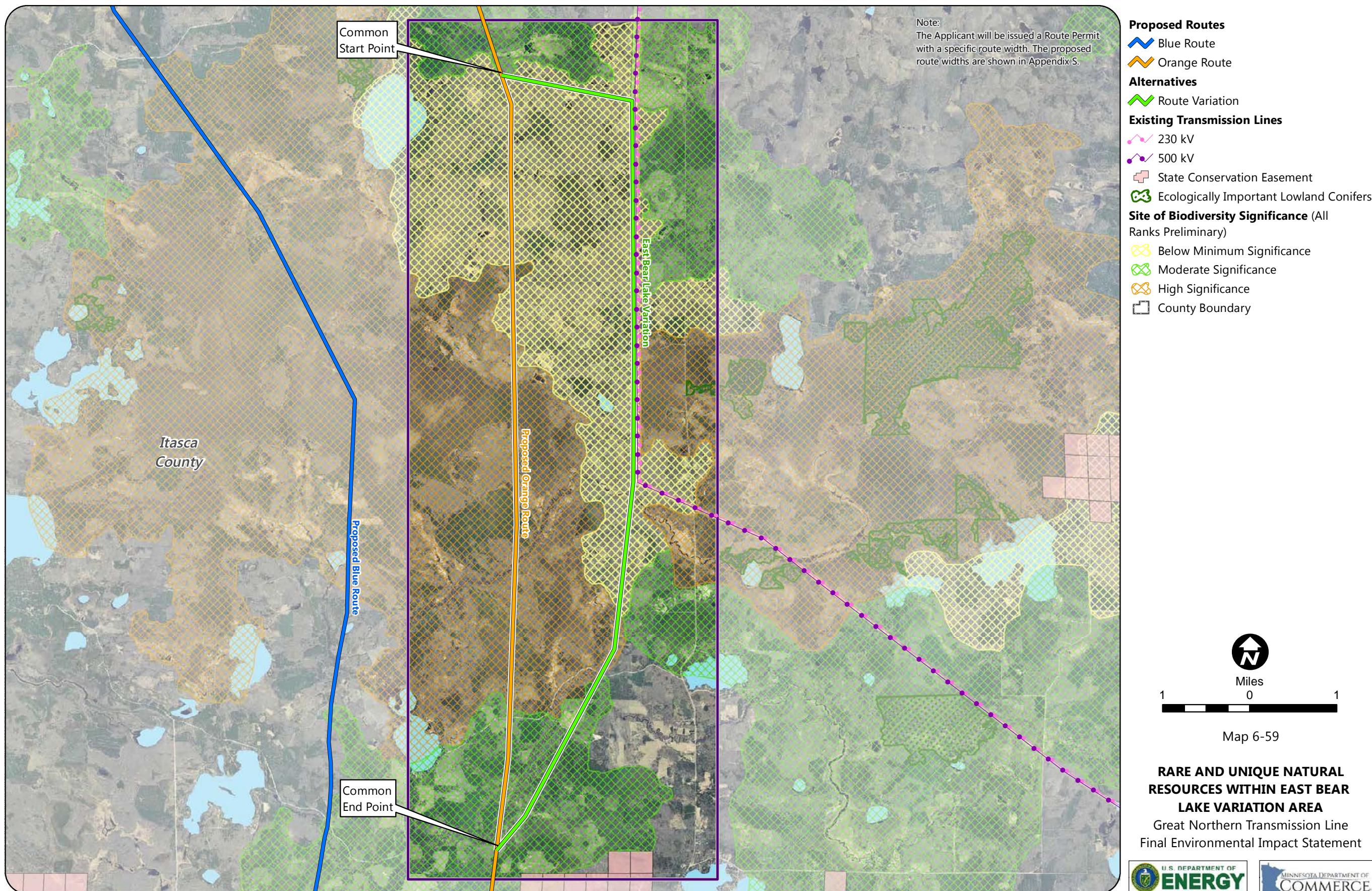
Map 6-57 Cultural Resources within East Bear Lake Variation Area



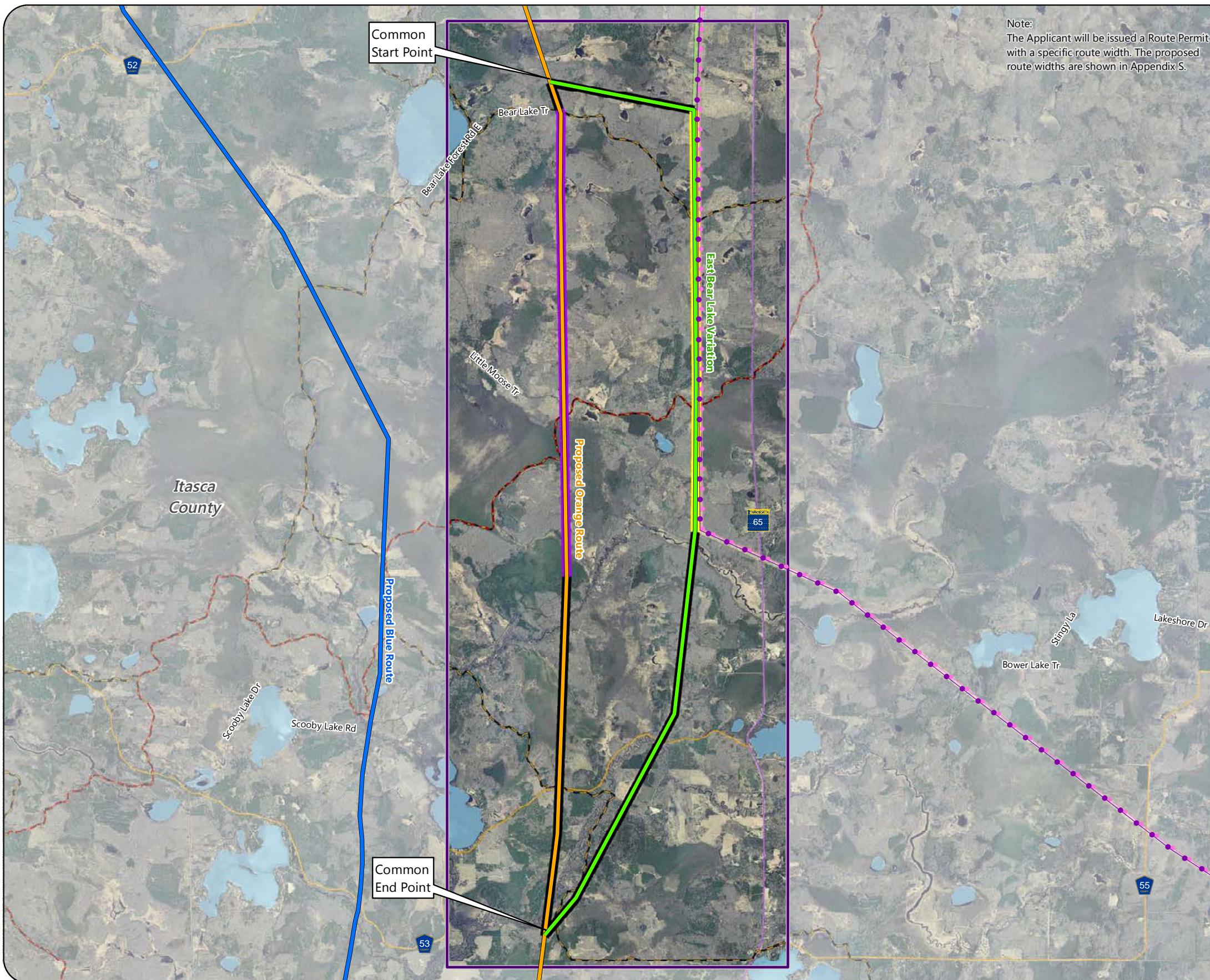
Map 6-58 Water and Wildlife Resources within East Bear Lake Variation Area



Map 6-59 Rare and Unique Natural Resources within East Bear Lake Variation Area



Map 6-60 Corridor Sharing within East Bear Lake Variation Area



Proposed Routes

Blue Route

Orange Route

Alternatives

Route Variation

Existing Transmission Lines

230 kV

500 kV

Snowmobile Trail

State Trail

Corridor Sharing by Category*

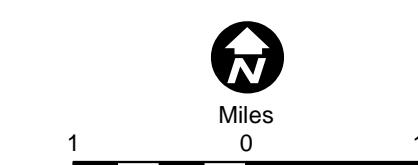
Existing Transmission Line

Field Line, Section Line, or Trail

None

County Boundary

*Note: Not all corridor sharing combinations shown



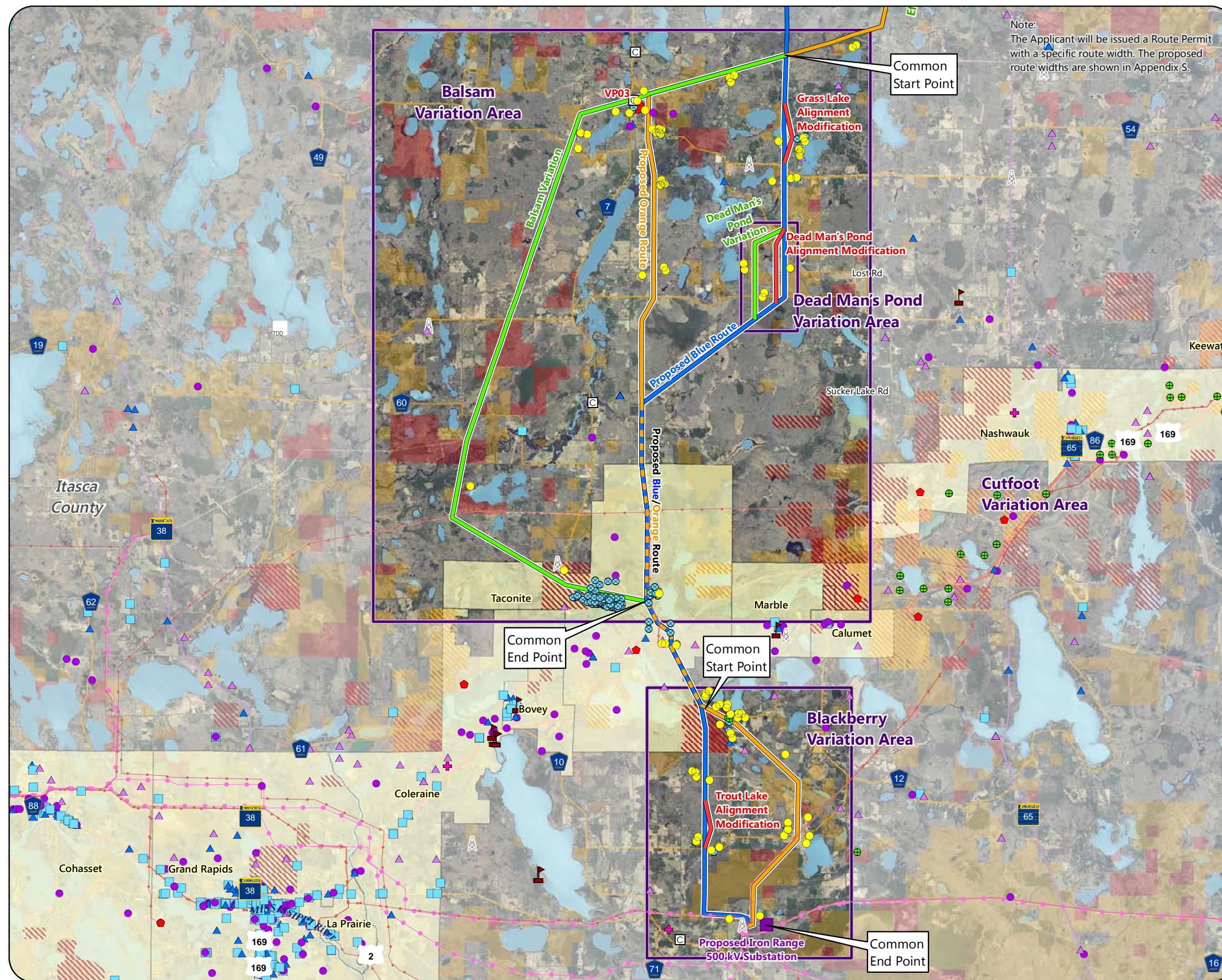
Map 6-60

**CORRIDOR SHARING WITHIN
EAST BEAR LAKE VARIATION AREA**

Great Northern Transmission Line
Final Environmental Impact Statement



Map 6-61 Human Settlement within Balsam, Dead Man's Pond, and Blackberry Variation Areas



- Visual Simulation Viewpoint
- Proposed Iron Range 500 kV Substation

Proposed Routes

- Blue/Orange Route
- Blue Route
- Orange Route

Alternatives

- Route Variation
- Alignment Modification
- School
- Residences Within 1,500 Feet of Anticipated Alignment
- Church
- Cemetery
- Aggregate Source Location
- Mineral Exploration/Engineering Drillhole
- County Well Index Within 1,500 Feet of Anticipated Alignment
- Communication Tower

MPCA Database

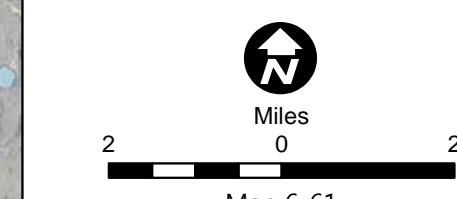
- Hazardous Waste
- Investigation and Cleanup
- Tanks and Leaks
- Multiple Activities

Existing Transmission Lines

- 69 or 115 kV
- 230 kV
- Active Mineral Lease
- Expired/Terminated Mineral Lease

State Fee Lands by Type

- Other - Acquired, Tax Forfeit, Volstead
- Trust Fund
- Municipal Boundary

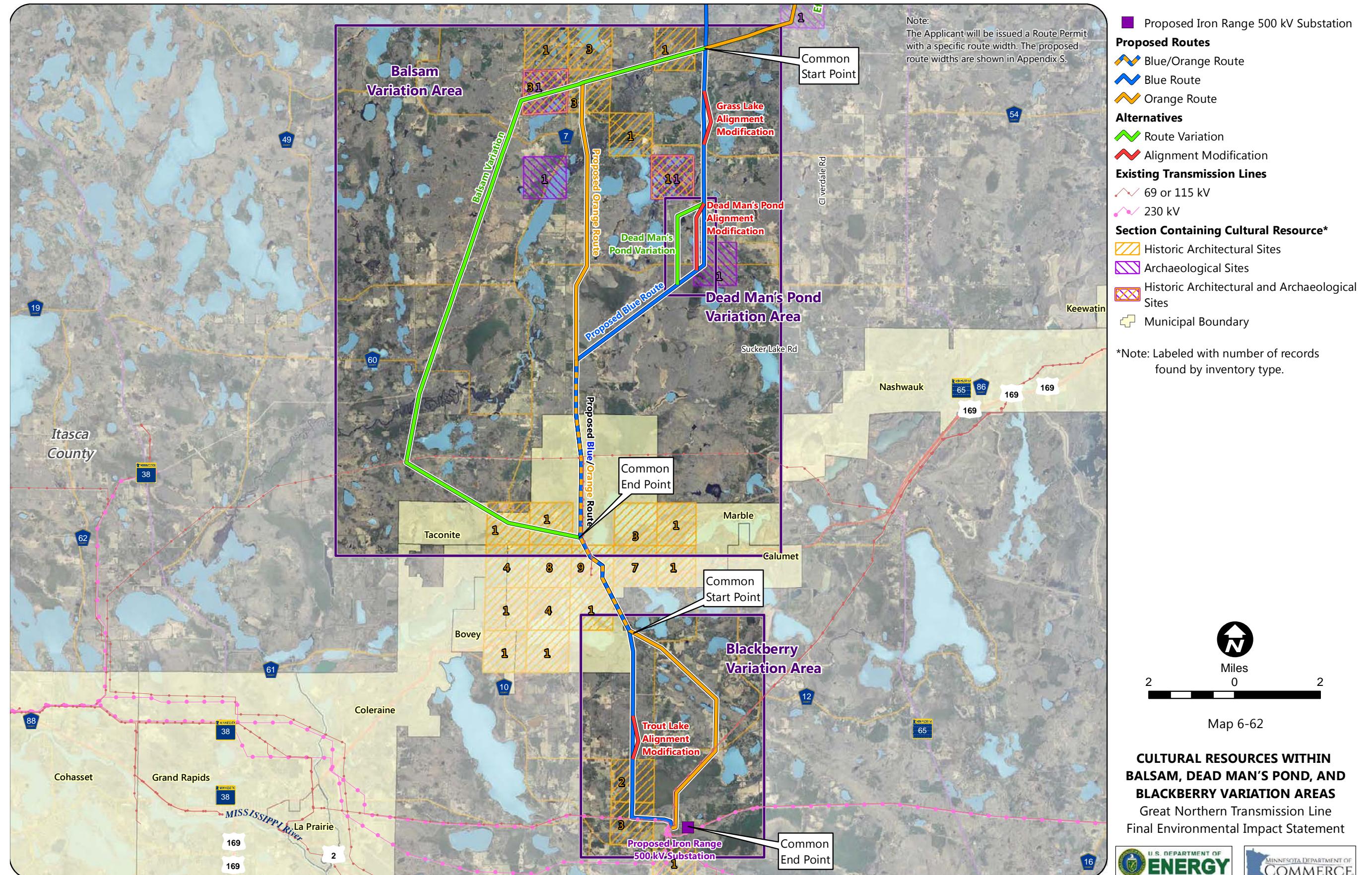


HUMAN SETTLEMENT WITHIN BALSAM, DEAD MAN'S POND, AND BLACKBERRY VARIATION AREAS

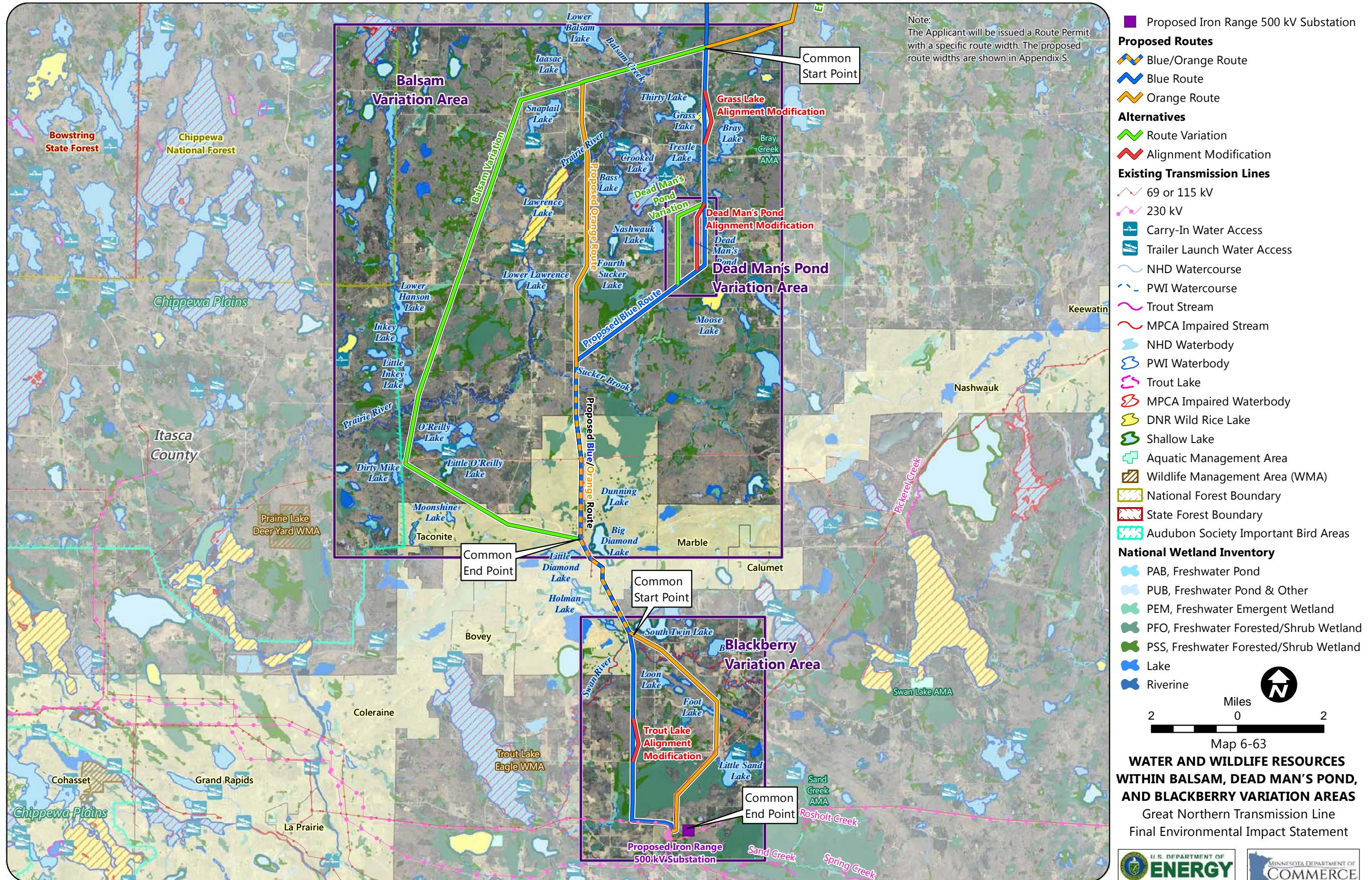
Great Northern Transmission Line
Final Environmental Impact Statement



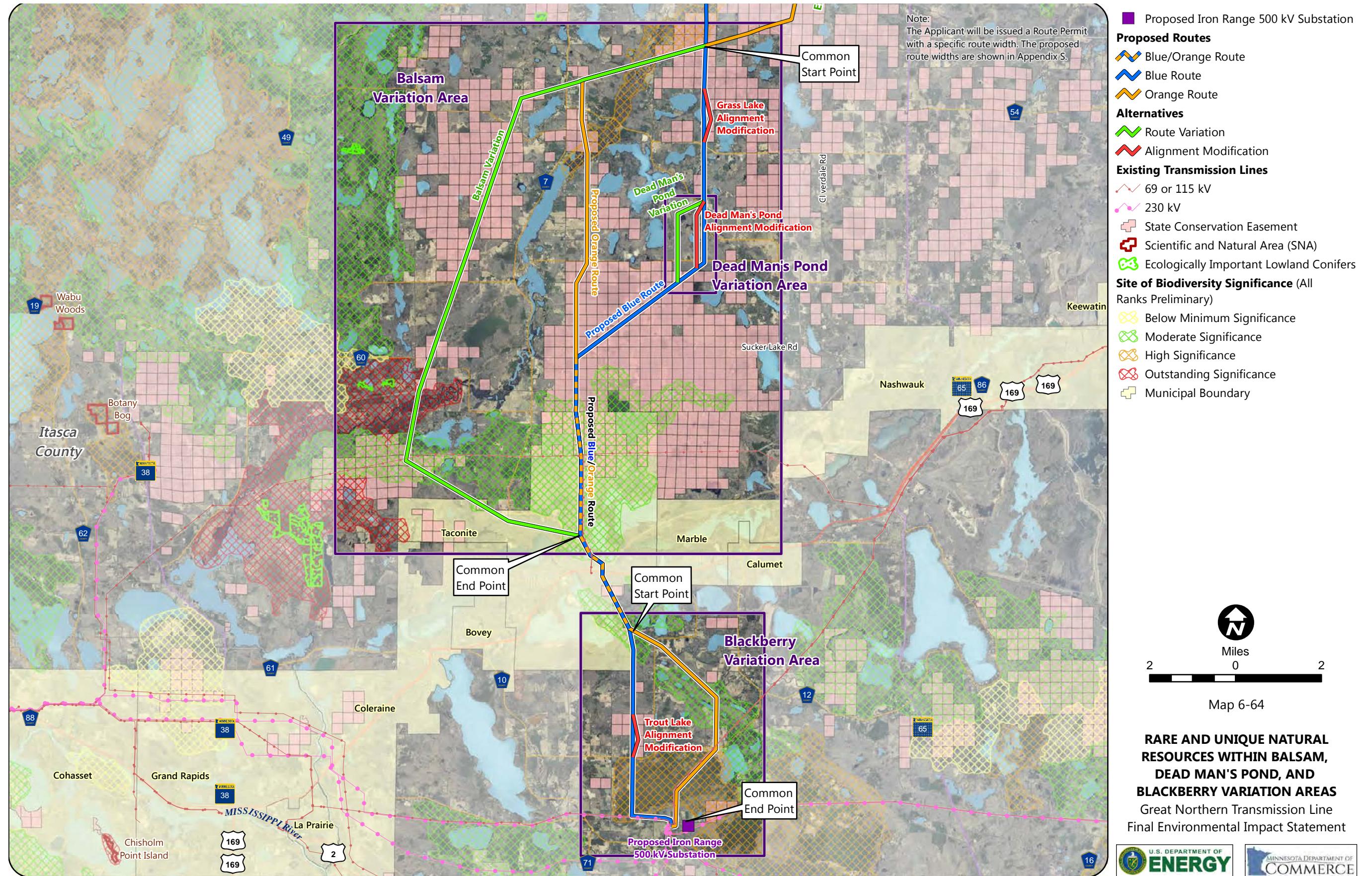
Map 6-62 Cultural Resources within Balsam, Dead Man's Pond, and Blackberry Variation Areas



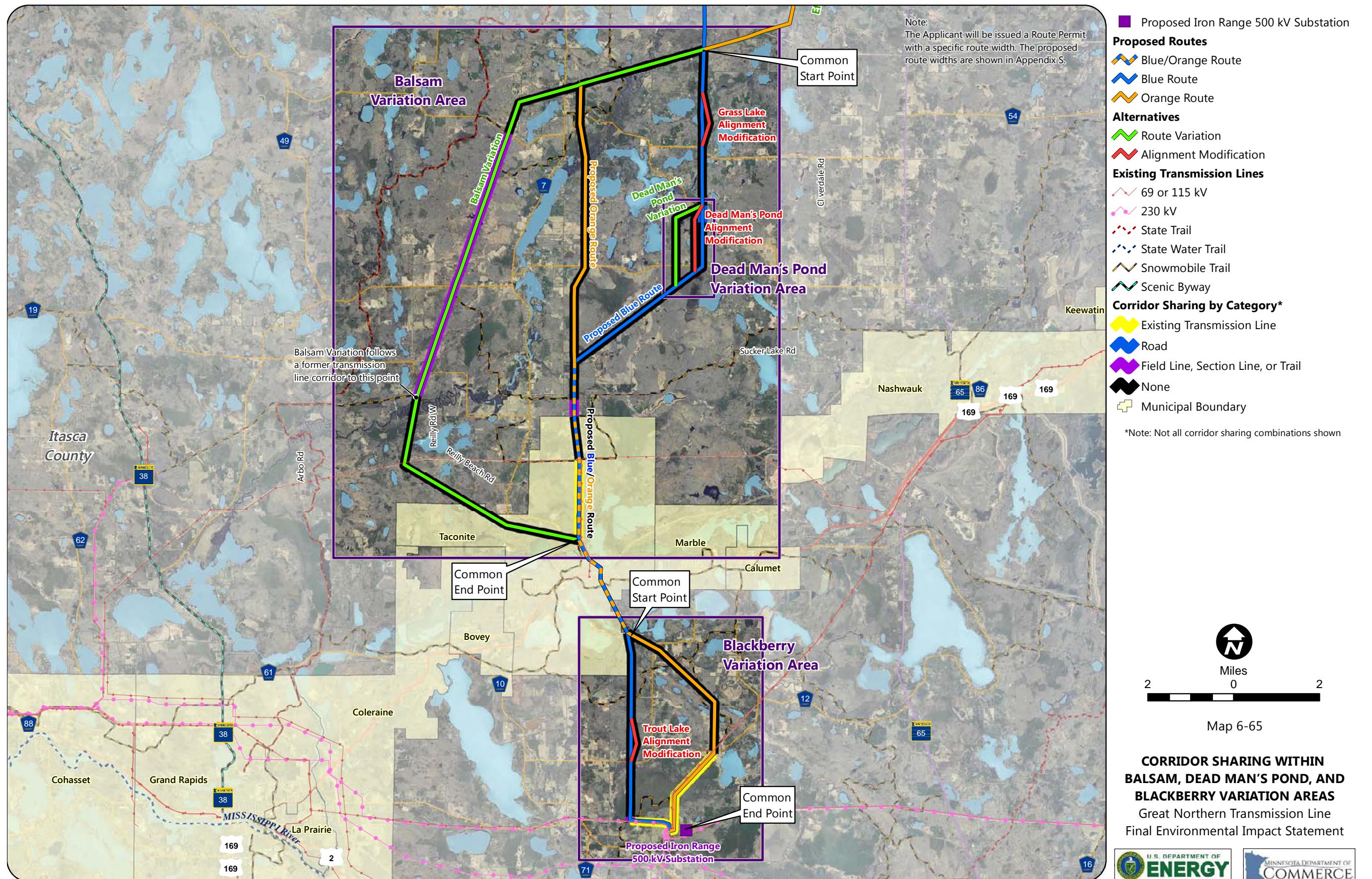
Map 6-63 Water and Wildlife Resources within Balsam, Dead Man's Pond, and Blackberry Variation Areas



Map 6-64 Rare and Unique Natural Resources within Balsam, Dead Man's Pond, and Blackberry Variation Areas



Map 6-65 Corridor Sharing within Balsam, Dead Man's Pond, and Blackberry Variation Areas



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6.5 Alignment Modifications

Minor adjustments to the proposed anticipated alignment within a given route or route alternative (i.e., alignment modifications), were proposed during the scoping period as described in Section 4.3. The purpose for each alignment modification is to avoid a specific issue raised by the commenters (e.g., sensitive lands, houses, following existing corridors). In the sections that follow, only the issues that differ between the proposed route and the alignment modification are described. Specific alignment modifications may be incorporated in the MN PUC Route Permit as a special condition should the MN PUC find they are warranted. Details for all the alignment modifications are provided in Appendix E.

6.5.1 West Section

There are no alignment modifications identified in the West Section.

6.5.2 Central Section

There are four alignment modifications proposed for the Central Section: Silver Creek WMA, Airstrip, Mizpah, and Gravel Pit (Map 4-8). These alignment modifications are described below in sections 6.5.2.1 through 6.5.2.4.

6.5.2.1 Silver Creek WMA Alignment Modification

The Silver Creek WMA Alignment Modification is located in the north-central portion of the Pine Island Variation Area (Map 4-9). The alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-4, Map 6-66). The Proposed Blue Route follows the south side of the existing 230 kV transmission line, which parallels the southern edge of the USFWS Interest Lands and the Silver Creek WMA. Land ownership includes private, state forest, and federal lands.

The Silver Creek WMA Alignment Modification shifts the anticipated alignment approximately 150 feet south onto state forest land and avoids impacts to federal land and the Silver Creek WMA. The alignment modification does not parallel an existing corridor like the Proposed Blue Route so would require creation of new corridor for its entire length (Map 6-66). Because of this, the alignment modification would result in more fragmentation of intact state forest.

6.5.2.2 Airstrip Alignment Modification

The Airstrip Alignment Modification is located in the east portion of the C2 Segment Option Variation Area (Map 4-12). This alignment modification is the same length as the comparable segment of the Proposed C2 Segment Option Route (Table 4-4, Map 6-67). The Proposed C2 Segment Option Route follows the west side of the existing 230 kV transmission line for over half of its length. Land ownership includes private, corporate, county-administered state, and state trust lands.

The Airstrip Alignment Modification shifts the anticipated alignment approximately 725 feet west to avoid impacts to the private airstrip located east of the existing 230 kV transmission line. The height of the proposed transmission line would be taller than the existing 230 kV transmission line and located northwest of the north end of the airstrip, so use of the airstrip may be affected since it has a northwest/southeast orientation. This alignment modification would be located approximately 1,000 feet west of the existing 230 kV transmission line so would provide additional distance for use of the airstrip (Map 6-67). Land ownership remains the same mix of private and state lands as described for the Proposed C2 Segment Option Route.

6.5.2.3 Mizpah Alignment Modification

The Mizpah Alignment Modification is located in the northwest portion of the J2 Segment Option Variation Area (Map 4-13). This alignment modification is the same length as the comparable segment of the Proposed Orange Route (Table 4-4, Map 6-68). Land ownership includes both private, county-administered state, and state forest lands.

The Mizpah Alignment Modification shifts the anticipated alignment north from a mix of private and state lands onto only state lands. Both the Proposed Orange Route and this alignment modification would require creation of new corridor for their entire length (Map 6-68). Because of this, both options would result in fragmentation of intact forest.

6.5.2.4 Gravel Pit Alignment Modification

The Gravel Pit Alignment Modification is located in the southeast portion of the J2 Variation Area (Map 4-13). This alignment modification is the same length as the comparable segment of the Proposed Orange Route (Table 4-4, Map 6-69). The Proposed Orange Route includes an existing private gravel pit and the existing Effie dump (MPCA State Assessment Site SA7836) within 100 feet of the west edge of the ROW (Map 6-69). Land ownership

includes private, corporate, county-administered state, and state fee lands.

The Gravel Pit Alignment Modification shifts the anticipated alignment approximately 750 feet east to avoid impacts to the private gravel pit and no privately-owned land would be located within the ROW. In addition, the Effie dump would be located more than 100 feet west and outside of the ROW (Map 6-69). Land ownership includes corporate, county-administered state, and state fee lands.

6.5.3 East Section

There are five alignment modifications proposed for the East Section: Bass Lake, Wilson Lake, Grass Lake, Dead Man's Pond, and Trout Lake (Map 4-14). These alignment modifications are described below in Section 6.5.3.1 through Section 6.5.3.5.

6.5.3.1 Bass Lake Alignment Modification

The Bass Lake Alignment Modification is located in the central portion of the Effie Variation Area (Map 4-15). This alignment modification is slightly longer (0.1 mile) than the comparable segment of the Proposed Blue/Orange Route (Table 4-5, Map 6-70). The Larson Lake State Forest Campground (George Washington State Forest) is located south of the Proposed Blue/Orange Route on the west side of Larson Lake. The Bass Lake County Park and Campground (managed by the Itasca County Land Department Park System, Grand Rapids, Minnesota) is located to the north of the Proposed Blue/Orange Route and surrounds Bass Lake. The Proposed Blue/Orange Route crosses lands designated as Outstanding Rank for the Preliminary MBS Sites of Biodiversity Significance (for more details, see Section 6.4.1). Land ownership includes corporate and state forest lands.

The Bass Lake Alignment Modification shifts the anticipated alignment approximately 750 feet southwest and away from the Bass Lake Itasca County Park (which includes a campground); however, it shifts the alignment closer to the Larson Lake State Forest campground (Map 6-70). This alignment modification crosses lands designated as Outstanding Rank for the Preliminary MBS Sites of Biodiversity Significance (for more details, see Section 6.4.1). Land ownership includes slightly more state land and less private corporate land compared to the Proposed Blue/Orange Route.

6.5.3.2 Wilson Lake Alignment Modification

The Wilson Lake Alignment Modification is located in the central portion of the Effie Variation Area

(Map 4-15). This alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-5, Map 6-71). The Proposed Blue Route crosses lands designated as Moderate Rank for the Preliminary MBS Sites of Biodiversity Significance (for more details, see Section 6.4.1). Land ownership includes corporate and state forest.

The Wilson Lake Alignment Modification shifts the anticipated alignment approximately 500 feet east from corporate and state forest lands onto an alignment with a greater percentage of state forest land (Map 6-71). This alignment modification crosses lands designated as Moderate Rank for the Preliminary MBS Sites of Biodiversity Significance (for more details, see Section 6.4.1).

6.5.3.3 Grass Lake Alignment Modification

The Grass Lake Alignment Modification is located in the northeast portion of the Balsam Variation Area (Map 4-17). The alignment modification is the same length as Proposed Blue Route (Table 4-5, Map 6-72). The Proposed Blue Route crosses Grass Lake, a MnDNR PWI waterbody and also a wild rice waterbody. There is one residence located within 1,000 feet west of the Proposed Blue Route, south of Grass Lake. Land ownership includes private, corporate, and county-administered state lands; part of the Proposed Blue Route follows a boundary between private and corporate lands.

The Grass Lake Alignment Modification shifts the anticipated alignment approximately 900 feet east to avoid crossing Grass Lake (Map 6-72). In addition, this alignment modification also shifts the transmission line east and away from one residence on the south end of Grass Lake, but shifts the alignment closer to six residences on the west side of Bray Lake. Land ownership includes corporate and state forest lands, and avoids private land.

6.5.3.4 Dead Man's Pond Alignment Modification

The Dead Man's Pond Alignment Modification is located in the central portion of the Dead Man's Pond Variation Area (Map 4-17). This alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-5, Map 6-73). There is one residence located east of and within 1,000 feet of the Proposed Blue Route. The Proposed Blue Route crosses and then follows the west side of CSAH 8 for about one-third of its length. Land ownership includes private, corporate, and county-administered state forest lands; part of the Proposed Blue Route follows a boundary between private and county-administered state forest lands.

The Dead Man's Pond Alignment Modification shifts the anticipated alignment approximately 1,000 feet west and away from one residence located near CSAH 8. However this modification shifts the alignment closer to two residences located along CSAH 57 and on to more private land. In addition, while this alignment modification crosses the CSAH 8 and CSHA 57, it does not parallel the highway corridors (Map 6-73). The alignment modification crosses Dead Man's Pond, a MnDNR PWI waterbody. In addition, this alignment modification crosses lands designated as Moderate Rank for the Preliminary MBS Sites of Biodiversity Significance (for more details, see Section 6.4.4). Land ownership includes more private, corporate, and county-administered state forest lands; but shifts the alignment west from the boundary between private and county-administered state forest lands onto private land.

6.5.3.5 Trout Lake Alignment Modification

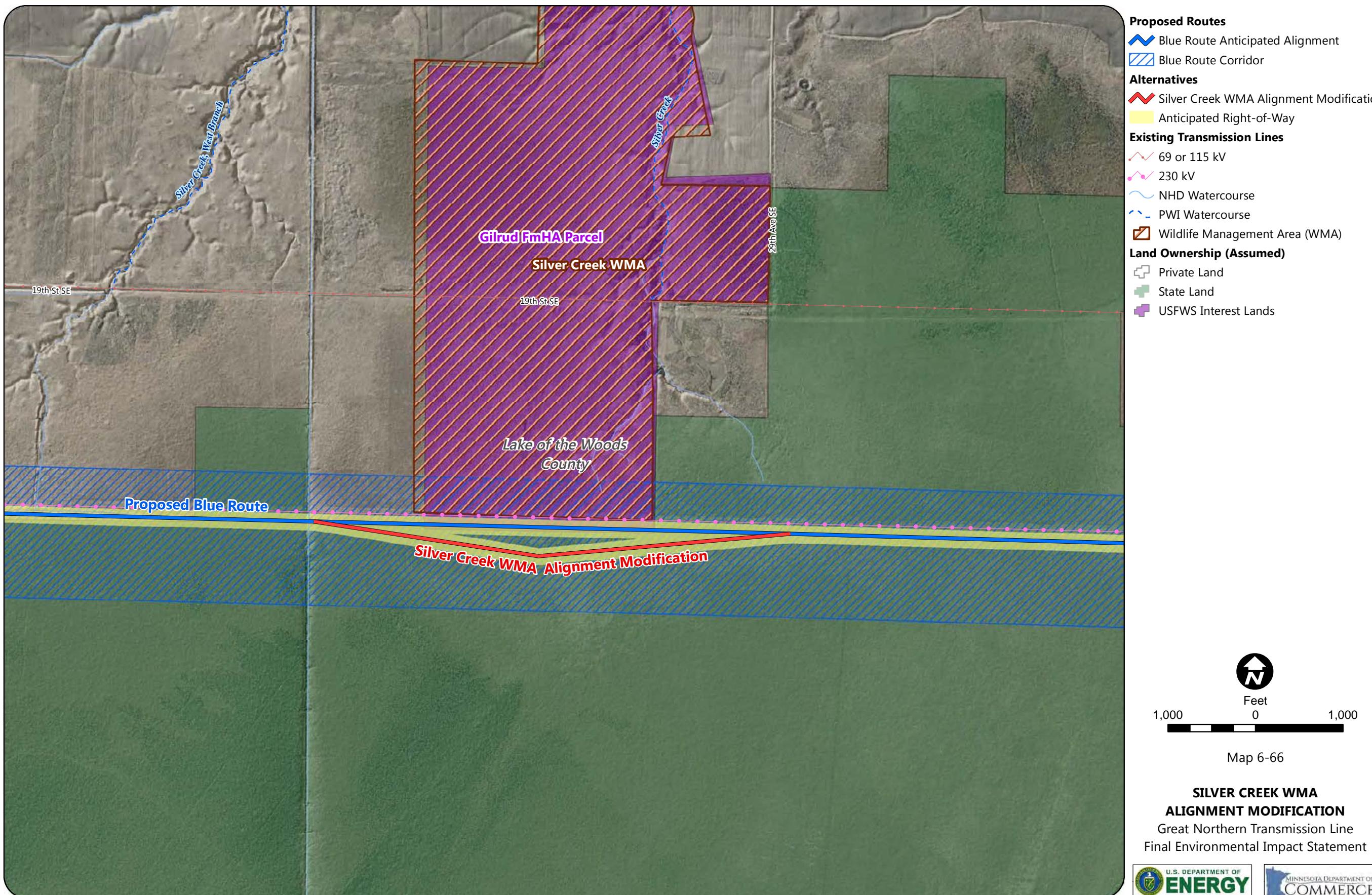
The Trout Lake Alignment Modification is located in the central portion of the Blackberry Variation Area (Map 4-17). This alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-5, Map 6-74). There are three residences within 1,000 feet of the Proposed Blue Route. For about half of its length (north end), the Proposed Blue Route crosses corporate land, and then it follows the boundary between corporate and private land.

The Trout Lake Alignment Modification shifts the anticipated alignment away from the two residences located west of the Proposed Blue Route, so only the one residence located within 1,000 feet to the southeast (south of CSAH 70) is still within 1,000 feet of this alignment (Map 6-74). Land ownership is corporate.

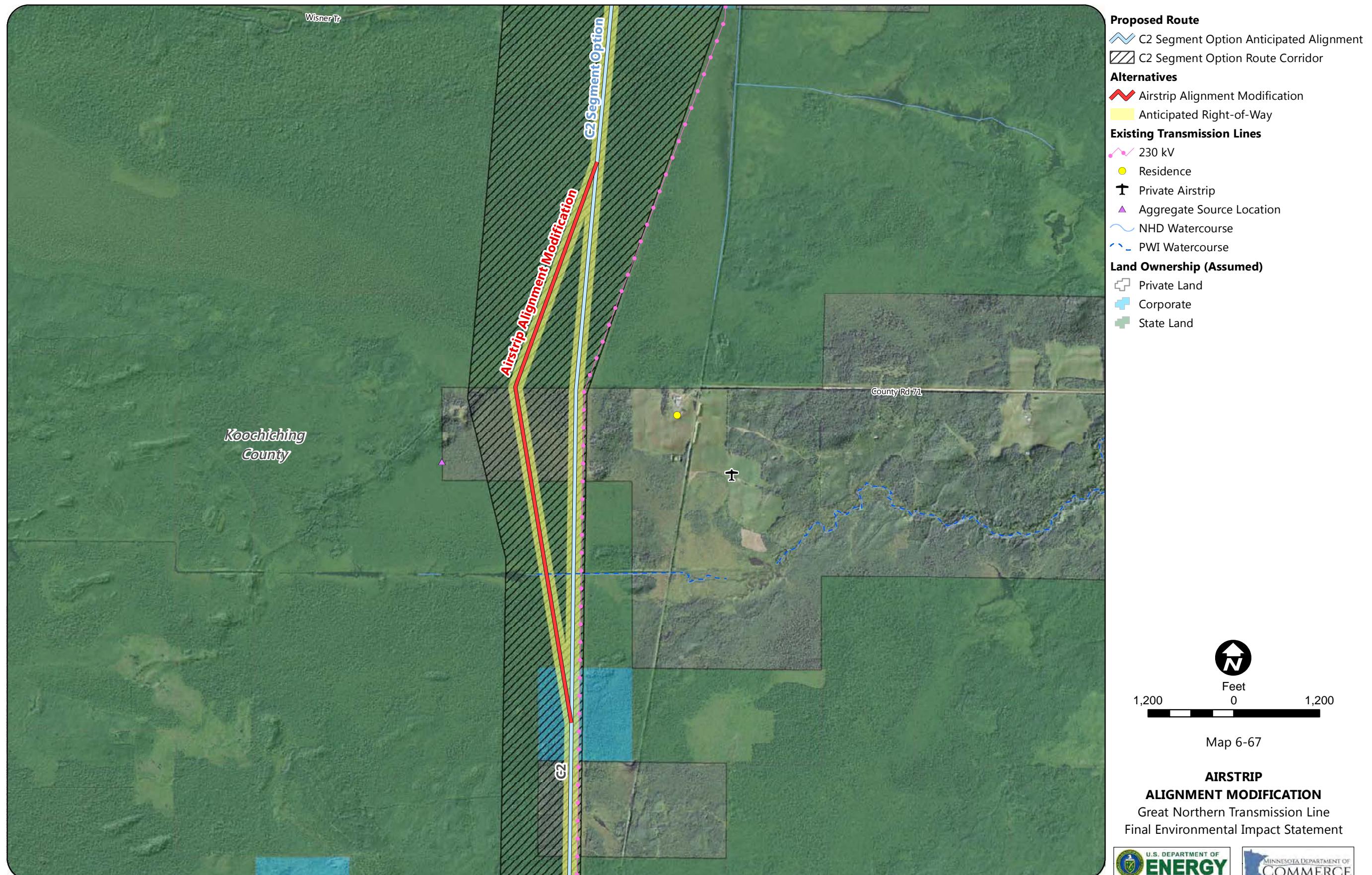
6.0 Comparative Environmental Consequences

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Map 6-66 Silver Creek WMA Alignment Modification



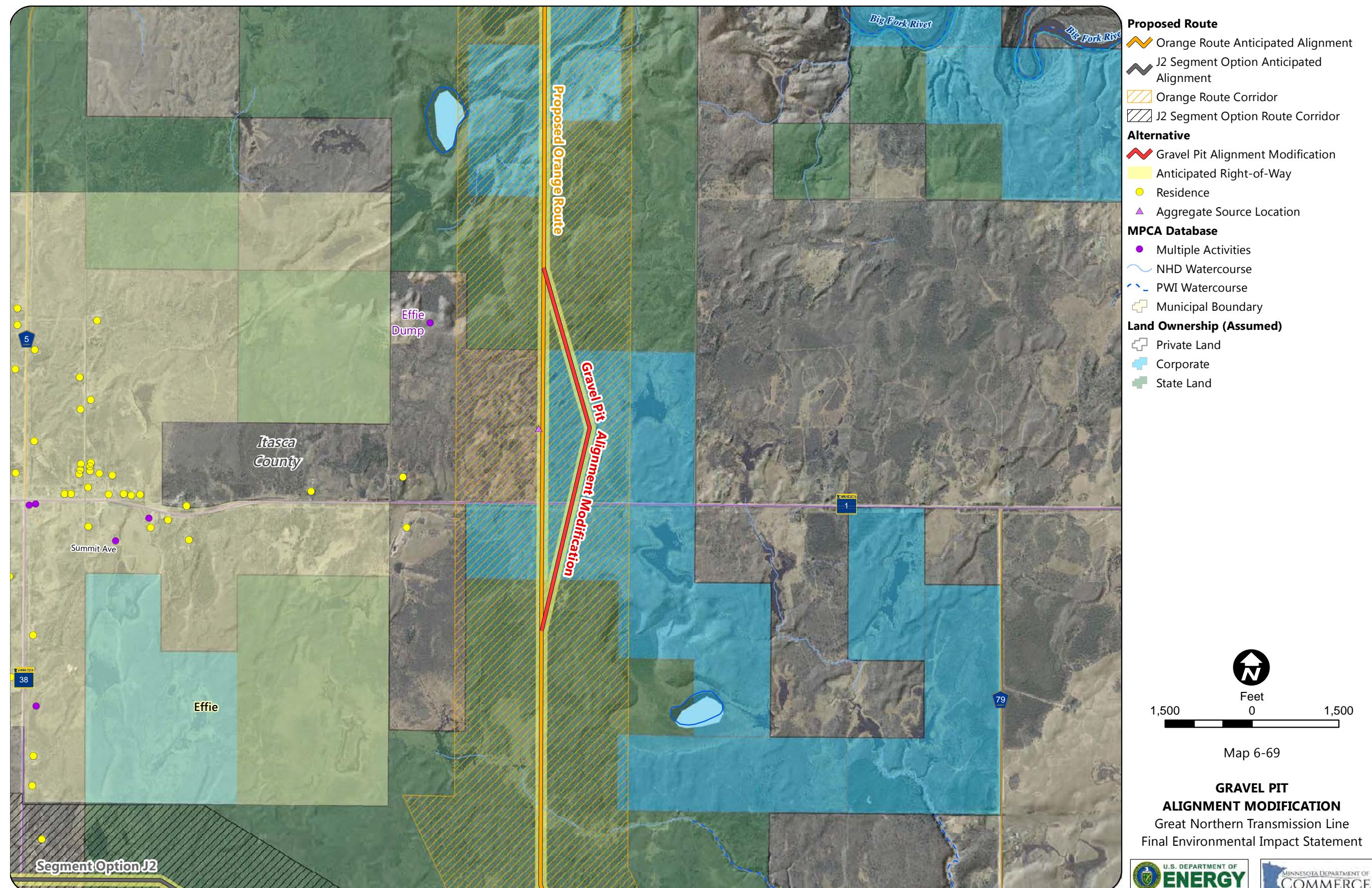
Map 6-67 Airstrip Alignment Modification



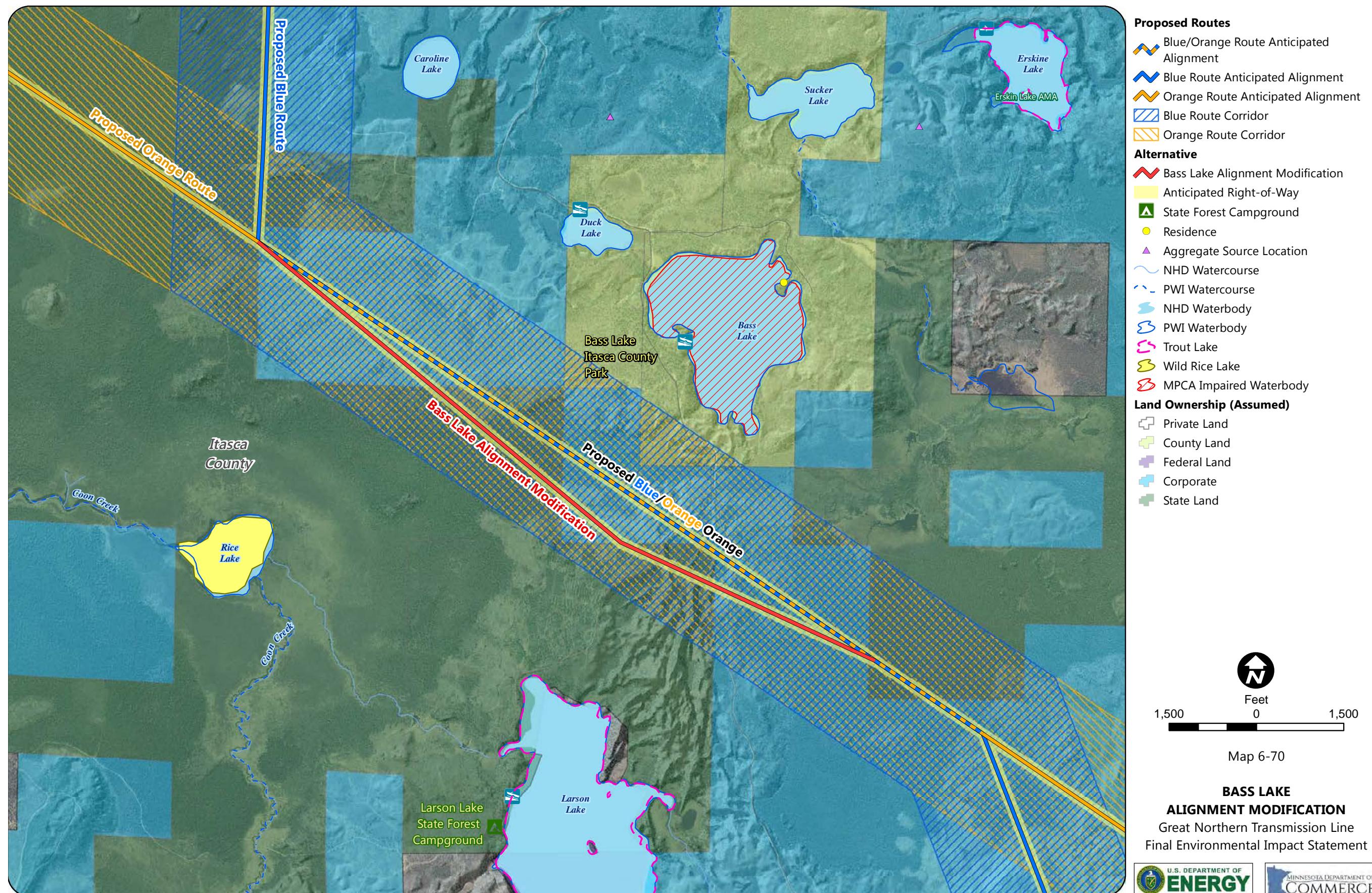
Map 6-68 Mizpah Alignment Modification



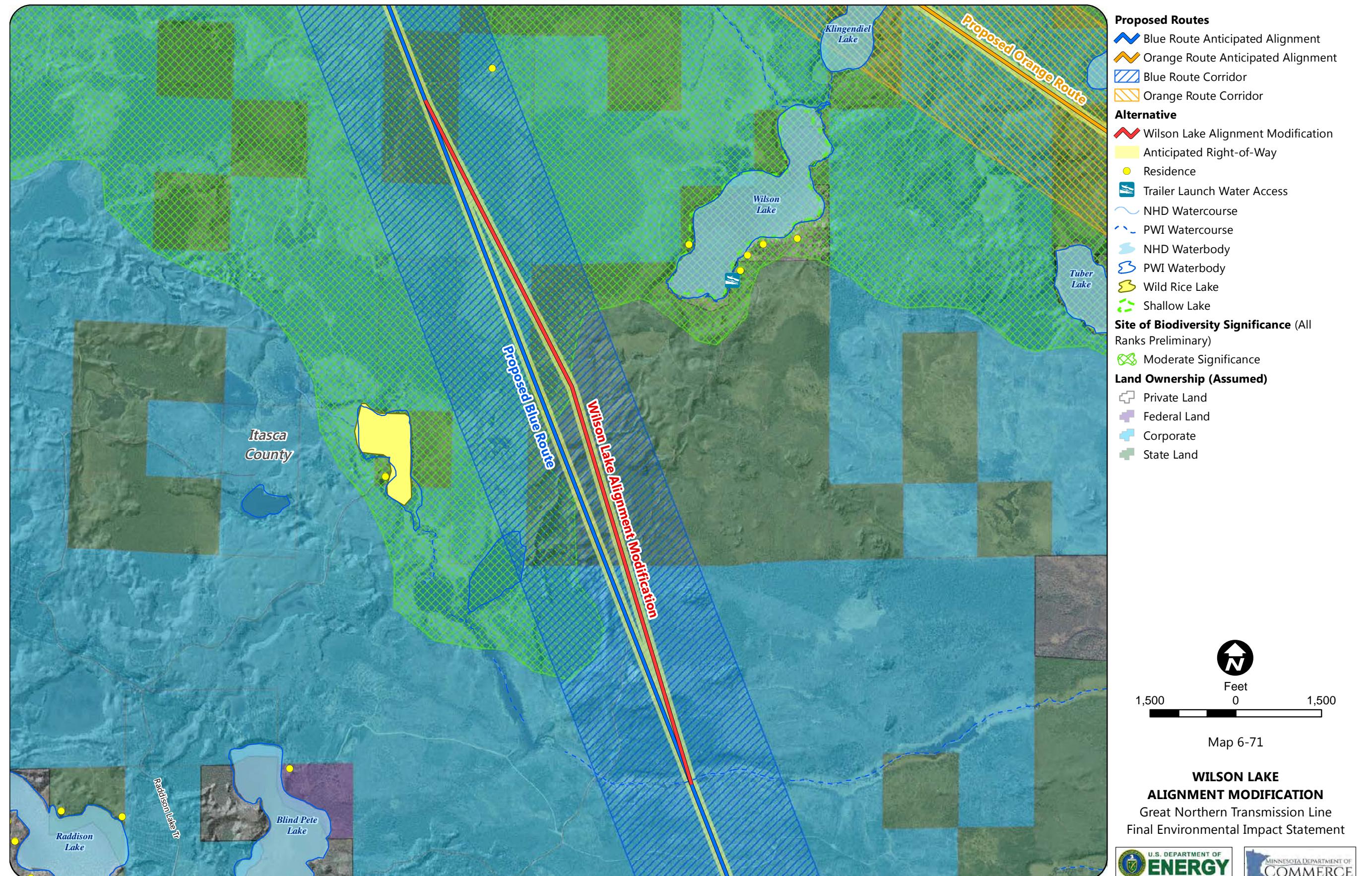
Map 6-69 Gravel Pit Alignment Modification



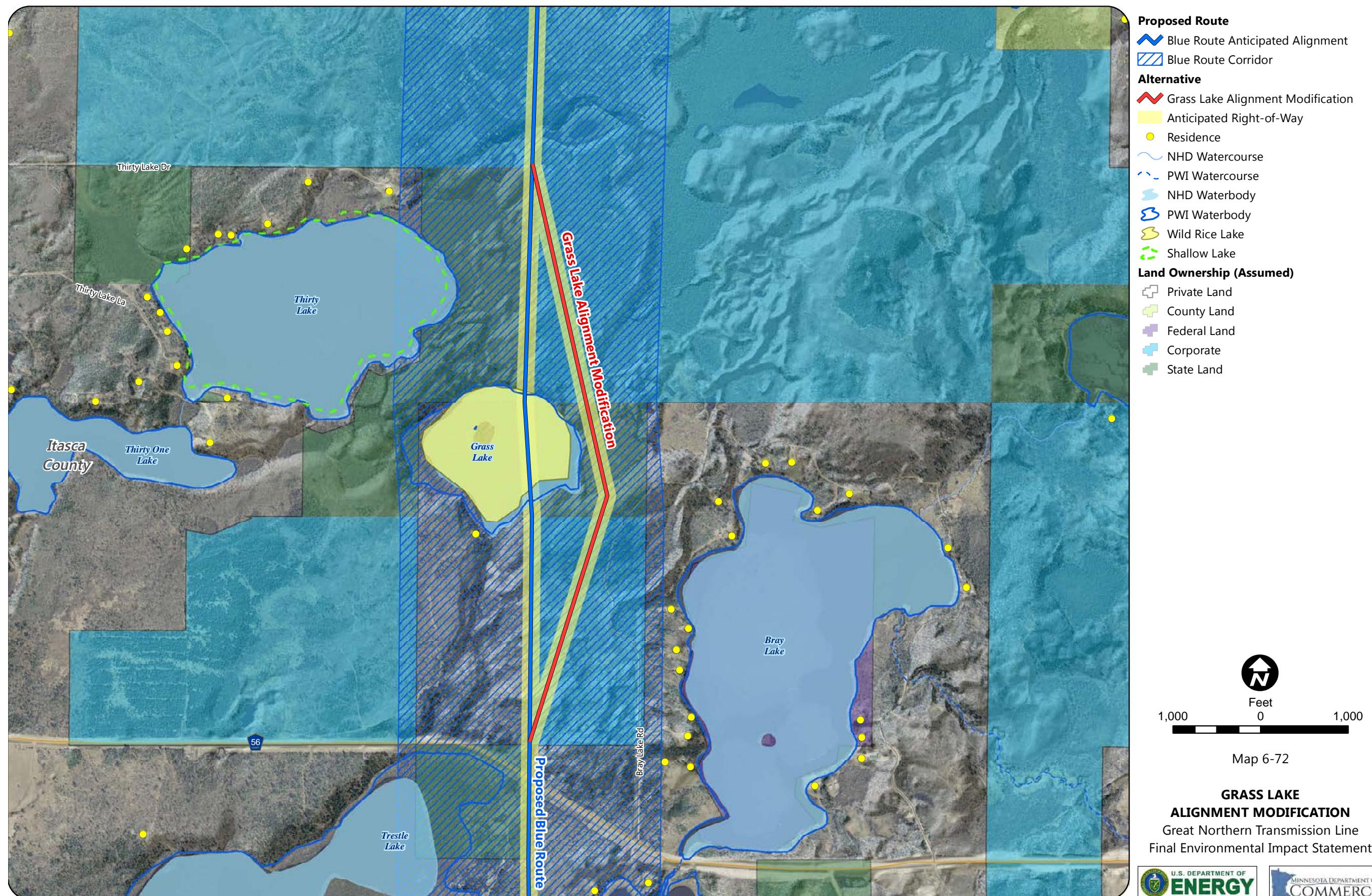
Map 6-70 Bass Lake Alignment Modification



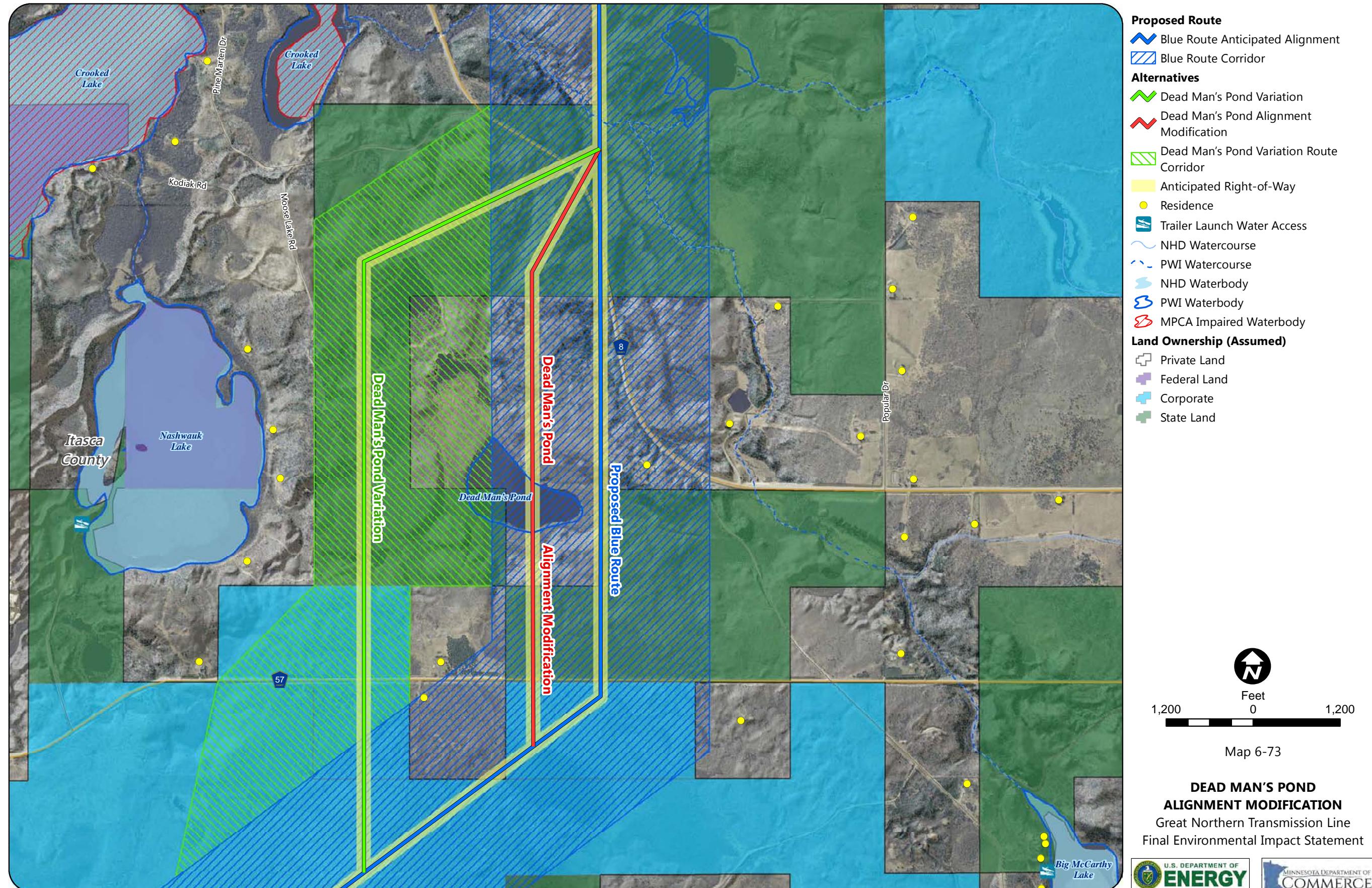
Map 6-71 Wilson Lake Alignment Modification



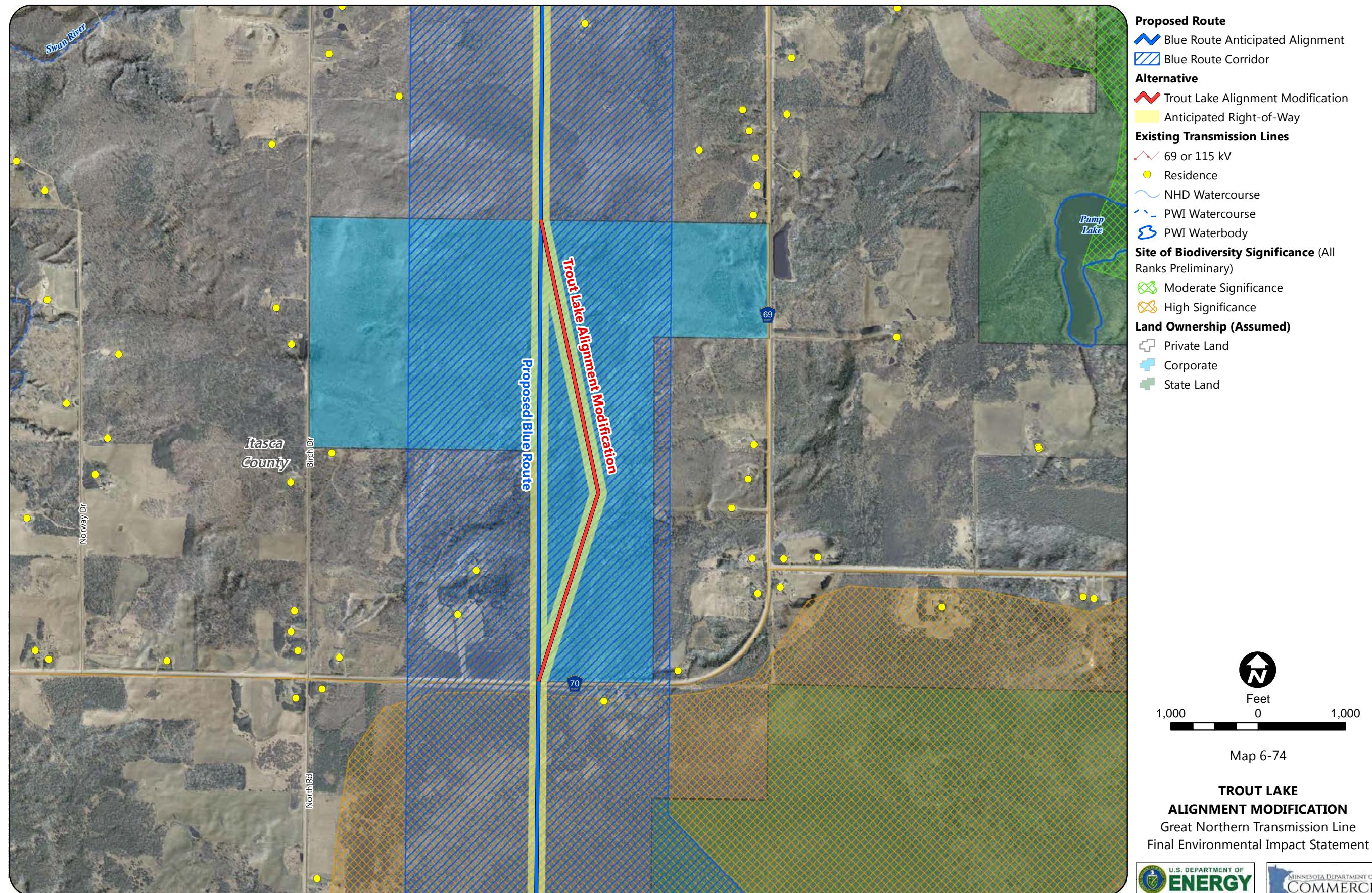
Map 6-72 Grass Lake Alignment Modification



Map 6-73 Dead Man's Pond Alignment Modification



Map 6-74 Trout Lake Alignment Modification



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6.6 Hops

There are five hops identified for the proposed Project as described in Chapter 4. Additional details are provided in Appendix E.

6.6.1 West Section

There are five hops identified for the proposed Project in the West Section – Hops 1, 2, 3, 4, and 5. Hops 1, 2, and 3 provide a connection for the Proposed Blue/Orange Route and Variation in the Cedar Bend WMA Variation Area to the variations in the Beltrami North and Beltrami North Central variation areas. Hops 3 and 4 provide a connection for the Proposed Blue/Orange Route and Beltrami North Variation 1 in the Beltrami North Variation Area to the Beltrami North Central Variations 3 and 4 in the Beltrami North Central Variation Area. Hop 5 provides a connection from the south end of Beltrami North Central variations 4 and 5 west to the Proposed Orange Route.

Hop 1

Hop 1 is located in the southeastern portion of the Cedar Bend WMA Variation Area (Map 4-5) and the northwestern corner of the Beltrami North Central Variation Area (Map 4-7). The length of Hop 1 is approximately 0.7 miles (Map 6-75). The closest residence to this hop is approximate 0.7 miles to the northwest. Land ownership includes only state forest lands; it crosses Lake of the Woods and Beltrami Island state forests (Map 6-13). Hop 1 crosses the existing 500 kV transmission line. The entire length of the hop crosses either shrub or forested wetlands (Map 6-13). This hop crosses MBS Sites of Biodiversity Significance ranked as high or moderate significance (Map 6-14).

Hop 2

Hop 2 is located in the southeastern portion of the Cedar Bend WMA Variation Area (Map 4-5) and the northwestern corner of the Beltrami North Central Variation Area (Map 4-7). The length of Hop 2 is approximately one mile (Map 6-75). The closest residence to this hop is approximate 0.7 miles to the northwest. Land ownership includes only state forest lands. The hop crosses Lake of the Woods and Beltrami Island state forests (Maps 6-13 and 6-23). Hop 2 parallels an existing 230 kV transmission line for its entire length. The entire length of the hop crosses either shrub or forested wetlands (Maps 6-13 and 6-23). This hop crosses MBS Sites of Biodiversity Significance ranked as high or moderate significance (Maps 6-14 and 6-24).

Hop 3

Hop 3 is located in the southeastern portion of the Cedar Bend WMA Variation Area (Map 4-5) and the northwestern corner of the Beltrami North Central Variation Area (Map 4-7). The length of Hop 3 is approximately 1.2 miles (Map 6-75). The closest residence to this hop is approximate 1.3 miles to the northwest. Land ownership includes only state forest lands; it crosses Beltrami Island state forest (Map 5-5). Hop 3 crosses the existing 500 kV transmission line. The entire length of the hop crosses either shrub or forested wetlands (Maps 6-13 and 6-23). This hop crosses MBS Sites of Biodiversity Significance ranked as high or moderate significance (Maps 6-14 and 6-24).

Hop 4

Hop 4 is located in the eastern portion of the Beltrami North Variation Area (Map 4-6) and the northwestern corner of the Beltrami North Central Variation Area (Map 4-7). The length of Hop 4 is approximately one mile (Map 6-75). The closest residence to this hop is approximate 1.2 miles to the northwest. Land ownership includes only state forest lands; it crosses Beltrami Island state forest (Map 6-18). Hop 4 does not cross any existing transmission lines. The entire length of the hop crosses either shrub or forested wetlands (Map 6-18). This hop crosses MBS Sites of Biodiversity Significance ranked as high significance (Map 6-19).

Hop 5

Hop 5 is located in the southwestern portion of the Beltrami North Central Variation Area (Map 4-7). The length of Hop 5 is approximately 3.5 miles (Map 6-76). The closest residence to this hop is approximate 0.4 miles to the north. Land ownership includes private and state forest; it crosses Lake of the Woods and Beltrami Island state forests (Map 6-18). The Border Trails snowmobile trail crosses this hop once (Map 5-5). The eastern end of the hop crosses an unnamed watercourse (Map 6-76). Hop 5 crosses the existing 500 kV transmission line. The entire length of the hop crosses emergent, shrub, or forested wetlands (Map 6-18). This hop crosses MBS Sites of Biodiversity Significance ranked as high or unknown significance (Map 6-19).

6.6.2 Central Section

There are no hops identified in the Central Section.

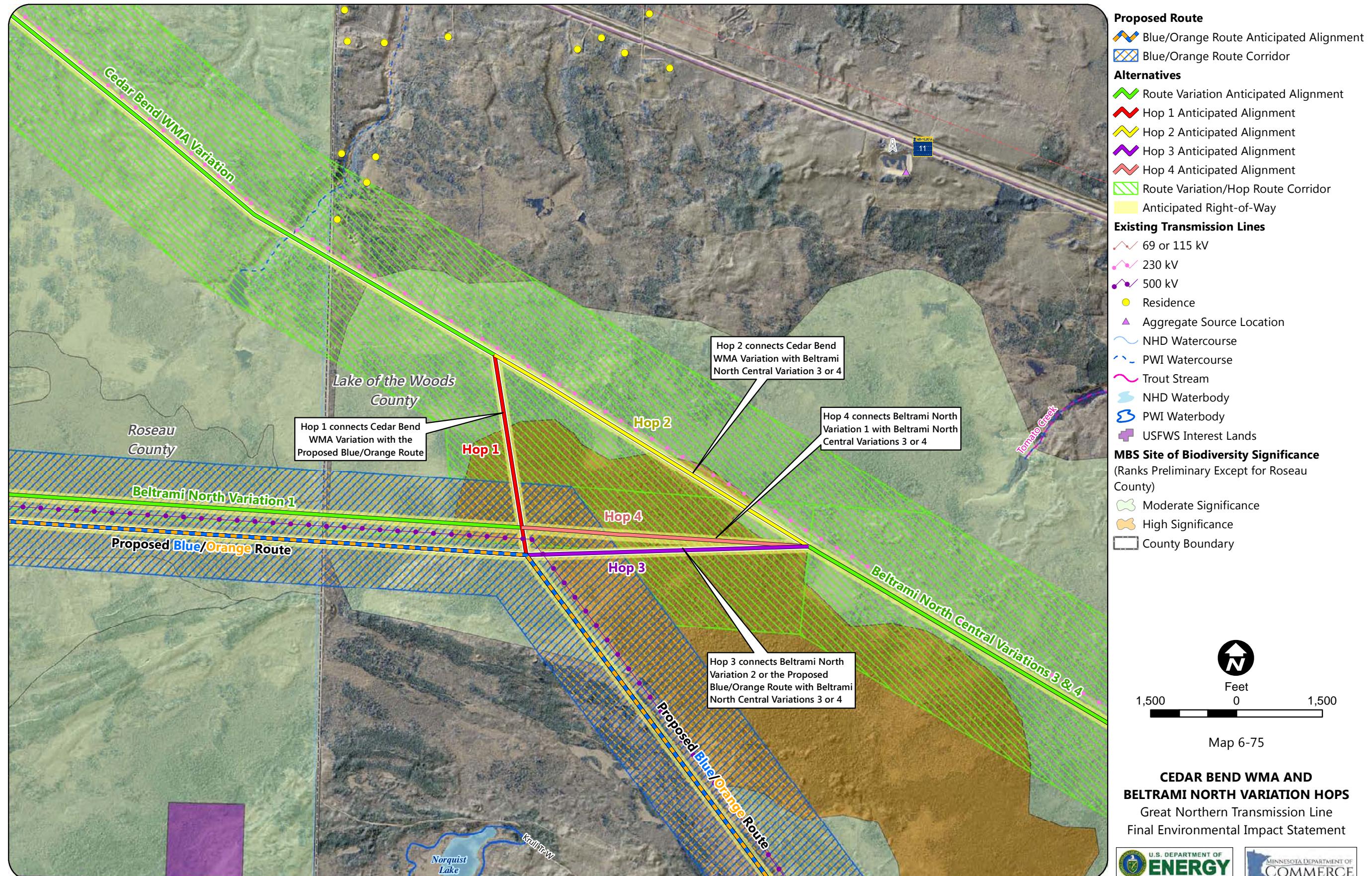
6.6.3 East Section

There are no hops identified in the East Section.

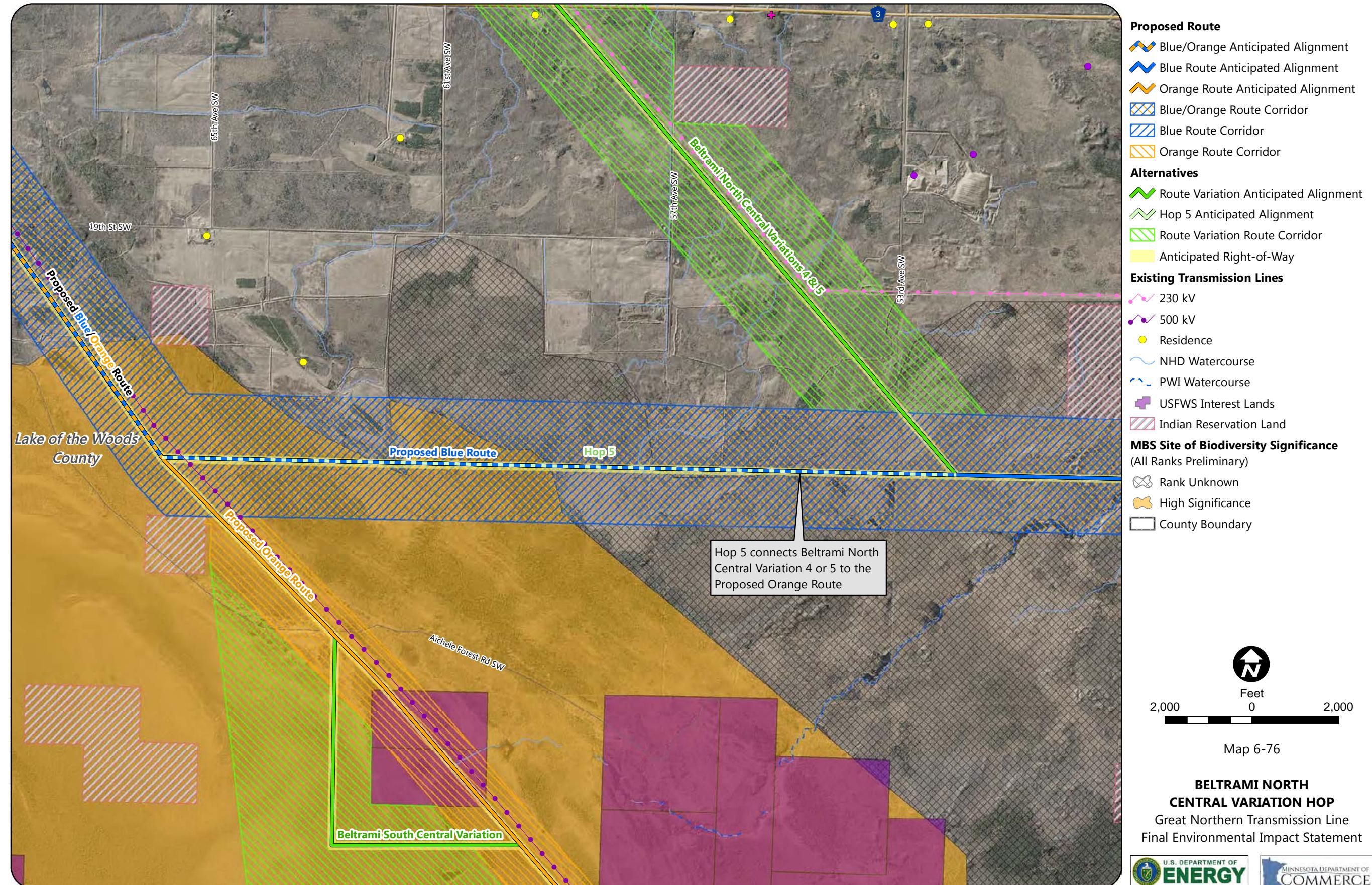
6.0 Comparative Environmental Consequences

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Map 6-75 Cedar Bend WMA and Beltrami North Variation Hops



Map 6-76 Beltrami North Central Variation Hop



6.7 Associated Facilities

The associated facilities for the proposed Project include the 500 kV Series Compensation Station, regeneration stations, and **proposed Iron Range 500 kV Substation**. Information regarding these associated facilities are provided in Chapter 2. Additional details are provided in Appendix E.

6.7.1 West Section

The associated facility located in the West Section are two regeneration stations and the proposed 500 kV Series Compensation Station.

6.7.1.1 Proposed Regeneration Stations

There are two proposed regeneration stations located along the Proposed Blue/Orange Route within the West Section (Map 6-77). The Warroad SCS and Rd 2 regeneration stations are located in the central portion of the Beltrami North Variation Area (Map 4-6) and Beltrami North Central Variation Area (Map 4-7), respectively.

The site for the Warroad SCS regeneration station is located in an upland area adjacent to the Proposed Blue/Orange Route on the east side of CSAH 2 (Map 6-18). There is a residence located approximately 0.6 miles northwest of the site (Map 6-16). Winter Road River is located approximately 0.1 mile north of the site (Map 6-18). Land ownership consists of private lands (Map 6-16).

The site for the Rd 2 regeneration station is located in an upland area adjacent to Route 5 (Map 6-23). There is a residence located approximately 0.13 miles south of the site (Map 6-21). Land ownership is private lands (Map 6-21).

6.7.1.2 Proposed 500 kV Series Compensation Station

The 60-acre site for the proposed 500 kV Series Compensation Station is located in the central portion of the Beltrami North Variation Area (Map 4-6). The nearest residence is located approximately 0.4 miles north of the site (Map 6-78). Land ownership includes private land with MnDNR-identified potential mineral resources (Map 6-16) and scattered NWI-identified emergent wetlands (Map 6-78). Based on U.S. Geological Survey (USGS) GAP land cover data, the southern half of the site is in the USDA Farm Service Agency Conservation Reserve Program.

The 500 kV Series Compensation Station would contain 500 kV series capacitor banks and other large-scale electrical equipment and structures

similar to those comprising most large substations. Depending on its location and surrounding elements in the landscape, the 500 kV Series Compensation Station could contrast strongly with its surroundings. It may be noticeable in foreground or middle ground views from residences or other sensitive visual resources, therefore it has the potential to result in significant aesthetic impacts.

6.7.2 Central Section

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

6.7.2.1 Proposed Regeneration Stations

There are four proposed regeneration stations located along the Proposed Blue Route and one proposed regeneration station located along the Proposed Orange Route within the Central Section (Map 6-77). The Rd 158 regeneration station is located in the northern portion of the Pine Island Variation Area. The two options for the Hwy 71 regeneration station are located in the southern portion of the C2 Segment Option Variation Area. The third Hwy 71 regeneration station is located in the northern portion of the J2 Segment Option Variation Area.

The site for the Rd 158 regeneration station is located in an upland area adjacent to Route 5 (Map 6-28). There is a residence located approximately 0.1 miles and 0.2 miles to the southeast and northeast of the site, respectively (Map 6-26). Land ownership is private lands (Map 6-26).

The site for the Hwy 71 regeneration station (option 1) is located in an emergent and forested wetland area adjacent to State Highway 71 (Map 6-43). There is a residence located approximately 2.5 north of the site (Map 6-41). Land ownership is state forest lands (Map 6-41). This site is located within a MBS Site of Biodiversity Significance ranked as unknown significance (Map 6-44).

The site for the Hwy 71 regeneration station (option 2) is located in an upland area adjacent to State Highway 71 (Map 6-43). There is a residence located approximately 2 miles north of the site (Map 6-41). An unnamed river is located approximately 0.1 mile northeast of the site (Land ownership is state forest lands (Map 6-43). Land ownership is state forest lands (Map 6-43).

The site for the third Hwy 71 regeneration station is located in an upland area between State Highway 71 to the west and a forest wetland to the east (Map 6-48). There is a residence located

approximately 1.4 miles southwest of the site (Map 6-46). Land ownership is state forest lands (Map 6-46). This site is located within a MBS Site of Biodiversity Significance ranked as unknown significance (Map 6-49). The regeneration stations consist of fairly small buildings that house infrastructure to boost the data signal passing through the optical fiber cable associated with the transmission line. Although the regeneration stations may contrast somewhat with their surroundings, the new transmission line nearby would produce stronger contrast and be more dominant due to its substantially taller height and contrasting form.

6.7.3 East Section

The associated facility located in the East Section is the two proposed regeneration stations and the proposed **Iron Range** 500 kV Substation.

6.7.3.1 Proposed Regeneration Stations

There is one proposed regeneration station located along the Proposed Blue Route and one proposed regeneration station located along the Proposed Orange Route within the East Section (Map 6-77). The Rd 287 and Hwy 1 regeneration stations are located in the southeastern portion of the Effie Variation Area.

The site for the Rd 287 regeneration station is located in an upland area just south of the intersection of CSAH 42 and CR 287 (Map 6-53). There is a residence located approximately 0.4 miles southwest of the site (Map 6-51). The Big Fork River is located approximately 0.5 miles west of the site (Map 6-53). Land ownership is private lands (Map 6-51).

The site for the Hwy 1 regeneration station is located in an upland area near the intersection of State Highway 1 and Township Road 751 (Map 6-53). The closest residence is located approximately 0.2 miles northwest of the site (Map 6-51). Land ownership is county-administered state forest lands (Map 6-51).

6.7.3.2 Proposed Iron Range 500 kV Substation

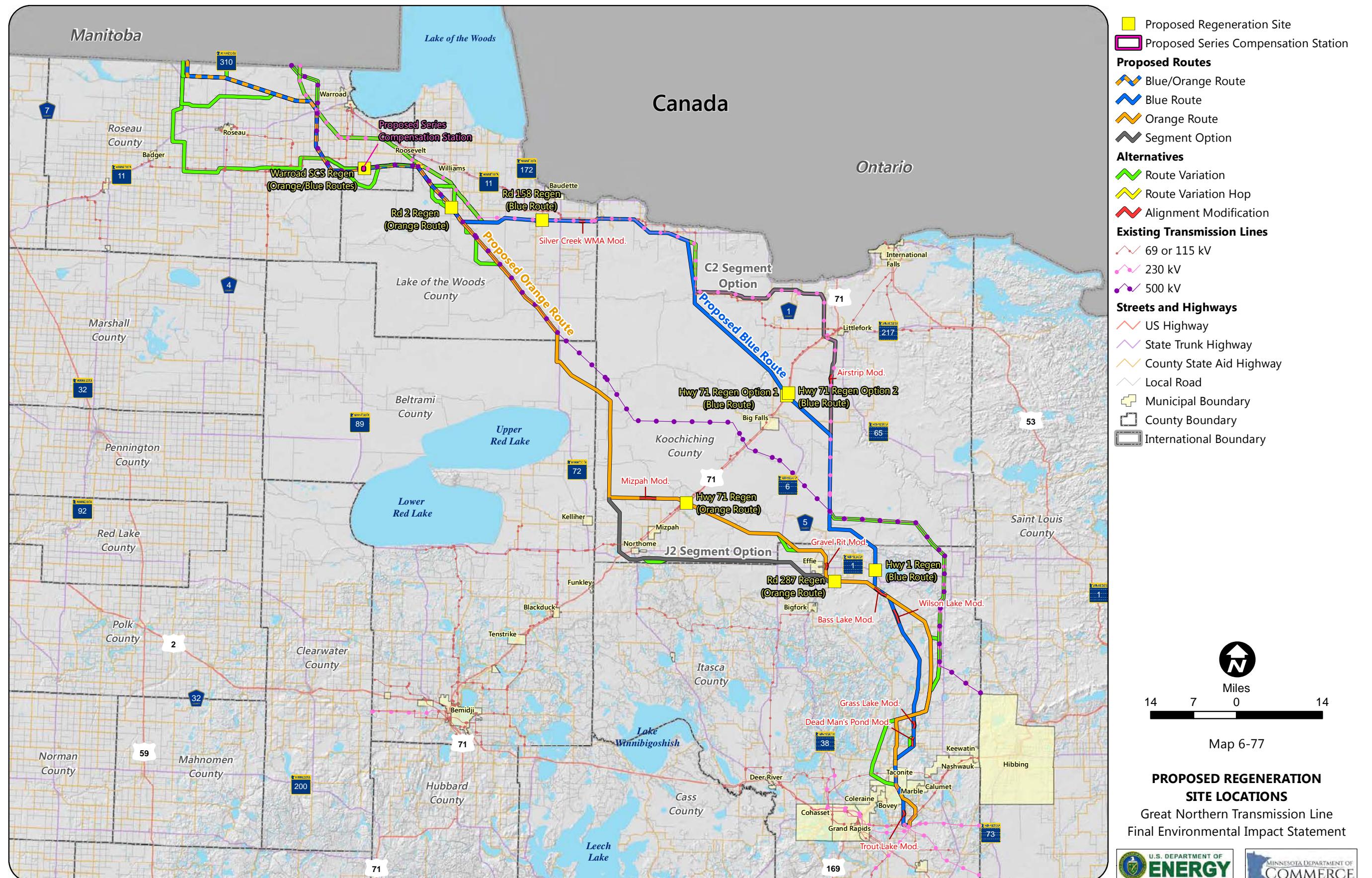
The proposed Iron Range 500 kV Substation would be located at the terminus of the Proposed Blue Route or the Proposed Orange Route adjacent to and approximately 0.25 miles east of the existing Blackberry Substation in the Blackberry Variation Area in the East Section (Map 6-79). There are existing transmission line corridors on the southwest and southeast sides of the **proposed** fenced

substation area. Three residences are located north of the **proposed** fenced substation site: 0.14 miles north from the northwest corner, 0.11 miles northeast of the northeast corner, and 0.24 miles northeast of the northeast corner (Map 6-79). Noise levels for the proposed **Iron Range** 500 kV Substation is discussed in Section 5.2.1.2.

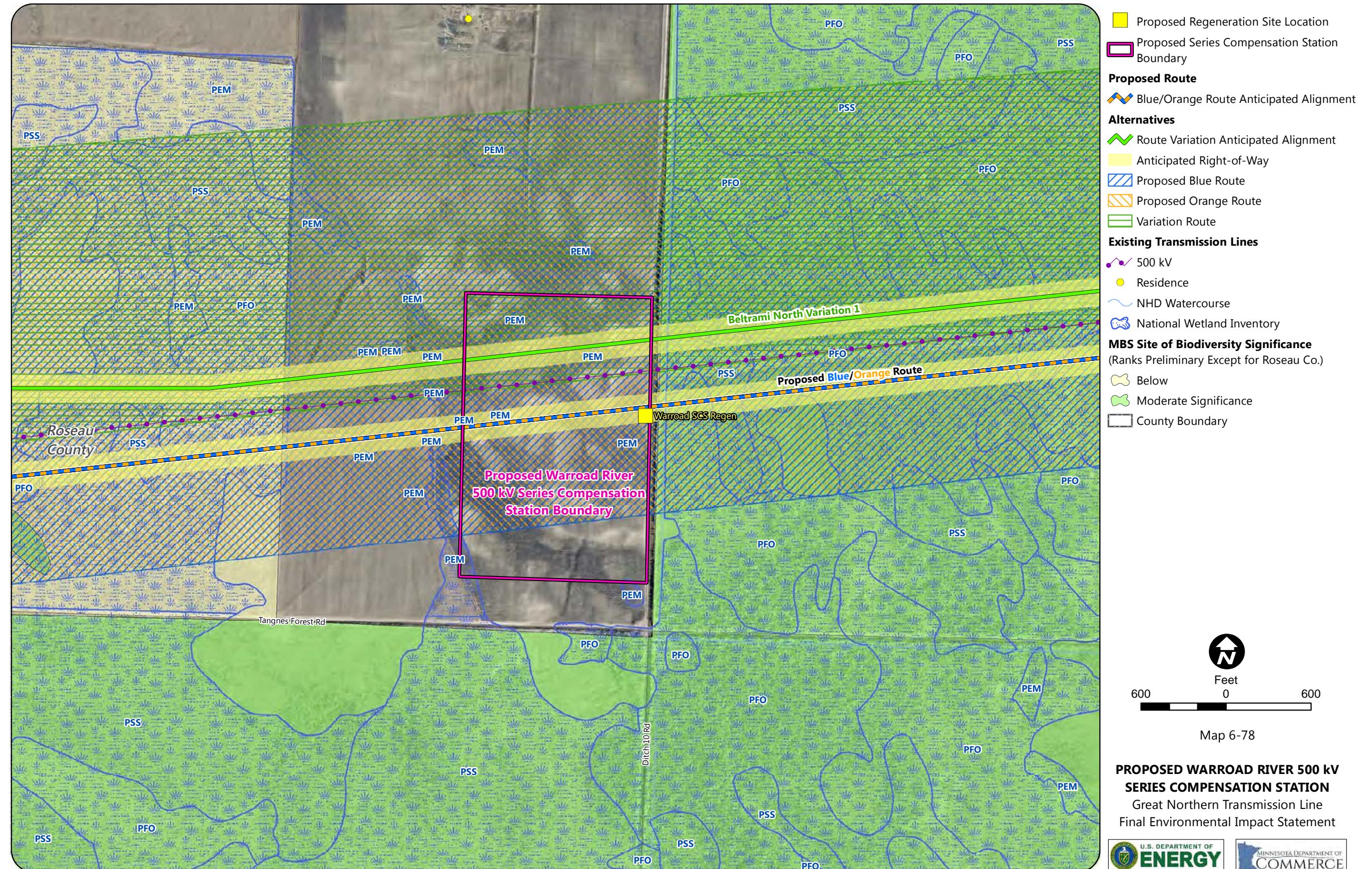
The fenced area of the **proposed** substation is approximately 23 acres (Map 6-79). There are two access roads that connect from CR 434 to the northeast and northwest areas of the **proposed** substation. The access roads cross upland areas and are each 0.5 miles in length. Near CR 434, the access roads are 20 feet wide and lead to a parking lot just outside the fenced area that is approximately 70 feet by 60 feet. The north-central portion of the fenced area of the **proposed** substation directly impacts 0.3 acres of a shallow marsh/forested wetland complex (Map 6-79). Wetlands are identified south of the **proposed** fenced substation site, but would not be impacted by the proposed Project. No other natural resources were identified within or nearby the **proposed** fenced substation area.

The proposed **Iron Range** 500 kV Substation would contain many of the same elements as the existing substation and be similar in appearance and scale to it. Several existing large transmission lines extend through the area in the immediate vicinity of the new substation and enter the existing substation nearby. Because the **proposed** **Iron Range** 500 kV Substation would be visible in the same views from surrounding locations, the addition of the proposed substation adjacent to the existing substation and transmission lines would result in only an incremental increase in contrast for these views. The incremental increase in contrast would be slightly greater where the proposed substation is located between the existing substation and viewers and slightly less where the proposed substation is located on the opposite side of the existing substation from viewers.

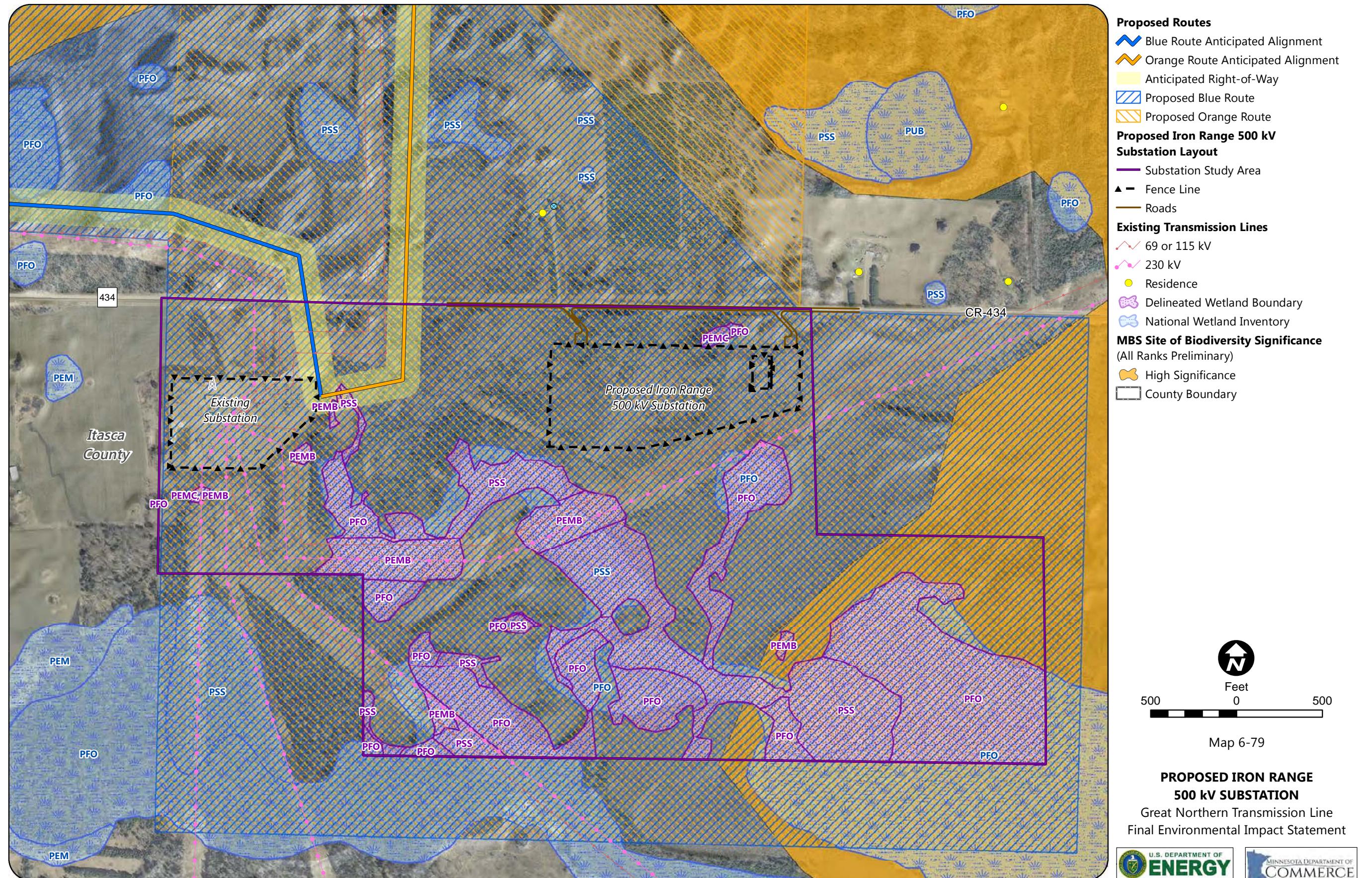
Map 6-77 Proposed Regeneration Site Locations



Map 6-78 Proposed Site of Series Compensation Facilities



Map 6-79 Proposed Blackberry 500 kV Substation



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