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 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 Section1502.15.

81 According to CEQ's NEPA implementing regulations at 40 CFR Section 1508.8, effects and impacts are synonymous terms. Directs 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 500kV Variation, and Border Crossing 230kV 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 (Site RO-ROC-018; not National Register of Historic Places (NRHP) eligible) and snowmobile trail, while the border crossings associated with the Proposed Border Crossing-Blue/Orange Route and all border crossing variations

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 500kV Variation	Border Crossing 230kV 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	3	4	1	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/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.

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 500kV Variation and Border Crossing 230kV 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.

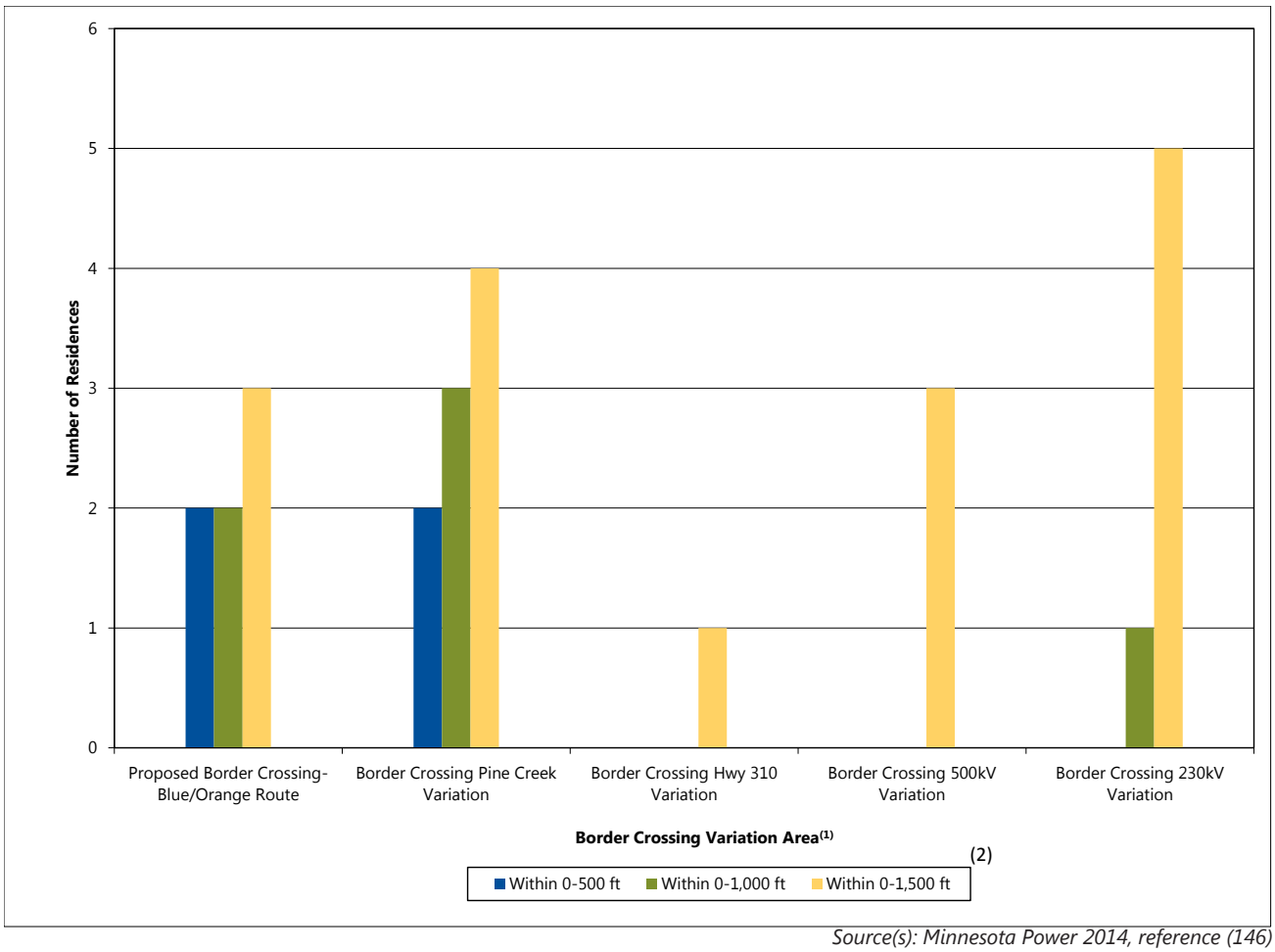
Potential aesthetic impacts are expected to be minimal due to the corridor sharing and lack of residences and recommended NRHP eligibility of historic architectural sites.

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 230kV 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 (one), none within 1,000 feet or 500 feet of the anticipated alignment. The Proposed Border Crossing-Blue/Orange Route would have three residences within 1,500 feet of the anticipated alignment, with two of those within 500 feet. The Border Crossing 500kV 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 four 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 (one), 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 500kV Variation or Border Crossing 230kV 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 500kV Variation and Border Crossing 230kV 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 500kV Variation affects fewer residences (three) than the Border Crossing 230kV Variation (five) and parallels an existing 500 kV transmission line of similar design. Therefore the Border Crossing 500kV Variation would result in less aesthetic impact than the Border Crossing 230kV Variation, as well as the other three alternatives.

The transmission line associated with the Border Crossing 500kV Variation and the Border Crossing 230kV 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 500kV Variation and Border Crossing 230kV 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 500kV Variation, and Border Crossing 230kV 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 500kV

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 500kV Variation	Border Crossing 230kV 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/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

Table 6-3 identifies the amount of land by ownership 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

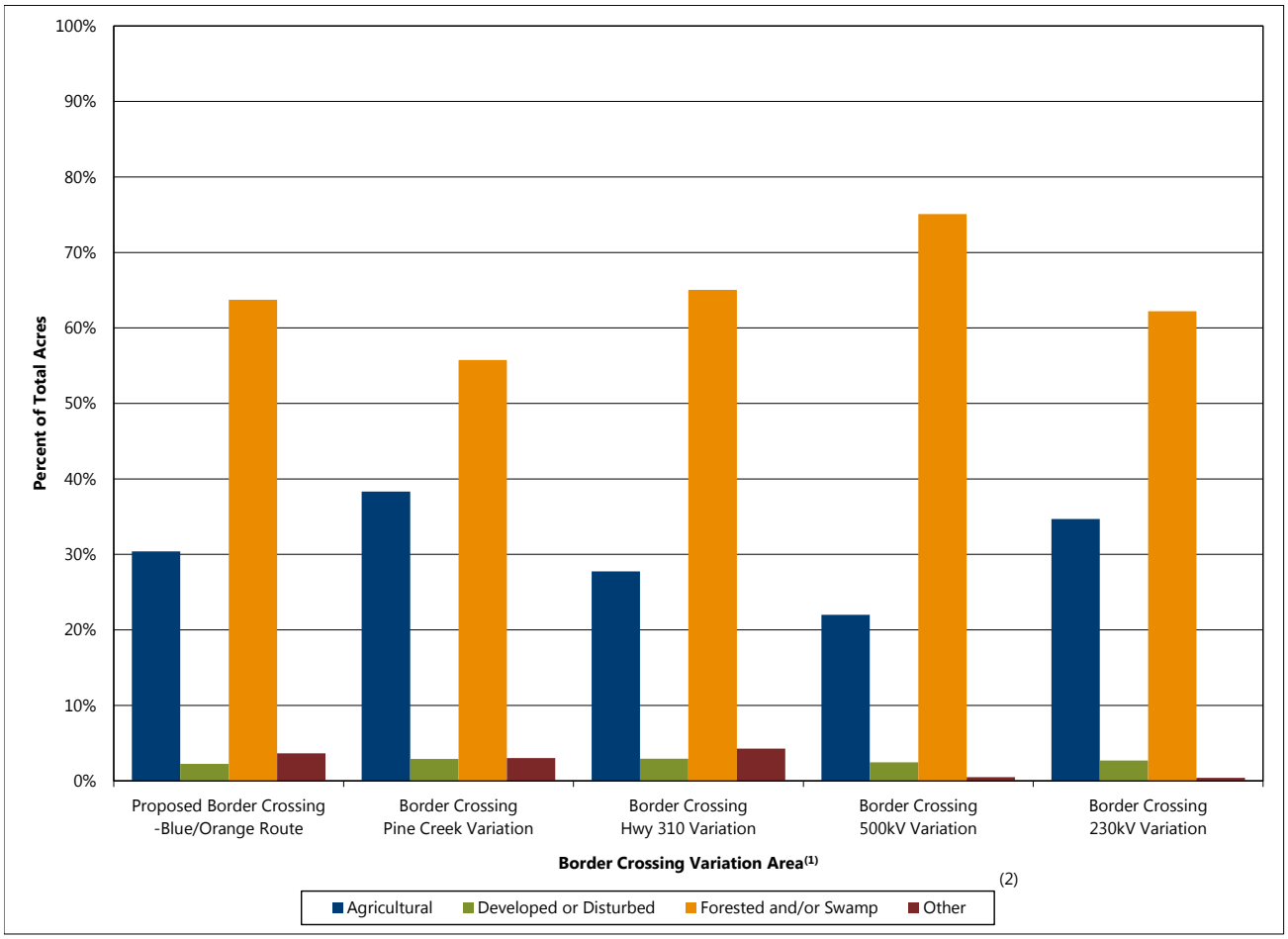
The border crossing for the Proposed Border Crossing-Blue/Orange Route is located on trust fund state fee lands. The border crossings for the Border Crossing Hwy 310 Variation, Border Crossing 500kV Variation, and Border Crossing 230kV Variation are located on consolidated conservation state fee lands. 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 230kV 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 500kV and Border Crossing 230kV 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 from

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.

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 habit 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.

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.

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

Table 6-3 Land Ownership 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 500kV Variation	Border Crossing 230kV Variation
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

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.

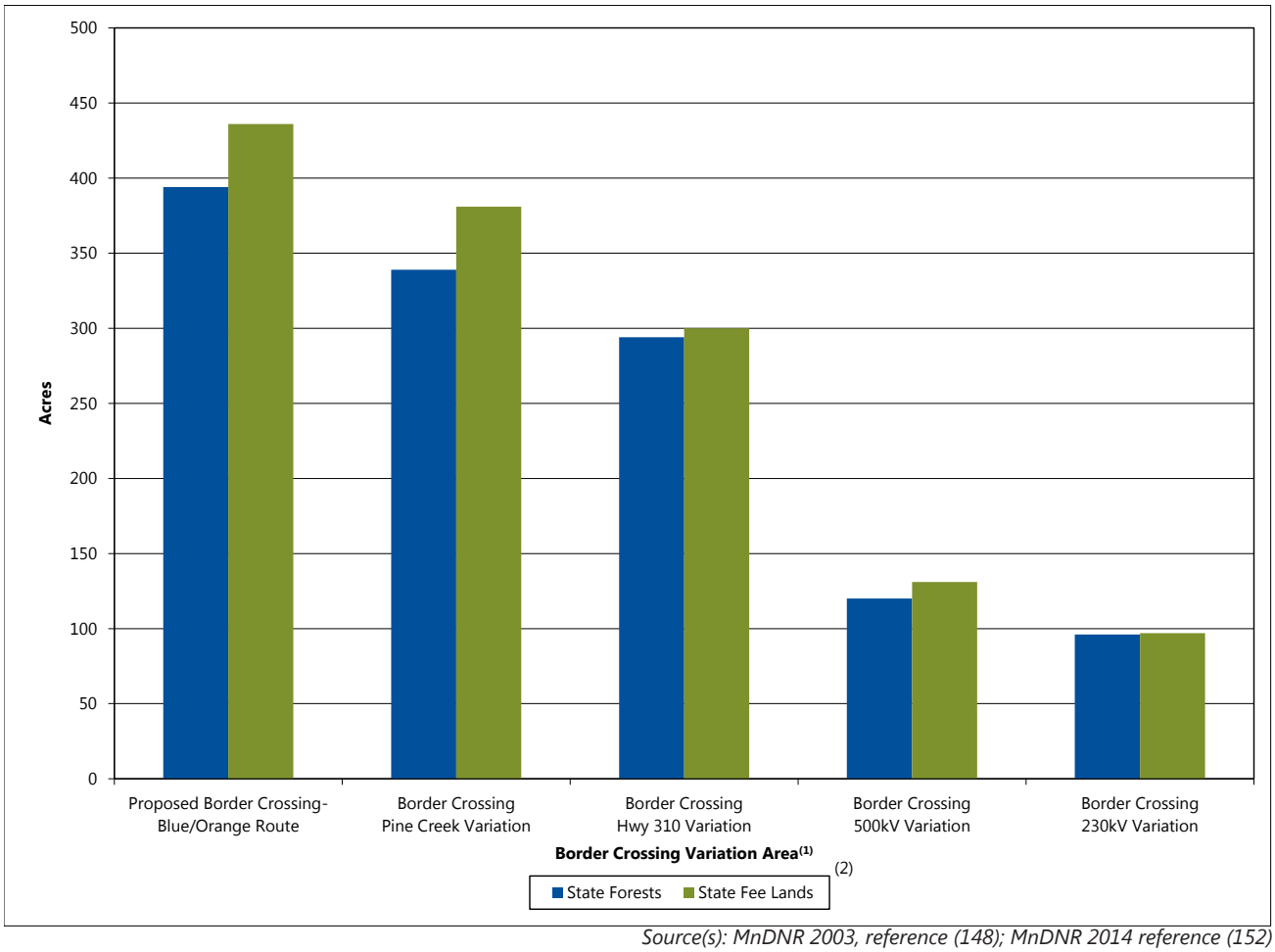
Impacts from the proposed Project are expected to be minimal in areas where the proposed Project would parallel an existing ROW or property line. Paralleling an existing ROW would minimize or prevent habitat fragmentation in forested and/or swamp land. Structures on the edge of agricultural fields would 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 500kV Variation and Border Crossing 230kV 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. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts to these resources from the proposed Project.

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



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

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.

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 500kV 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 230kV Variation are located on areas that are designated prime farmland if drained.

Construction activities associated with the border crossings for the Border Crossing Pine Creek Variation and Border Crossing 230kV Variation could

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 500kV Variation	Border Crossing 230kV 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.

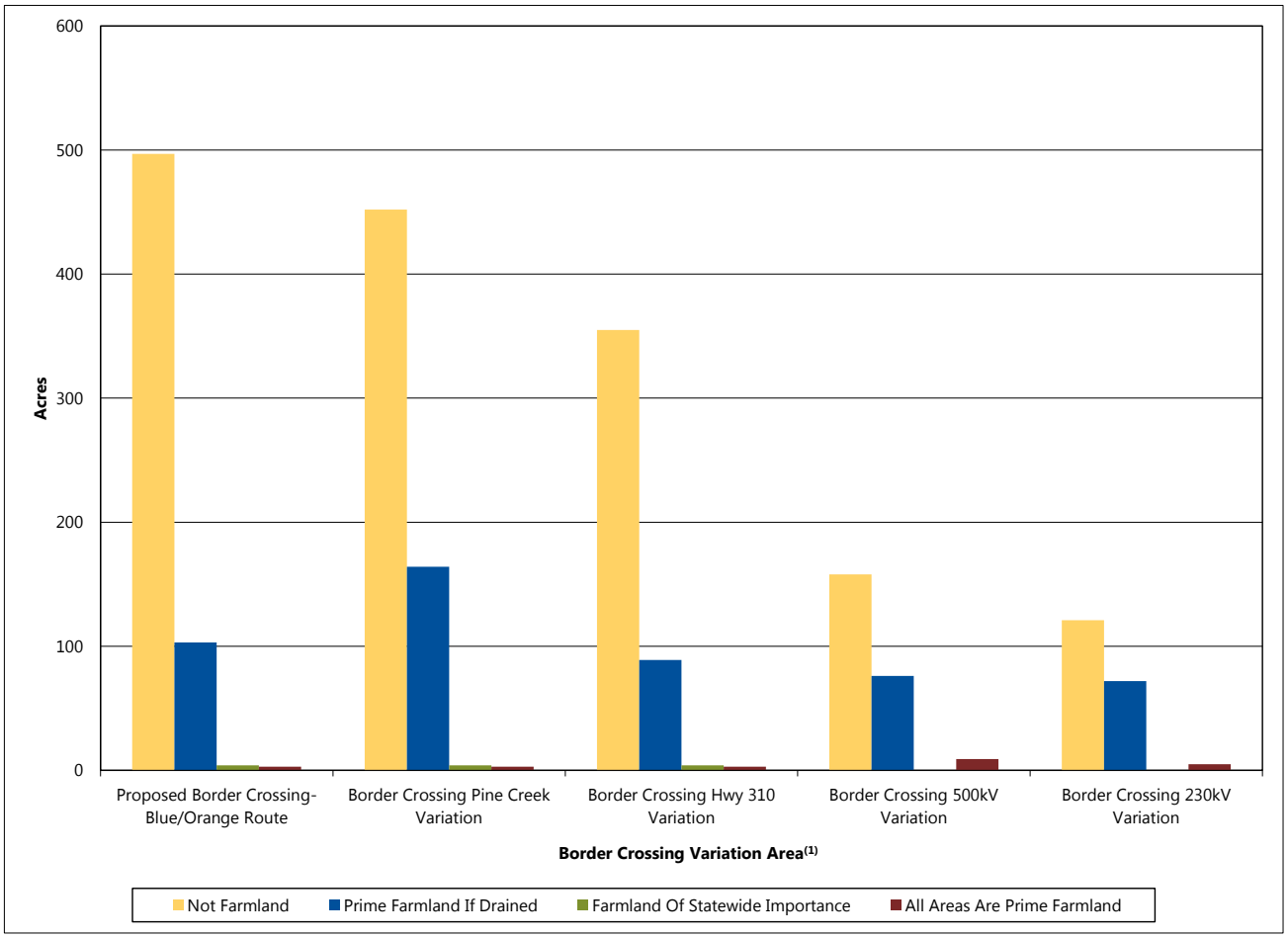
limit the use of fields or affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the physical presence of transmission line structures and associated facilities. 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 500kV 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 passes through the most acres of farmland, including the most acres of prime farmland if drained (Table 6-4, Figure 6-4). The Border Crossing 230kV Variation has the shortest transmission line route of the proposed route and variations in the Border Crossing Variation Area and parallelss an existing 230 kV transmission line corridor for its entire length. The Border Crossing 230kV 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 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 6-4 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.

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 500kV Variation, and Border Crossing 230kV Variation are all forested areas within the Lost River State Forest. The Border Crossing Pine Creek Variation is the only border crossing that is not forested and is not state forest land.

The border crossings for the Border Crossing 500kV Variation and Border Crossing 230kV 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.

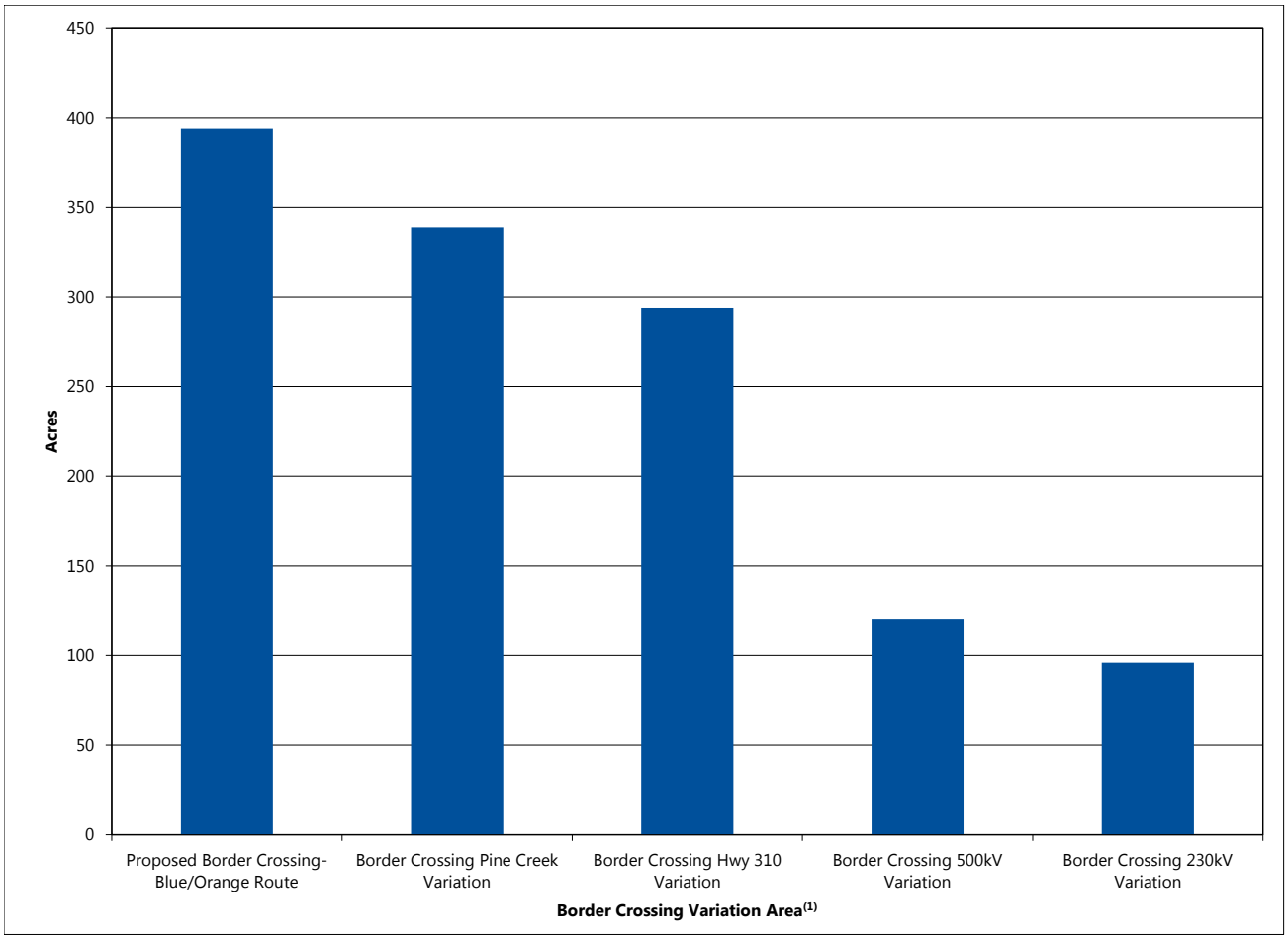
Transmission Line Routes and Variations

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 230kV Variation, which parallels an existing 230 kV transmission line corridor for its entire lengthand 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-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

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.

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 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, whether active or inactive, 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, or adverse effects, on cultural resources, which include archaeological and historic architectural resources, are evaluated based upon their proximity to the proposed Project. Resources identified within the ROW would be directly affected if they are located where they would be disturbed or destroyed during construction or operations. Depending upon the type of resources that are encountered and the environmental conditions in place, both a direct and indirect effect would occur for resources identified within 1,500 feet on either side of the anticipated alignment. Historic architectural sites identified within one mile of the anticipated alignment would be subject to indirect impacts; these impacts could include visual and noise impacts. The currently proposed direct Area of Potential Effect (APE), proposed by the U.S. Department of Energy (DOE) in its Section 106 Initiation Letter to the Minnesota State Historic Preservation Office (SHPO) and described in Section 5.3.3 is consistent with the ROI and for archaeological and historic architectural 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. Resources that would be directly impacted by the proposed Project are located within the direct APE, e.g. the ROW. The proposed indirect APE for architectural resources, as proposed by DOE as part of the Section 106 process, includes historic architectural sites within one mile on either side of the proposed transmission center line. Under Section 106 of the National Historic Preservation Act (NHPA), the indirect impacts on NRHP-eligible archaeological resources would not result in physical destruction or damage to all or part of the NRHP-eligible archeological resources, additionally, 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. As a result, the indirect APE is not considered for 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 and historic architectural resources within 1,500 feet of the anticipated alignment, and within one mile of the anticipated alignment (indirect APE for historic architectural sites) for the proposed route and variations in the Border Crossing Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

International Border Crossings

There are no historic architectural sites 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 1,500 feet of the anticipated alignment) associated with the border crossings. There is a historic architectural site (RO-ROC-018) within 450 feet 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.

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 500kV Variation	Border Crossing 230kV 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.

There are no anticipated direct, adverse, long-term effects for historic architectural sites 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 affect a historic architectural site; however, this site has not been previously determined as NRHP eligible. 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 effects to this resource, which could be considered an adverse effect under Section 106 of the NHPA if this archaeological resource is determined NRHP-eligible.

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 or Border Crossing 230kV Variation have any documented archaeological or historic architectural sites within the direct APE (Table 6-5). Both the Border Crossing Pine Creek Variation and Border Crossing 500kV Variation have one archaeological site located within the ROW which could be affected. Site 21ROaa, a precontact artifact scatter with an undetermined NRHP status, is located within the ROW of the Border Crossing Pine Creek Variation. Site 21Rod, a precontact site where a toothed spear point and small copper point was found, has an unknown NRHP status. The Border Crossing Hwy 310 Variation is the only variation potentially indirectly affecting historic architectural sites, although this site (RO-ROC-018) has been recommended not eligible for NRHP-listing.

There is currently no identified potential for direct, adverse, long-term impacts on archaeological or historic architectural sites for the Proposed Border Crossing-Blue/Orange Route, Border Crossing Hwy 310 Variation, and Border Crossing 230kV Variation as there were no sites 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 significant impacts on archaeological resources is possible for the Border Crossing Pine Creek Variation and the Border Crossing 500kV Variation 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 direct APEs for the Border Crossing Pine Creek Variation and the Border Crossing 500kV Variation contain archaeological

resources that have not been evaluated for NRHP-eligibility, the proposed Project may result in direct effects 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 effects on site RO-ROC-018, 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 recommended as not NRHP-eligible, these impacts are expected to be minimal.

As the proposed route and variations have not yet been surveyed architectural or built resource surveys, inventories 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 Programmatic Agreement (PA) 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 effects to historic architectural sites, including traditional cultural resources, during construction 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 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 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 500kV Variation, and Border Crossing 230kV 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 230kV 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 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

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 500kV Variation	Border Crossing 230kV 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 are described in the text and figure below.

Border Crossing Pine Creek Variation would also cross a third PWI stream, Pine Creek. The Border Crossing 500kV Variation and Border Crossing 230kV 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.

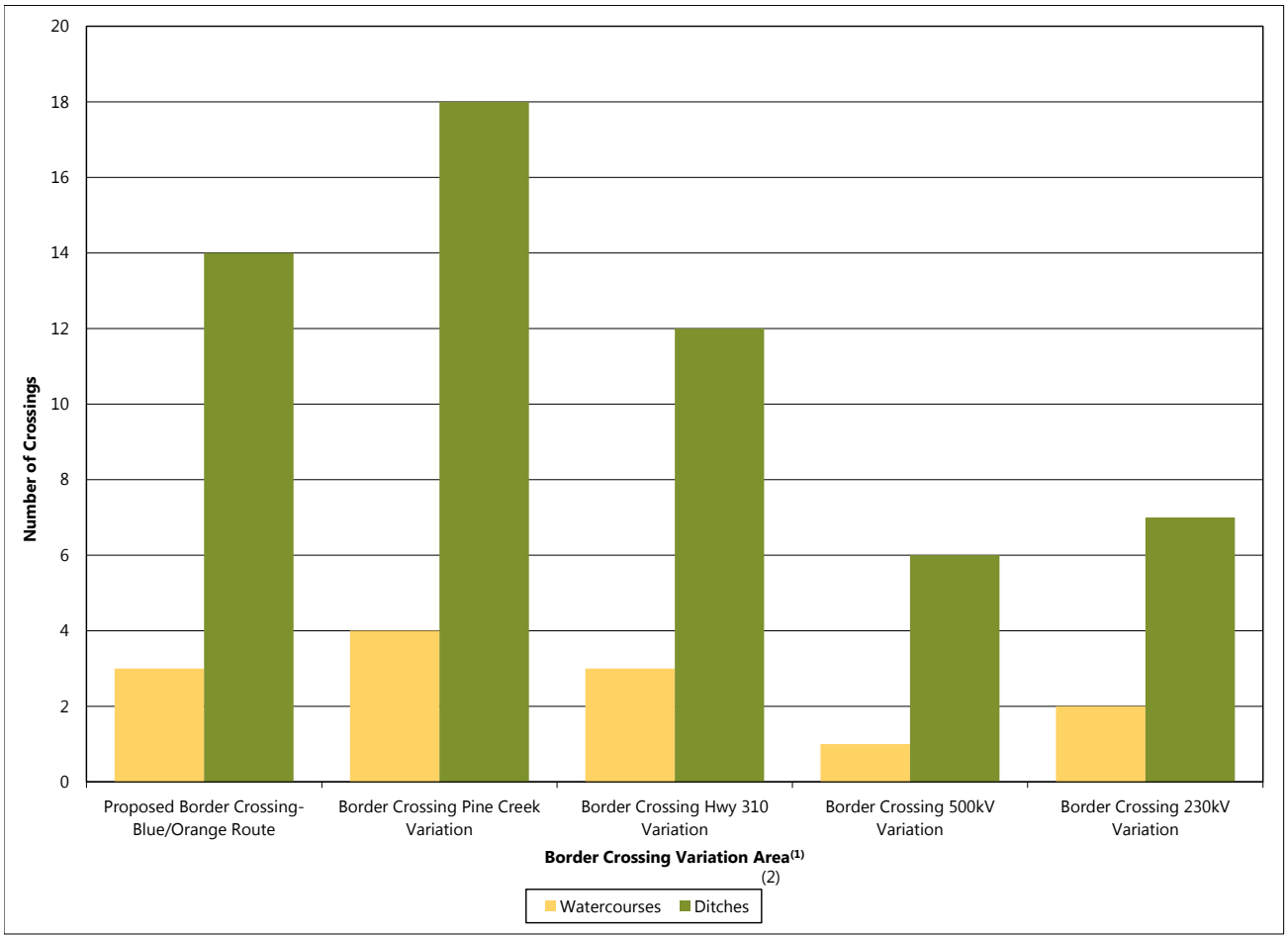
The Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation would all require crossing Sprague Creek, a Minnesota Pollution Control Agency (MPCA) listed impaired water, as shown in Table 5-24.

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

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.

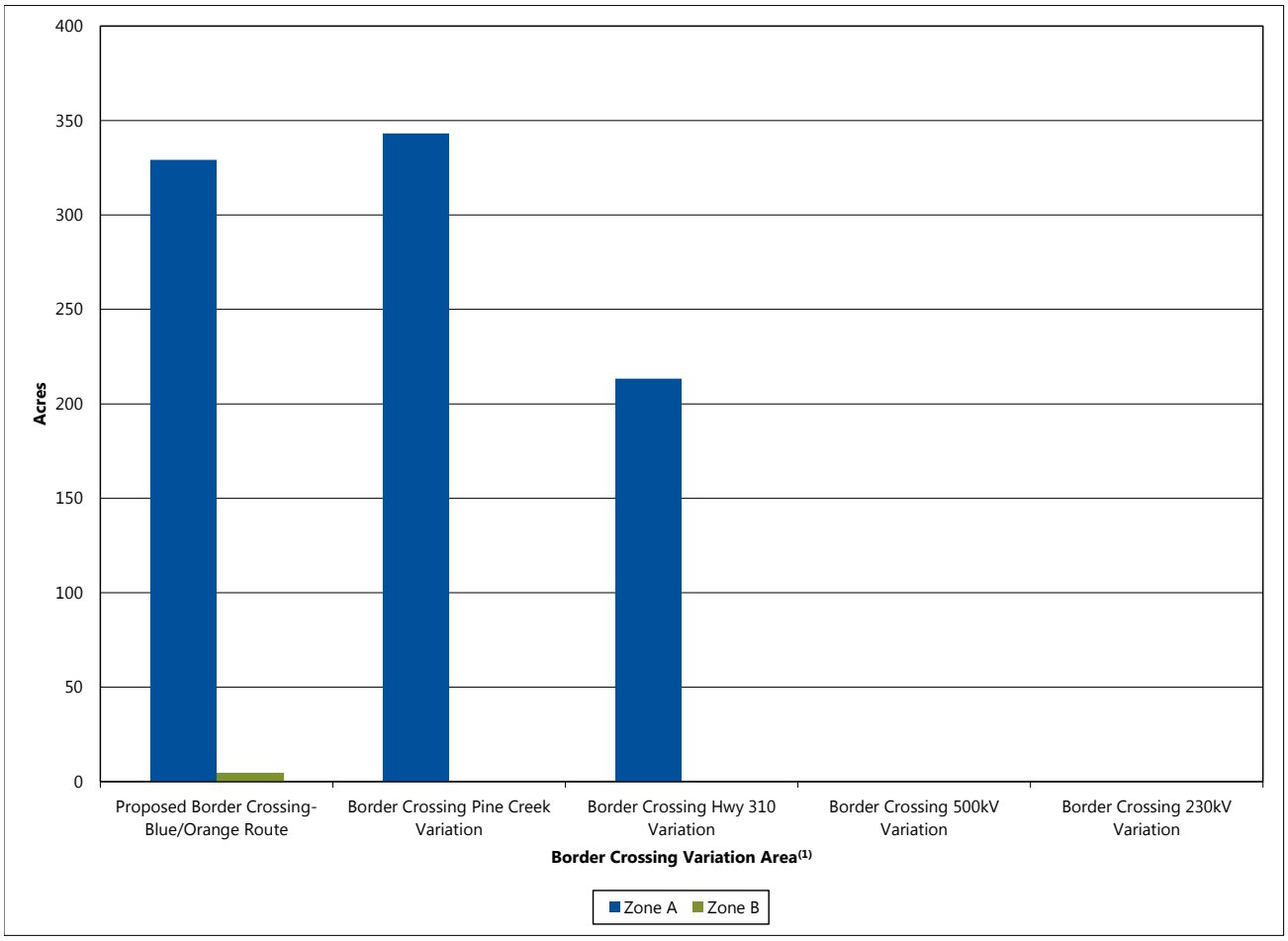
(2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

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 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). 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.

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.

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

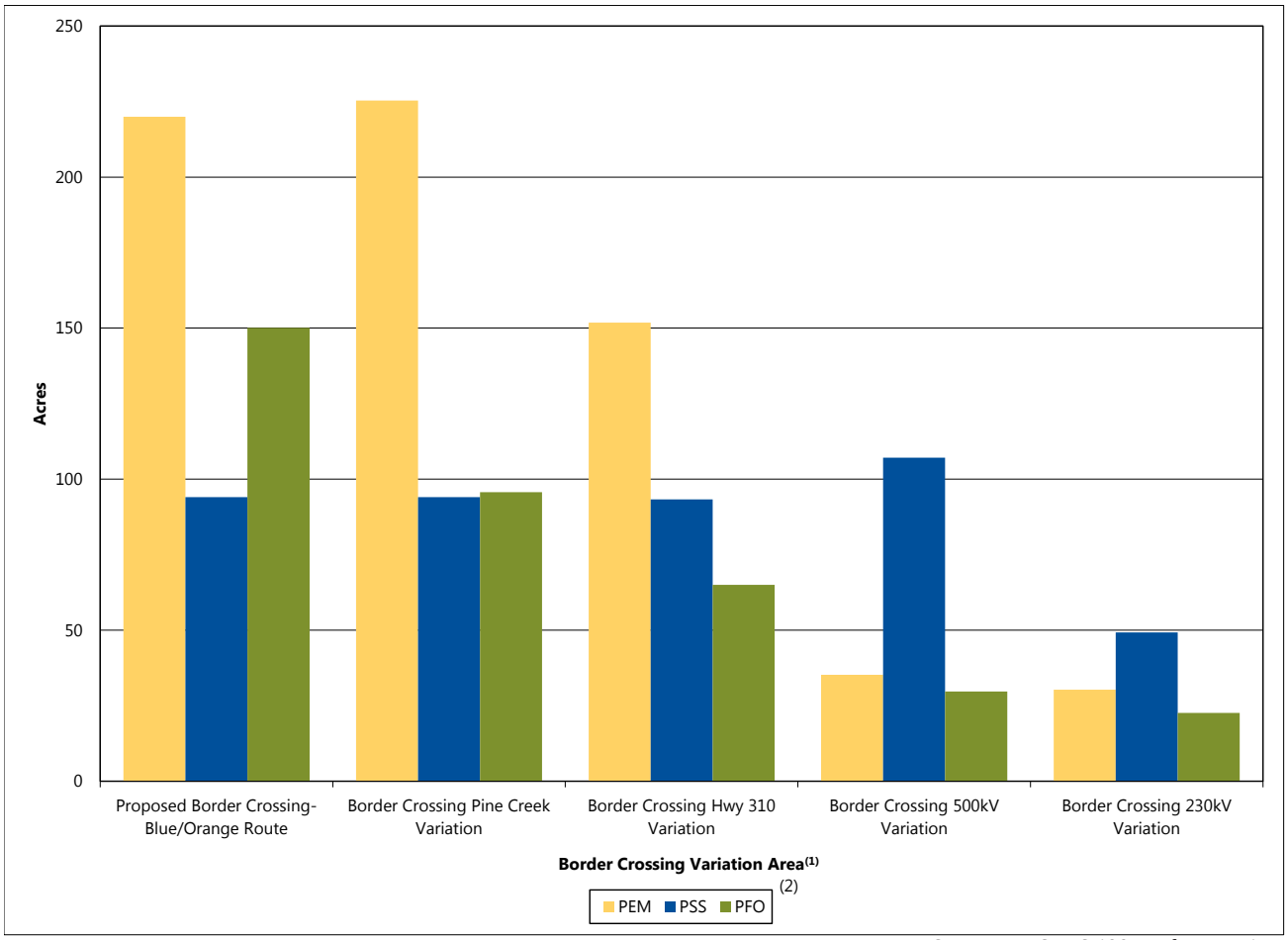
International Border Crossings

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 230kV Variation is North American Boreal Flooded & Swamp Forest, located within the Lost River State Forest. Similarly, the vegetation for the Border Crossing 500kV 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 230kV Variation, and Border Crossing 500kV 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

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).

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 500kV and Border Crossing 230kV 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

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 500kV Variation	Border Crossing 230kV 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 & 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.

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.

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

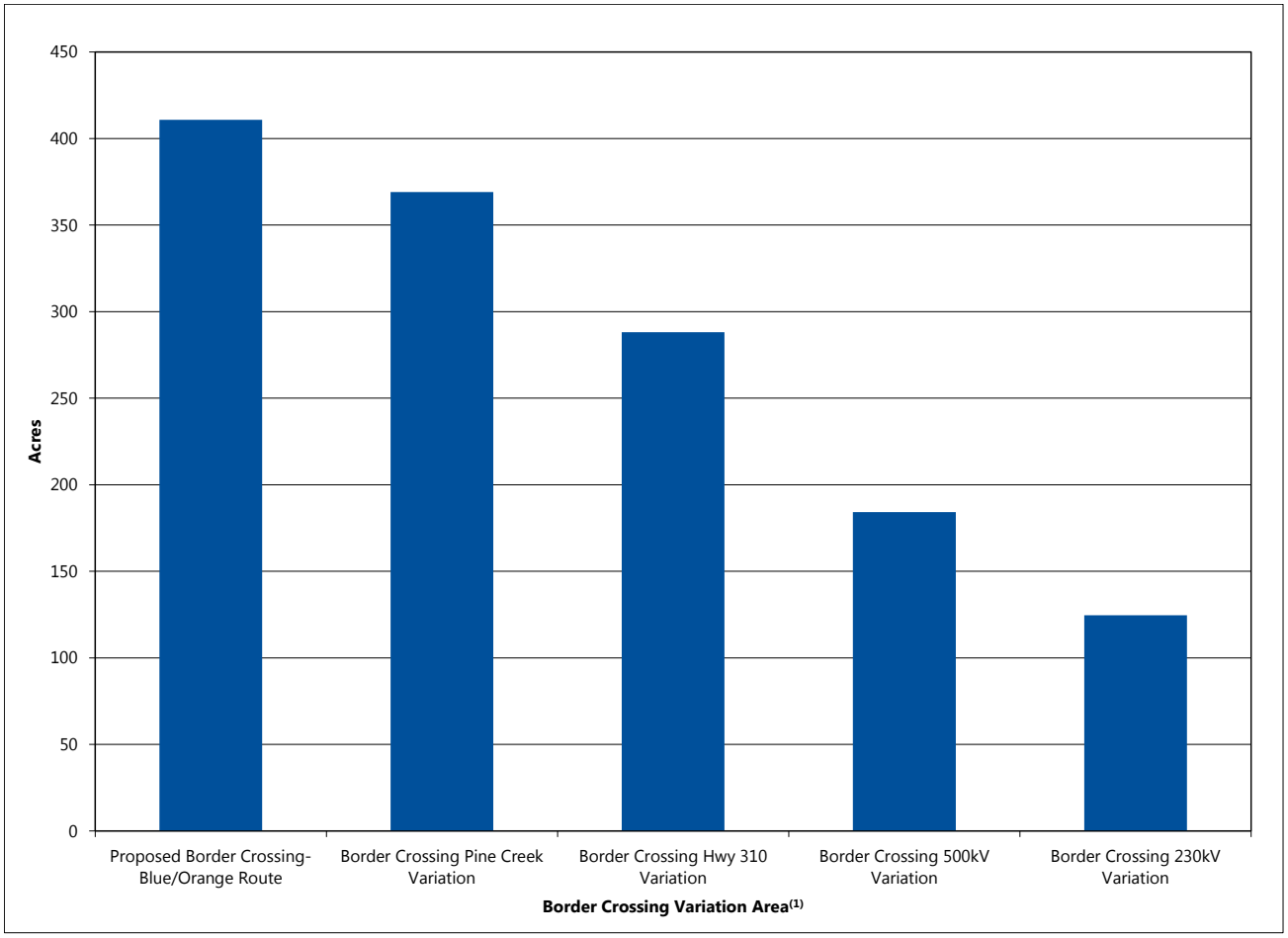
Proposed Border Crossing-Blue/Orange Route and all Border Crossing variations do not cross any Wildlife Management Areas (WMA), Grassland Bird Conservation Area core areas, or come within 1,500 feet of the Minnesota Department of Natural Resources (MnDNR) Gray Owl Management Area. As such, potential 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

Figure 6-9 Acres of all Forested GAP Land Cover Types within the Anticipated ROW 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.

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 500kV Variation	Border Crossing 230kV 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) 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.

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 230kV Variation or Border Crossing 500kV 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 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 500kV and Border Crossing 230kV 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-

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 500kV Variation	Border Crossing 230kV Variation
Anthus spragueii	Sprague's Pipit	Candidate	Endangered	Bird	X	X	X		
Carex sterilis	Sterile Sedge	None	Threatened	Vascular Plant	X[3]				
Cypripedium arietinum	Ram's-head Lady's-slipper	None	Threatened	Vascular Plant	X[3]	X	X		
Accipiter gentilis	Northern Goshawk	None	Special Concern	Bird	X	X	X	X	X
Ammodramus nelsoni	Nelson's Sparrow	None	Special Concern	Bird	X	X		X	
Cladium mariscoides	Twig-rush	None	Special Concern	Vascular Plant	X[3]	X[3]			
Coturnicops noveboracensis	Yellow Rail	None	Special Concern	Bird	X	X		X	
Drosera anglica	English Sundew	None	Special Concern	Vascular Plant	X[3]				
Drosera linearis	Linear-leaved Sundew	None	Special Concern	Vascular Plant	X[3]				
Limosa fedoa	Marbled Godwit	None	Special Concern	Bird	X	X	X		
Malaxis monophyllos var. brachypoda	White Adder's-mouth	None	Special Concern	Vascular Plant			X[3]		
Ranunculus lapponicus	Lapland Buttercup	None	Special Concern	Vascular Plant	X	X			

Source(s): MnDNR 2014, 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.

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 230kV Variation and the Border Crossing 500kV 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 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, passes 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 500kV Variation impacting more acres of native plant communities with a conservation status of S2 (imperiled) and S3 (vulnerable to extirpation). However, the Border Crossing 500kV 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

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

Resource	Type	Evaluation Parameter(1)	Border Crossing Variation Area(1)				
			Proposed Border Crossing-Blue/ Orange Route	Border Crossing Pine Creek Variation	Border Crossing Hwy 310 Variation	Border Crossing 500kV Variation	Border Crossing 230kV Variation
Associated Transmission Line(3)	--	Length (mi)	25.0	25.7	18.6	10.1	8.2
Existing Transmission Line(4)	--	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	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 Referece 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.

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 500kV and Border Crossing 230kV 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 230kV Variation and Proposed Border Crossing 500kV 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 Creek Variation parallel an existing corridor at their associated border crossings.

Transmission Line Routes and Alternatives

The Border Crossing 500kV Variation and Border Crossing 230kV 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 230kV 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 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

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 500kV Variation	Border Crossing 230kV Variation
Transmission Line (may include Road, Trail, PLSS, Field Line)	Percent of Total Length(3)	7	7	10	100	100
Road/Trail (may include PLSS, Field Line)	Percent of Total Length(3)	23	25	24	0	0
Field Line (may include 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.

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

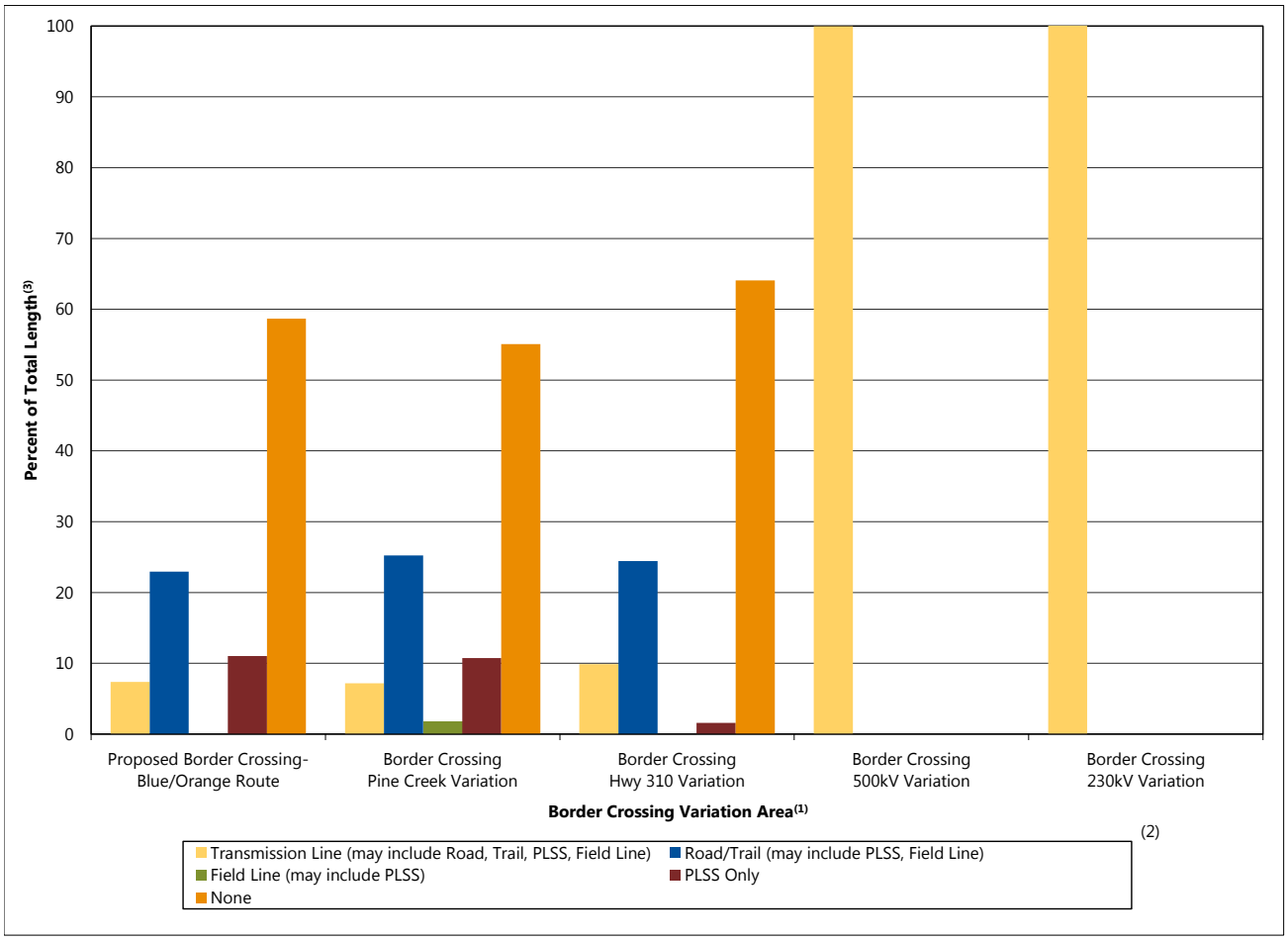
As described in the Aesthetics discussion for the Border Crossing Variation (Section 6.2.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 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 (12), 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 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.

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) 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.

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

Variation Area	Name in the EIS	Cost (Total)	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 500kV Variation	$11,512,144	$1,151,214	10.1
	Border Crossing 230kV Variation	$9,862,592	$1,208,592	8.2

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

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

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 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 (12) 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

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	12	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)

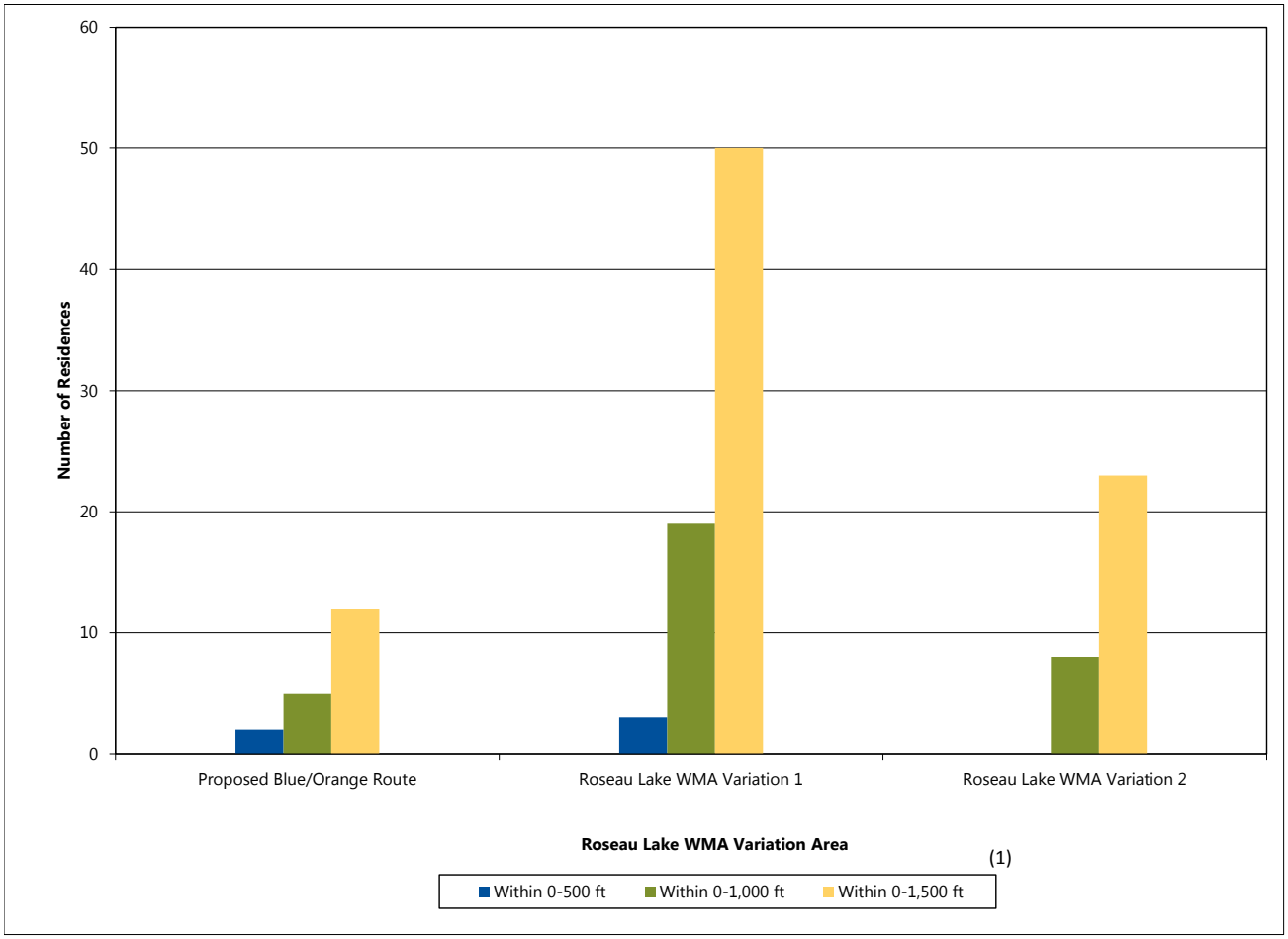
Note(s): Totals may not sum due to rounding

(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/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.

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 (12) 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 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.

Land Ownership

Table 6-15 and Figure 6-13 identify the amount of land by ownership 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 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 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

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

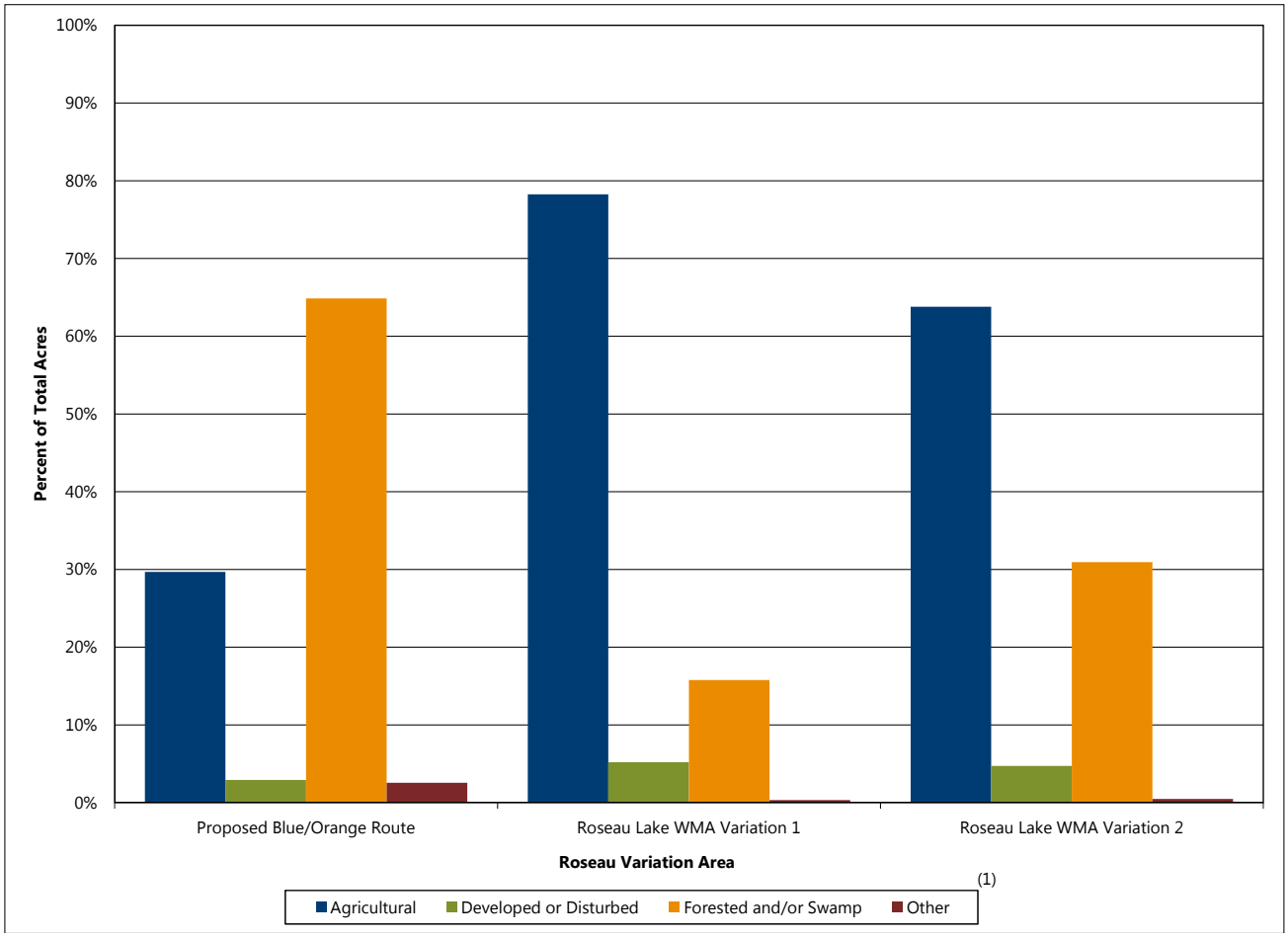
Source: USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland & 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.

Figure 6-12 Land Uses within the ROI in the Roseau Lake 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 & Shrubland and Introduced & Semi Natural Vegetation. See detailed summary of all types in Appendix E.

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.

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

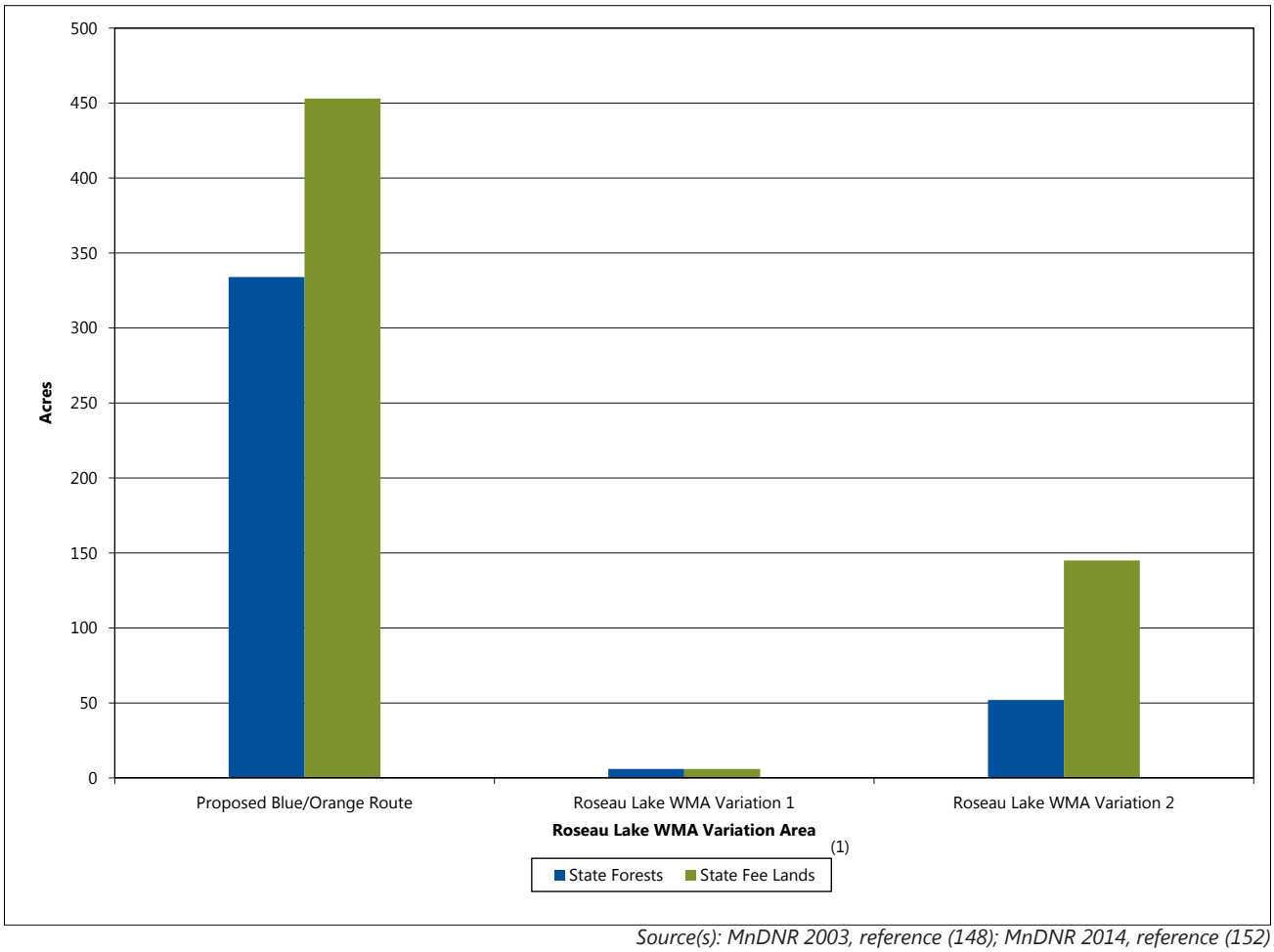
Resource	Type	Evaluation Parameter	Roseau Lake WMA Variation Area		
			Proposed Blue/ Orange Route	Roseau Lake WMA Variation 1	Roseau Lake WMA Variation 2
State Forests	--	Acres within ROW	334	6	52
State Fee Lands(1) Total	--	Acres within ROW	453	6	145
State Fee Lands(1) by Type	Consolidated Conservation	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

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 6-13 Land Ownership within the ROI in the Roseau Lake WMA 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.

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 6-16 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.

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

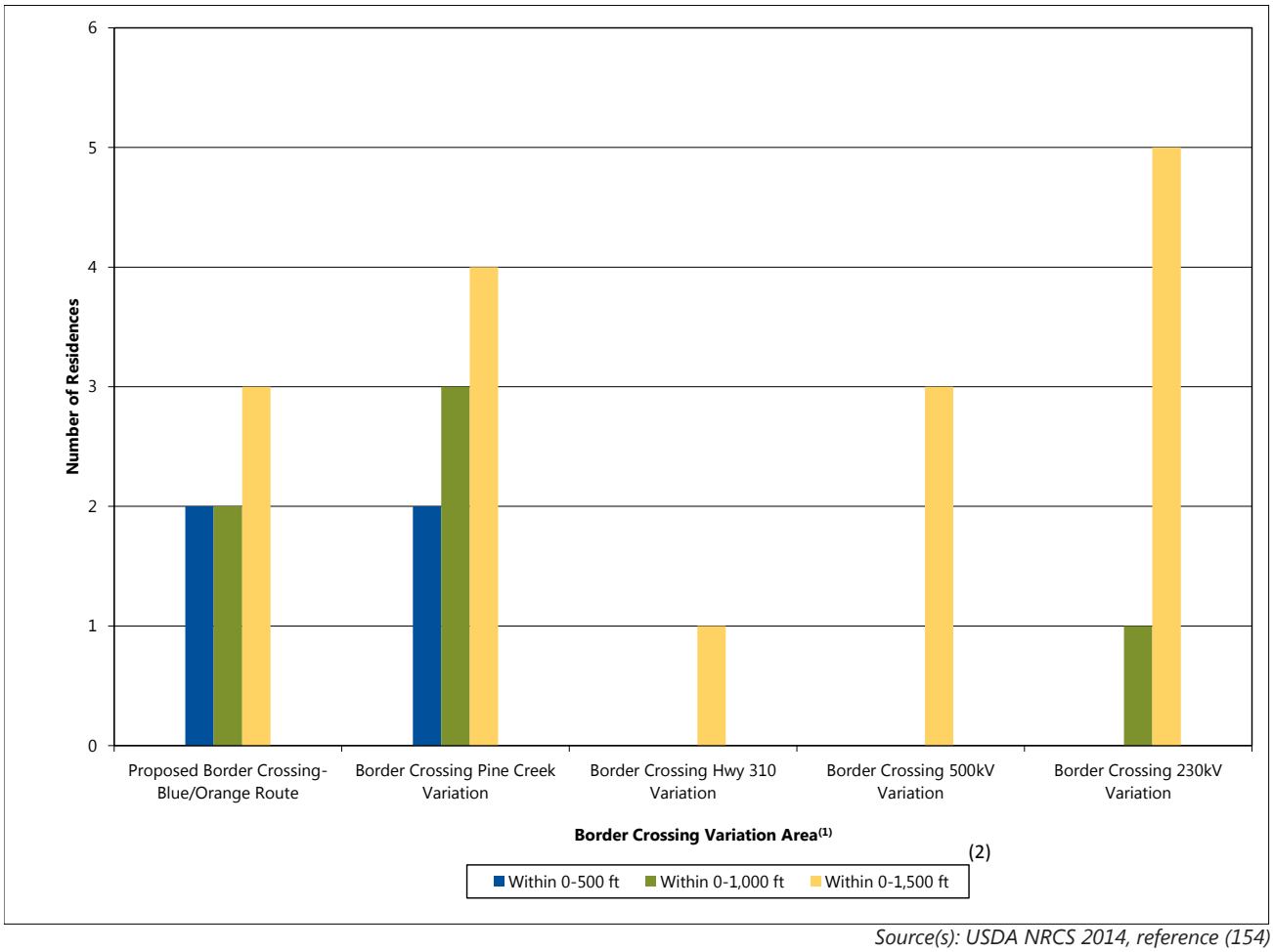
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148)

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



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

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

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.

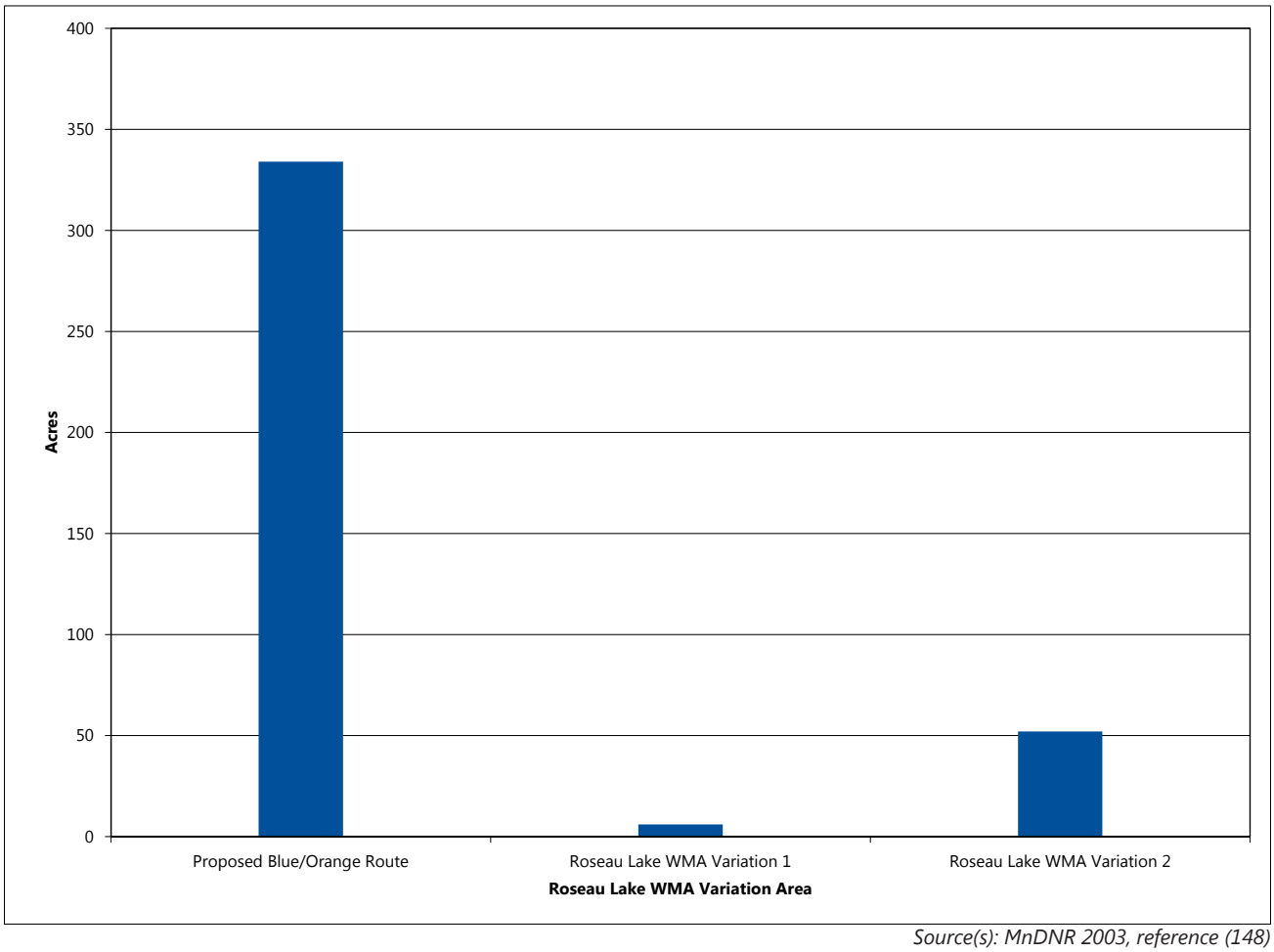
As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. However, such impacts are not expected from the proposed Project because such activities do 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 APE for potential direct effects to archaeological and historic architectural resources includes the 200-foot ROW of the proposed transmission line. In addition, potential indirect effects to historic architectural sites 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 sites. Table 6-17 provides a summary of the previously recorded archaeological 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 be found in the Phase IA cultural resources survey report located in Appendix P.

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



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

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

Within the Roseau Lake WMA Variation Area, the Proposed Blue/Orange Route does not cross any archaeological or historic architectural sites, while the Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 cross substantially more archaeological and historic architectural resources. None of the archaeological or historic architectural sites 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 effects as a result of the construction or operation of the proposed Project. The two historic architectural sites, RO-JAD-002 (Bridge No. L9057) and RO-DET-002 (Town Hall), that are located within the Roseau Lake WMA Variation 2 indirect APE, have not been evaluated for NRHP 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 effects 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 effects on 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 wooden bridge. Because the NRHP eligibility status for the historic architectural sites has not been evaluated, the significance of these impacts 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

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.

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.

As the proposed route and variations have not yet been surveyed, historic architectural site surveys, inventories, or assessments 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 proposed PA 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 architectural sites as a result of construction 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.

6.2.2.4 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 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 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 6-18 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)

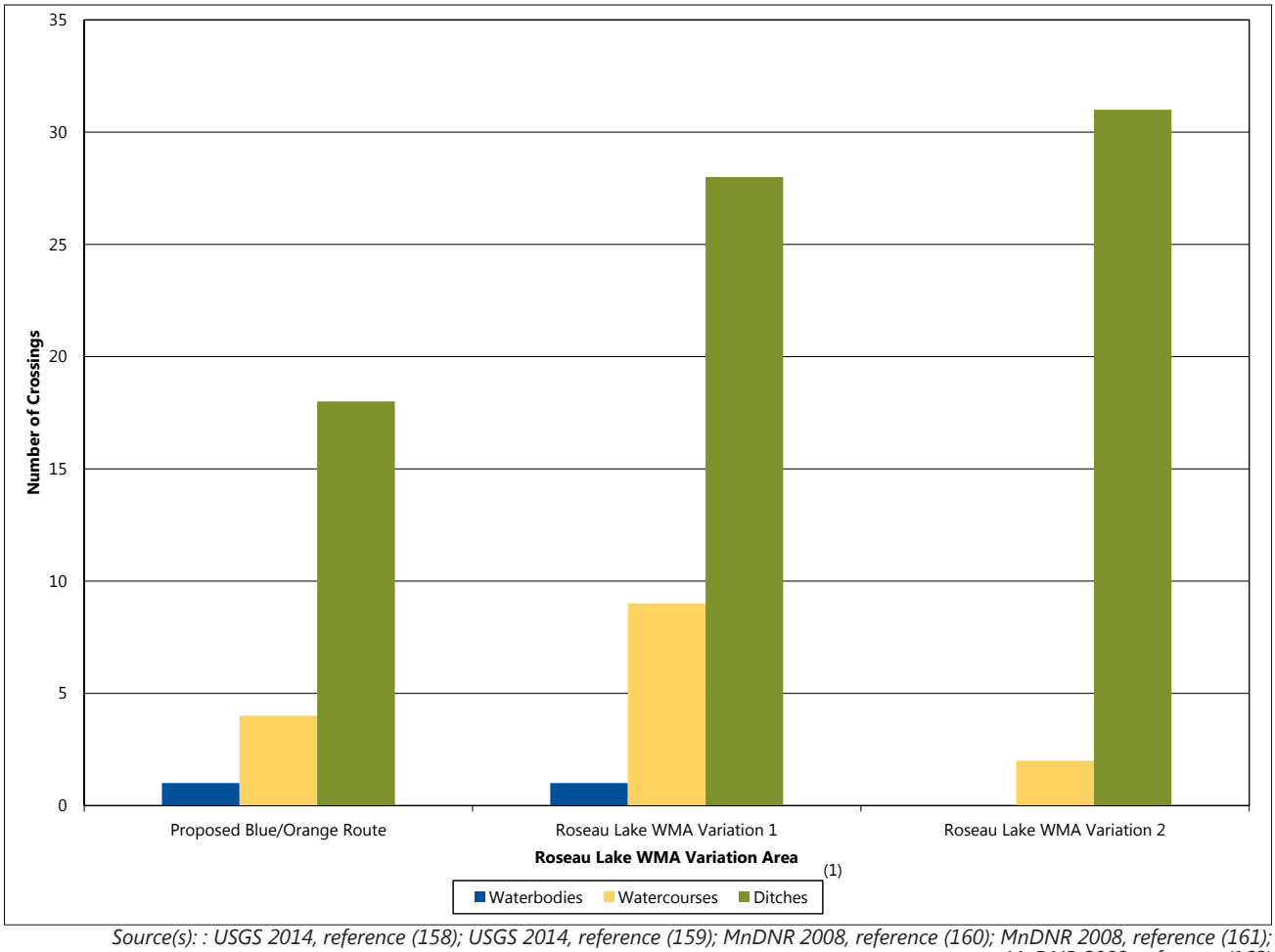
Note(s): Totals may not sum due to rounding

(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 are described in the text and figure below.

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.

Vegetation

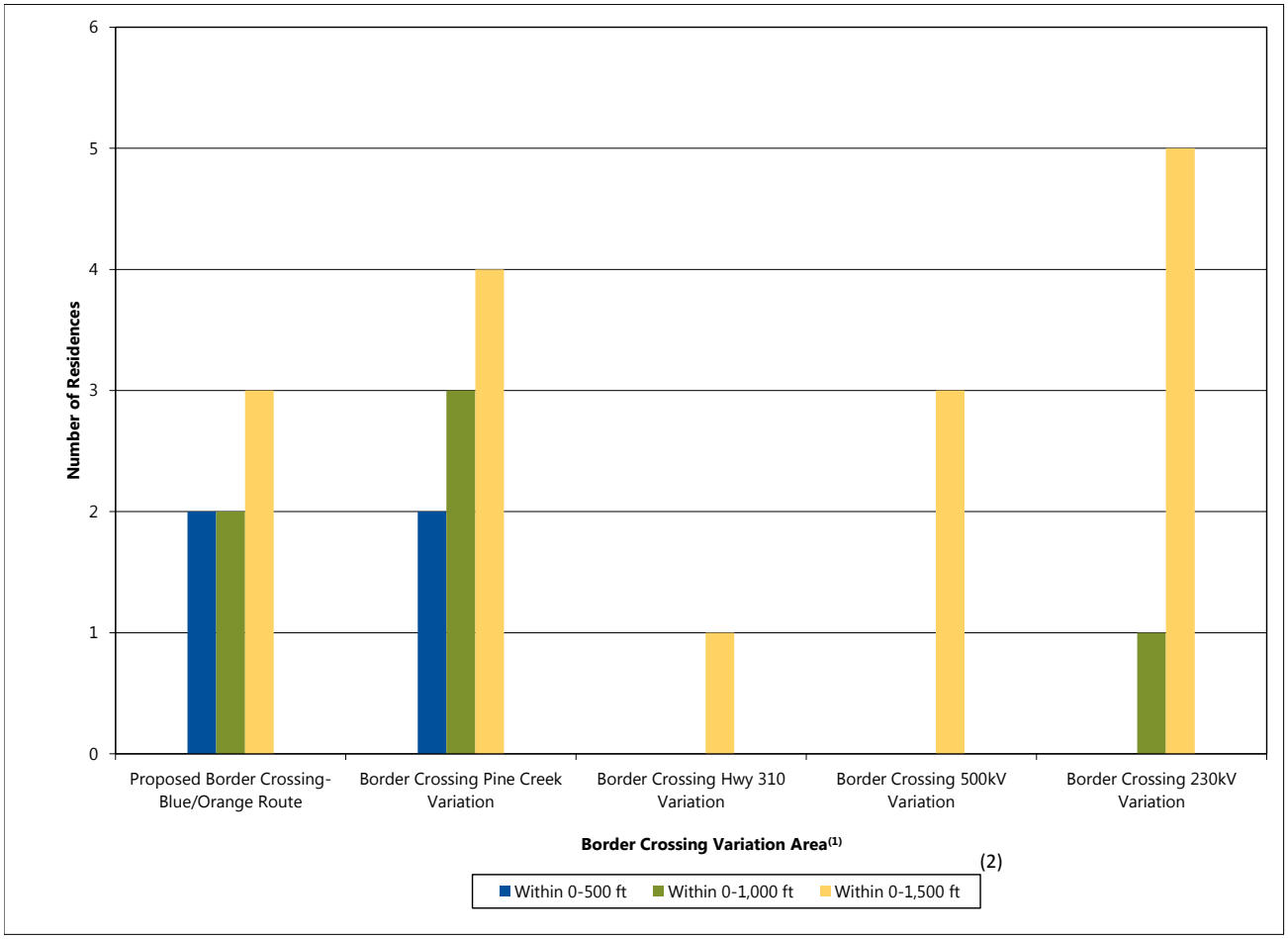
In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Roseau Lake WMA Variation Area are summarized in Table 6-19 and shown on Maps 5-5 and 6-8. Additional vegetation data beyond the dominant 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 Table 6-19 and Figure 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 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 6-17 Acres of Floodplain by Type within the Anticipated ROW in the Roseau Lake WMA Variation Area



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

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

Wildlife

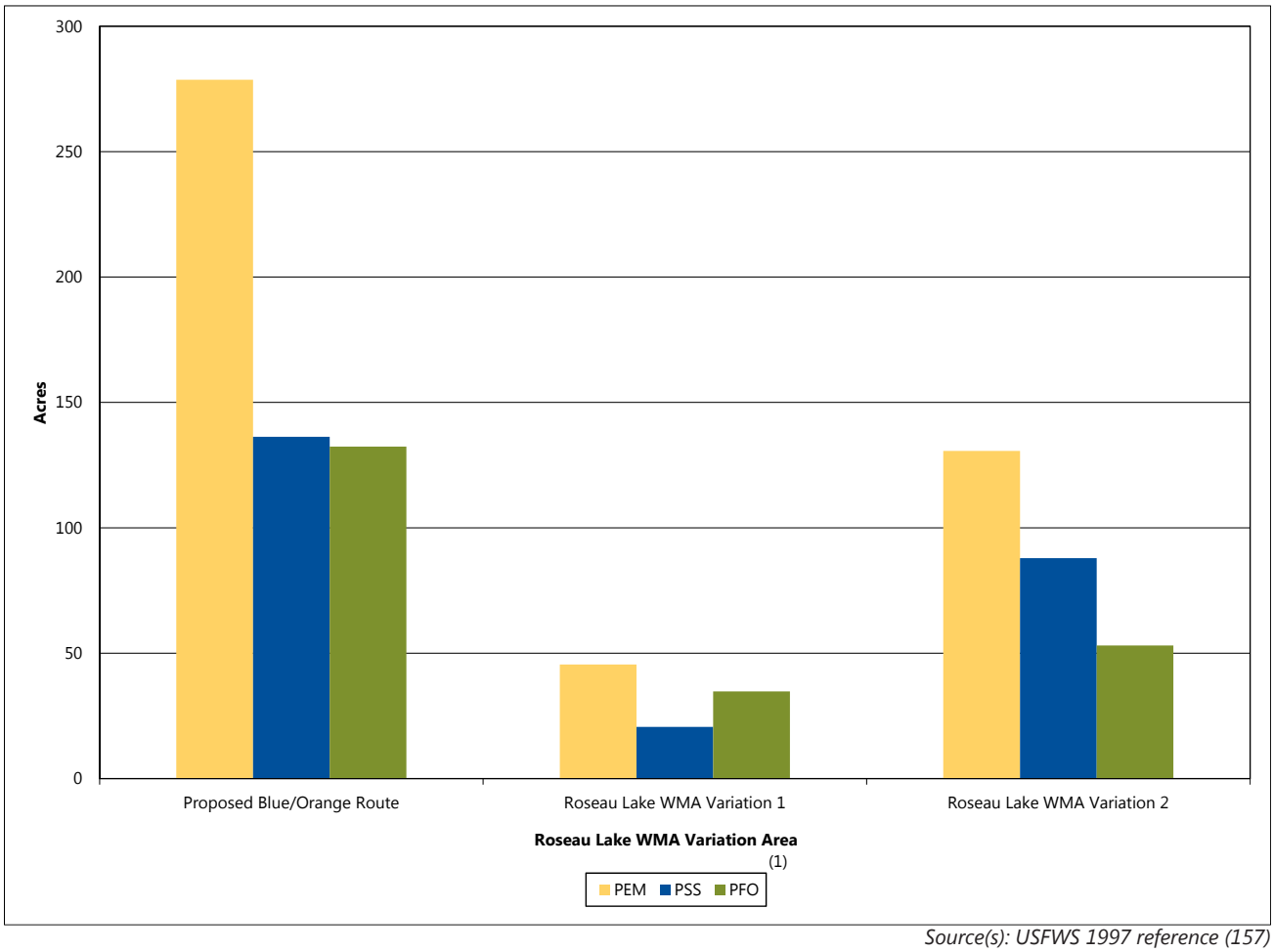
The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Roseau Lake WMA Variation Area are summarized in Table 6-20 and shown on Map 6-8. Additional, more detailed data related to wildlife resources in this variation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

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).

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.

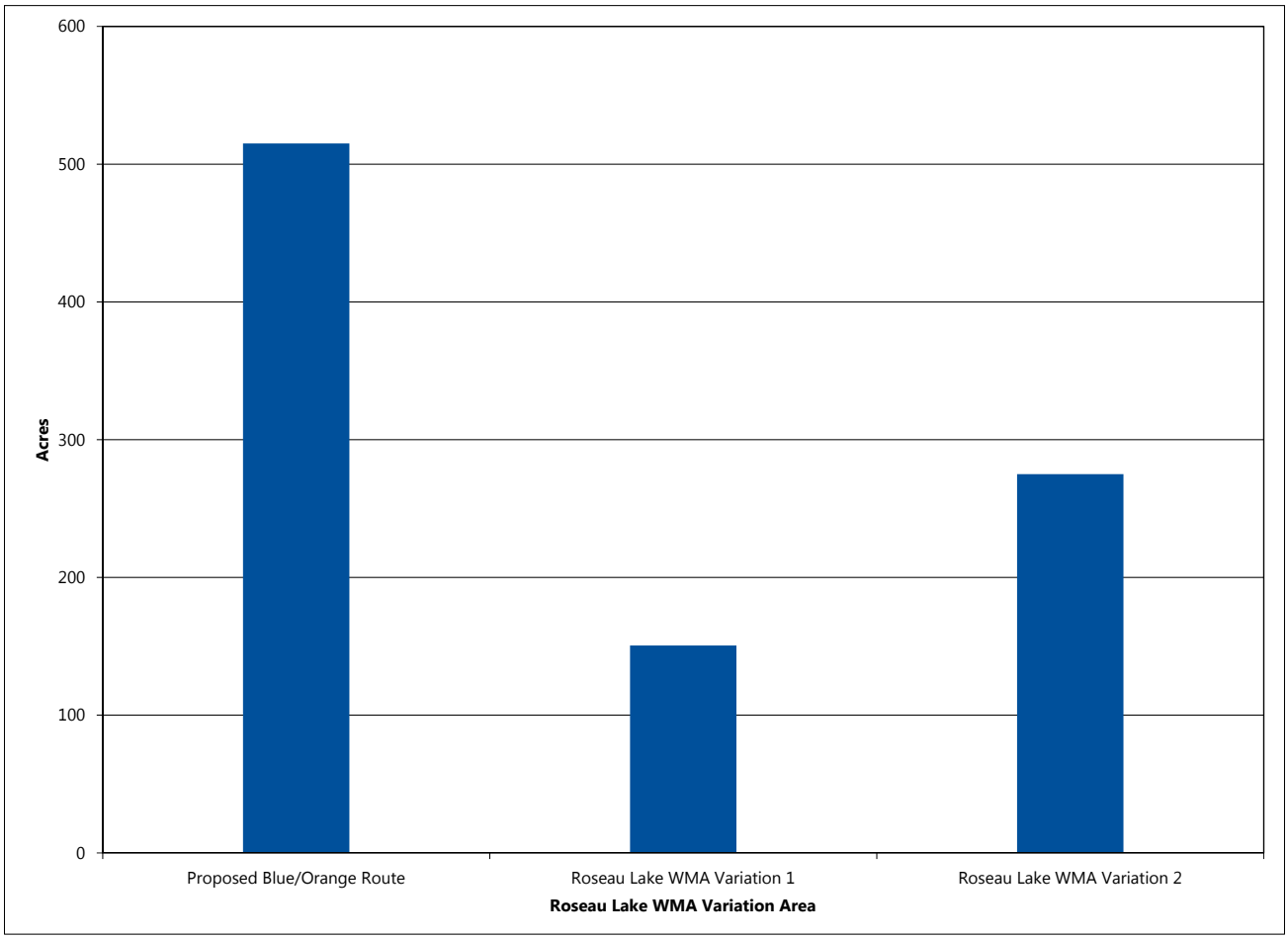
6.2.2.5 Rare and Unique Natural Resources

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 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

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



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

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

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; 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

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)

(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.

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).

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
Anthus spragueii	Sprague's Pipit	Candidate	Endangered	Bird	X		
Cypripedium arietinum	Ram's-head Lady's-slipper	None	Threatened	Vascular Plant	X		
Spilogale putorius	Eastern Spotted Skunk	None	Threatened	Mammal			X
Accipiter gentilis	Northern Goshawk	None	Special Concern	Bird	X		X
Ammodramus nelsoni	Nelson's Sparrow	None	Special Concern	Bird	X		
Coturnicops noveboracensis	Yellow Rail	None	Special Concern	Bird	X		
Lasmigona compressa	Creek Heelsplitter	None	Special Concern	Mussel		X	
Ligumia recta	Black Sandshell	None	Special Concern	Mussel		X	X
Limosa fedoa	Marbled Godwit	None	Special Concern	Bird	X	X	X
Mustela nivalis	Least Weasel	None	Special Concern	Mammal		X	
Ranunculus lapponicus	Lapland Buttercup	None	Special Concern	Vascular Plant	X		

Source(s): MnDNR 2014, reference (132)

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

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 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 passes 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 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

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.

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 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,

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 (may include Road, Trail, PLSS, Field Line)	Percent of Total Length(2)	33	7	27
Road/Trail (may include PLSS, Field Line)	Percent of Total Length(2)	19	4	16
Field Line (may include 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

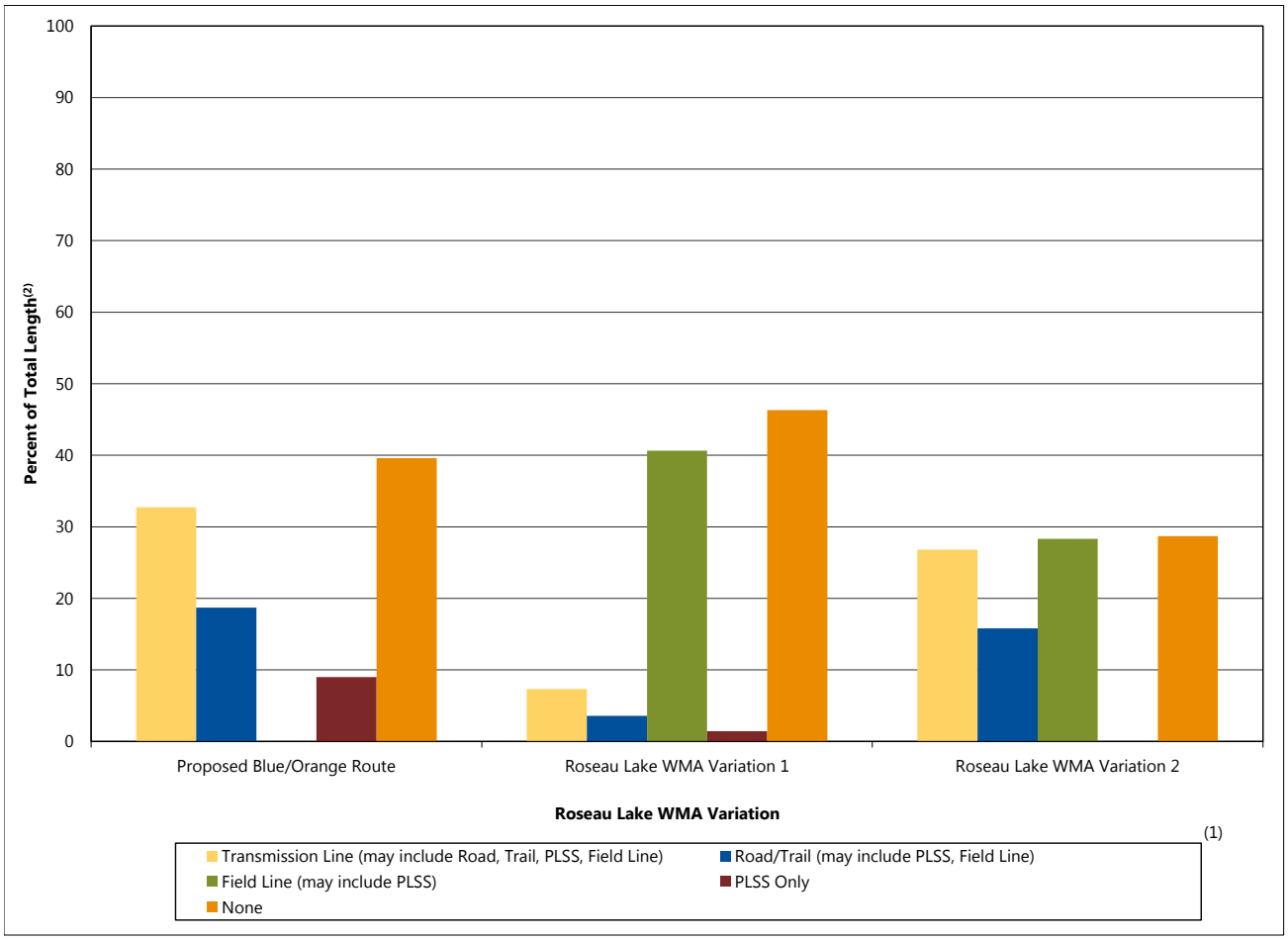
Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009, reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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.

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

Variation Area	Name in the EIS	Cost (Total)	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)

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

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 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/

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	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)

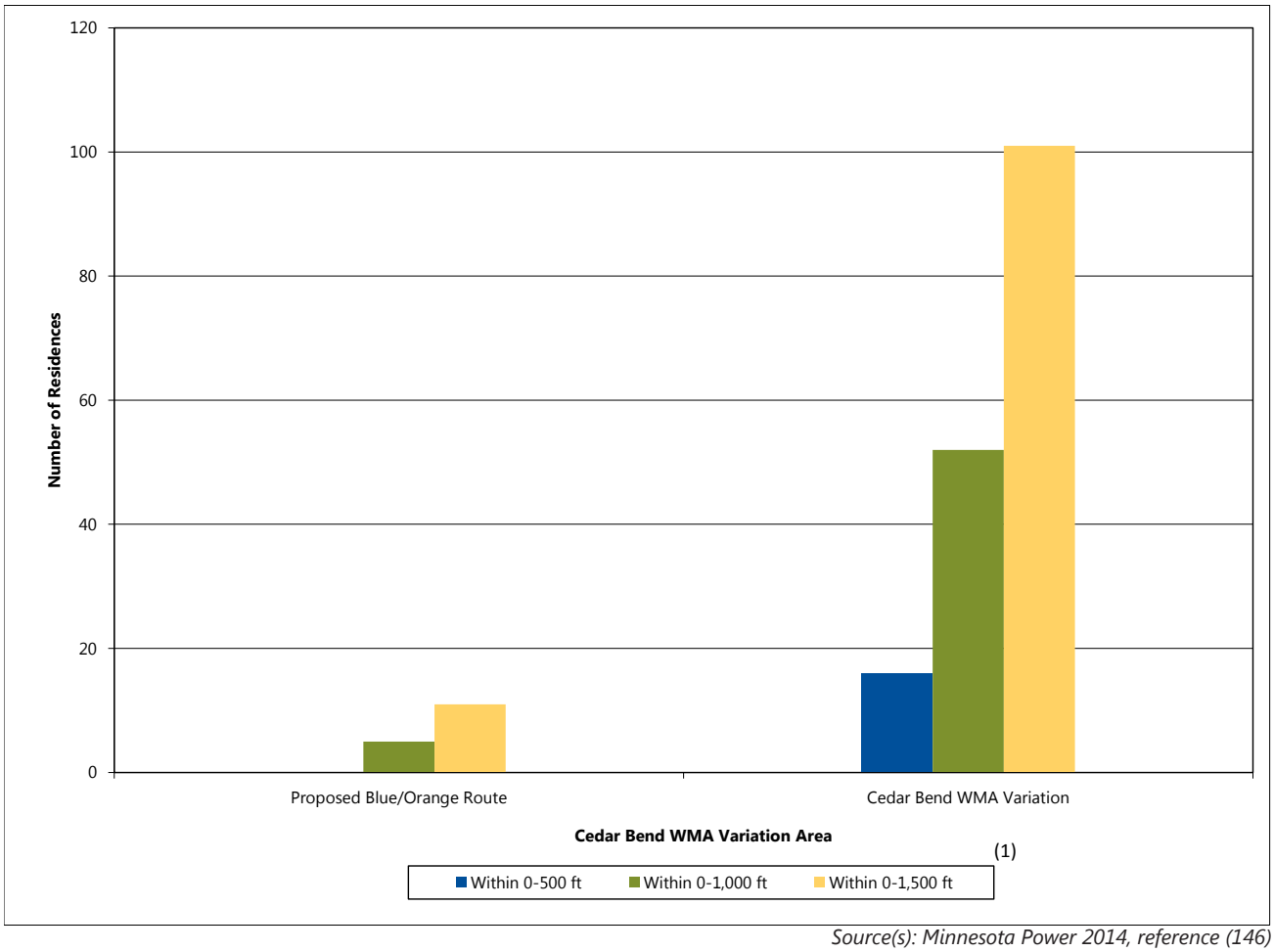
Note(s): Totals may not sum due to rounding

(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.

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

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

Table 6-27 identifies the amount of land by ownership 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 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.

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

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

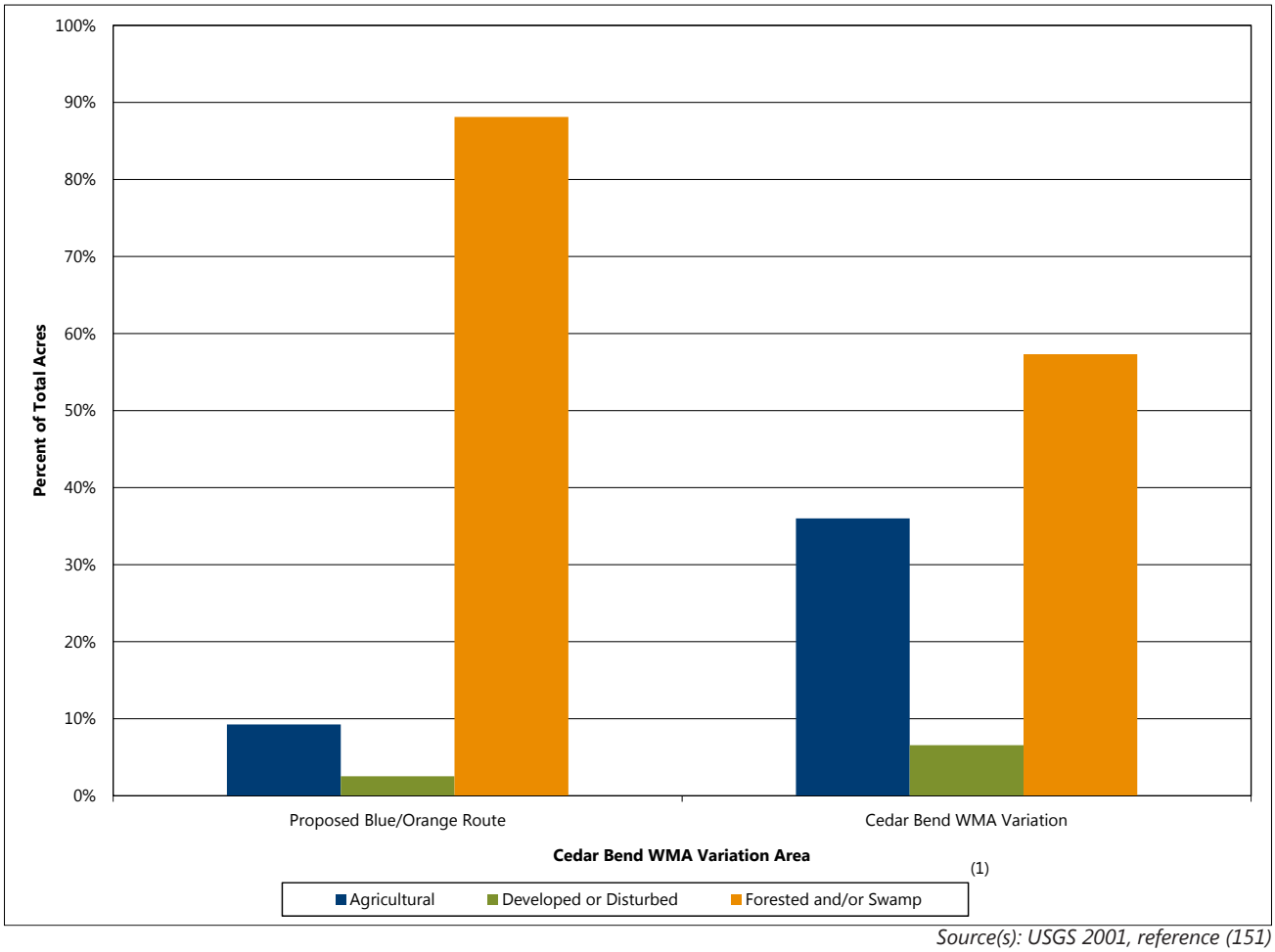
Source(s): USGS 2001, reference (151)

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

(1) Other category includes: Open water, Great Plains Grassland & 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.

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 & Shrubland and Introduced & Semi Natural Vegetation. See detailed summary of all types in Appendix E.

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

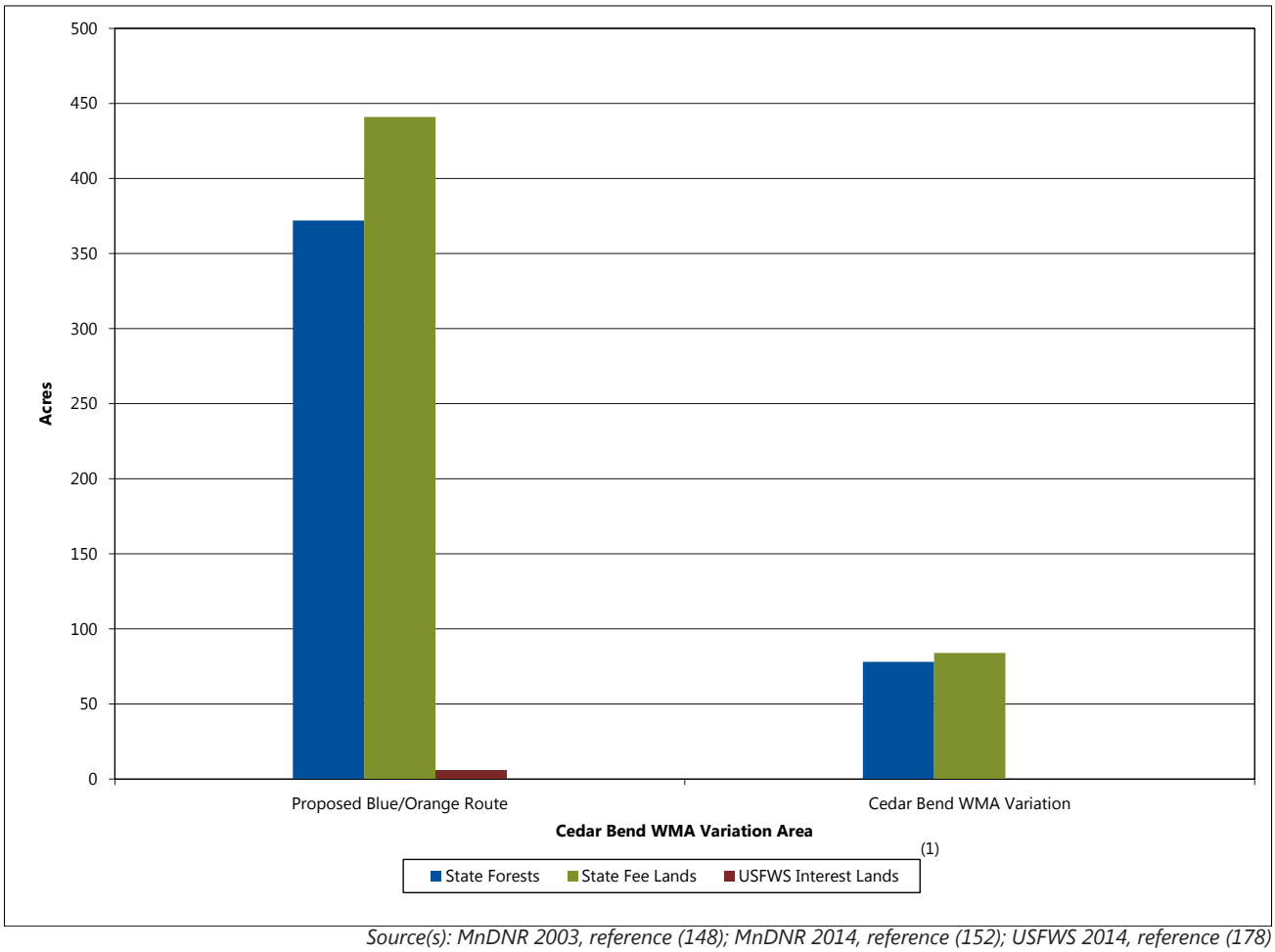
Resource	Type	Evaluation Parameter	Cedar Bend WMA Variation Area	
			Proposed Blue/ Orange Route	Cedar Bend WMA Variation
State Forests	--	Acres within ROW	372	78
State Fee Lands[1] Total	--	Acres within ROW	441	84
State Fee Lands[1] by Type	Consolidated Conservation	Acres within ROW	397	78
	Other - 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

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.

Figure 6-23 Land Ownership within the ROI in the Cedar Bend WMA 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.

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.

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	--	Acres within ROW	97	0

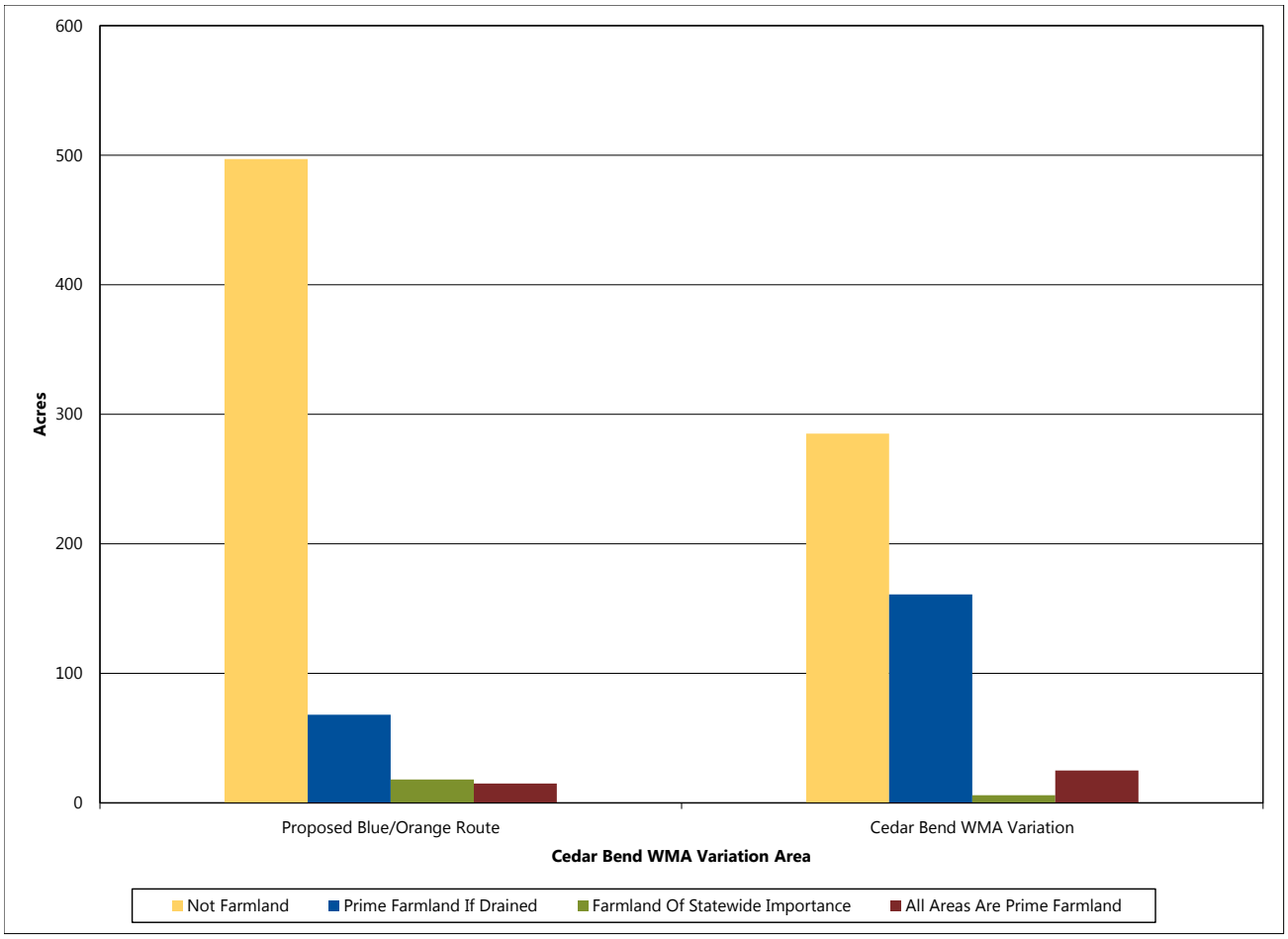
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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.

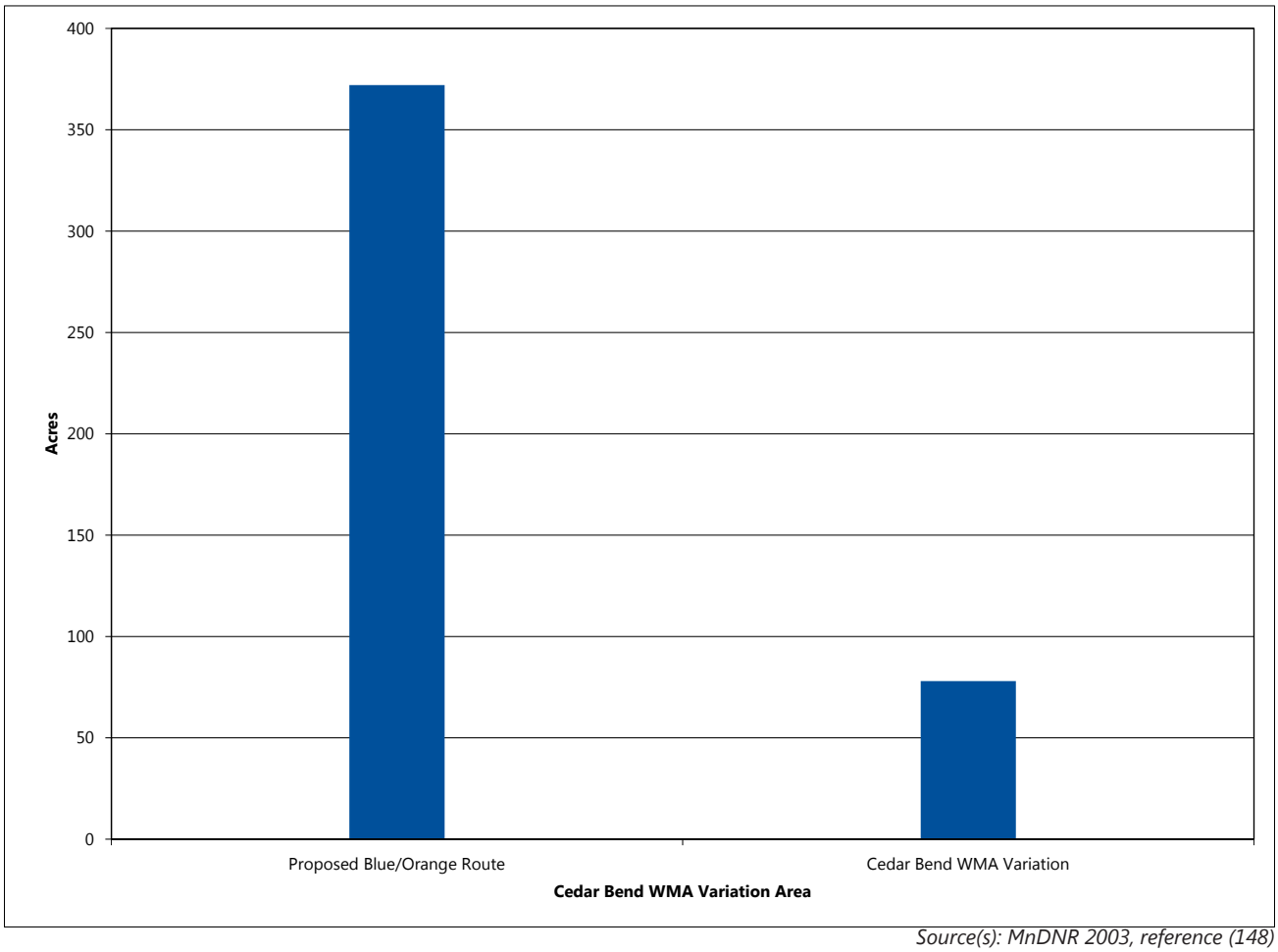
Figure 6-24 Acres of Farmland by Type within the Anticipated ROW in the Cedar Bend WMA Variation Area



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

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.

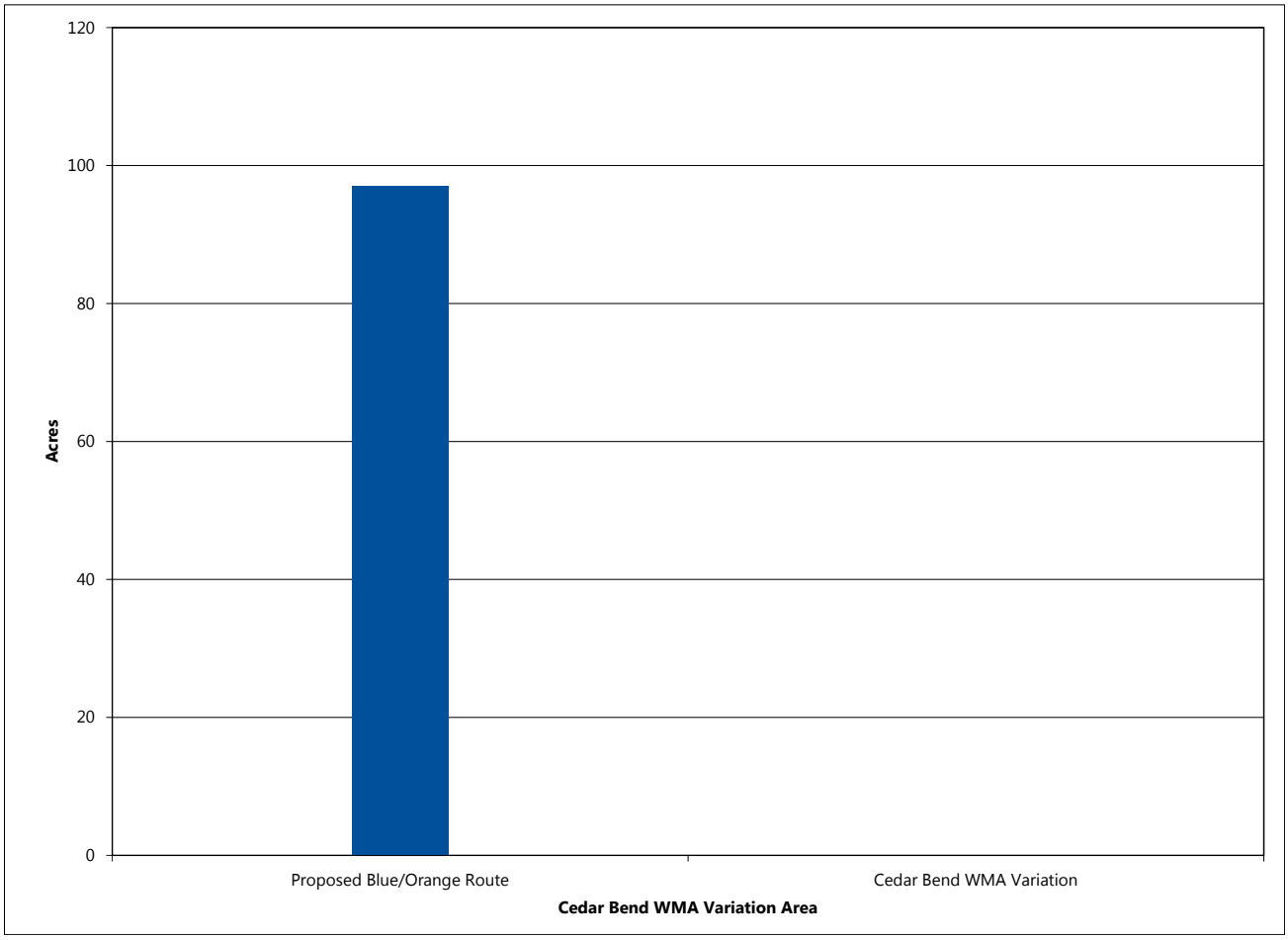
As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, 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 known aggregate resources or records of current mineral mining in the ROW of either the Proposed Blue/Orange Route or the Cedar Bend WMA Variation.

Figure 6-26 Acres of State Mining Land within the Anticipated ROW in the Cedar Bend WMA Variation Area



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

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

The Proposed Blue/Orange Route would traverse several acres of mining lands with state mineral leases, while the Cedar Bend WMA Variation would not traverse any mining lands with 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 held by Houston Oil and Minerals Exploration Company. 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 effects to archaeological and historic architectural resources includes the 200-foot 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 site.

Table 6-29 provides a summary of the previously recorded archaeological and historic architectural sites 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.

Within the Cedar Bend WMA Variation Area, no archaeologic sites or historic structures are present

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.

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 unknown NRHP eligibility. 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 resource investigations have not yet occurred for the Proposed Route or variations. Direct, adverse, long-term significant 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 effects to the resource that could be considered an adverse effect under Section 106 of the NHPA if this archaeological resource is determined NRHP-eligible. There is currently the potential for indirect, significant adverse effects to the historic resource sites 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. This indirect effect 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, detracting from the existing setting of the bridge.

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 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. As the proposed route and variation have not been surveyed,historic architectural site surveys, inventories, or assessments will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural site. These cultural resources investigations will be implemented as part of the DOE's proposed PA 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 effects on historic architectural site 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.

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 are described in the text and figure below.

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.

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.

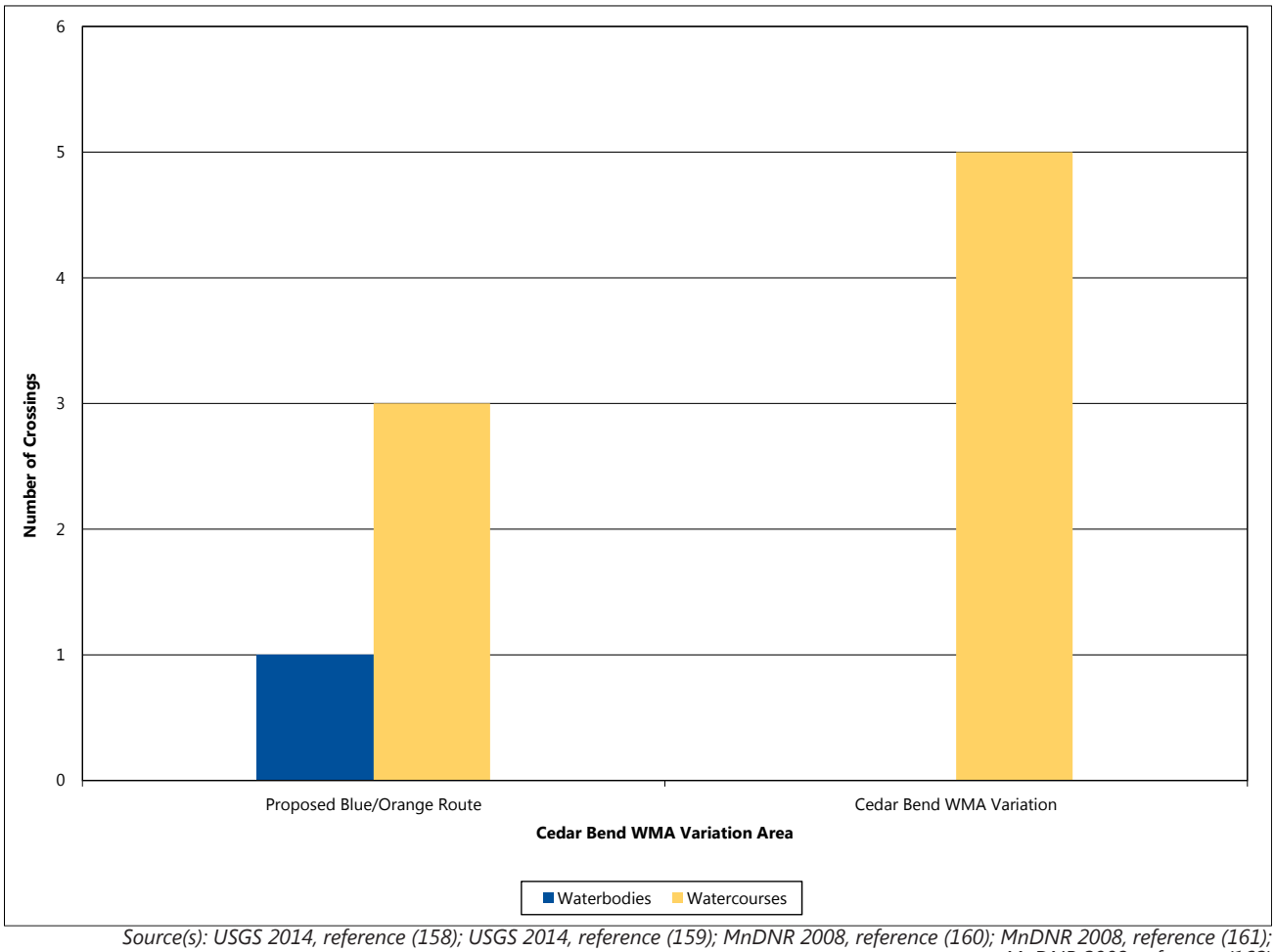
The Proposed Blue/Orange Route and the Cedar Bend WMA Variation would each require crossing the East Branch of the Warroad River and the West Branch of the Warroad River once. In addition, the Cedar Bend WMA Variation would cross Willow Creek. Each of these is a MPCA-listed impaired water, as shown on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

It is anticipated that PWI crossings, non-PWI water crossings, and impaired waters are spannable (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 westtland type through removal of woody vegetation in the ROW. As shown in Figure 6-29, the Proposed Blue/Orange Route contains more than

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

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.

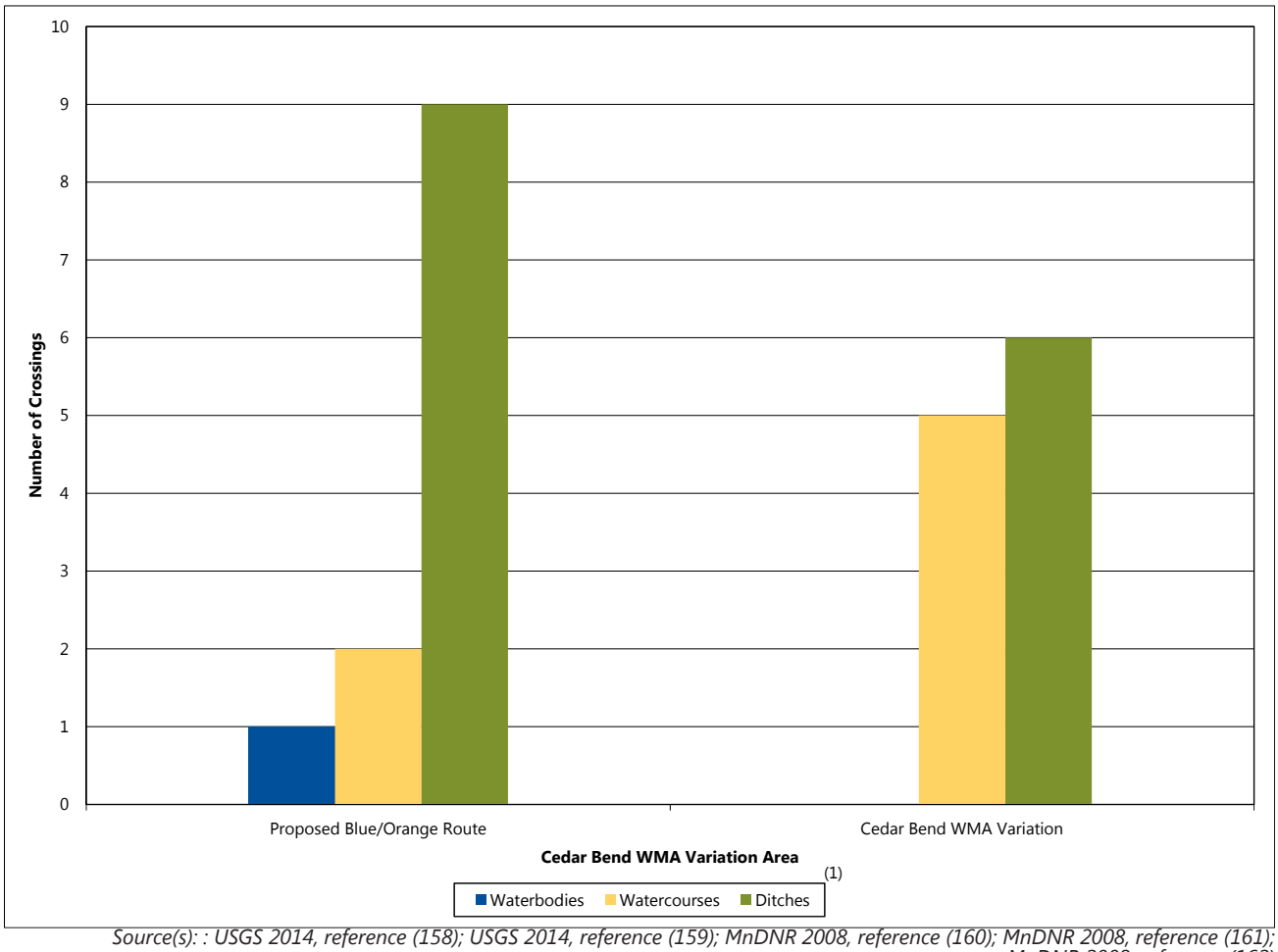
Both the Proposed Blue/Orange Route and the Cedar Bend WMA Variation would require placement of permanent fill in wetlands for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the West Section generally exceed the average spanning length allowable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

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.

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.

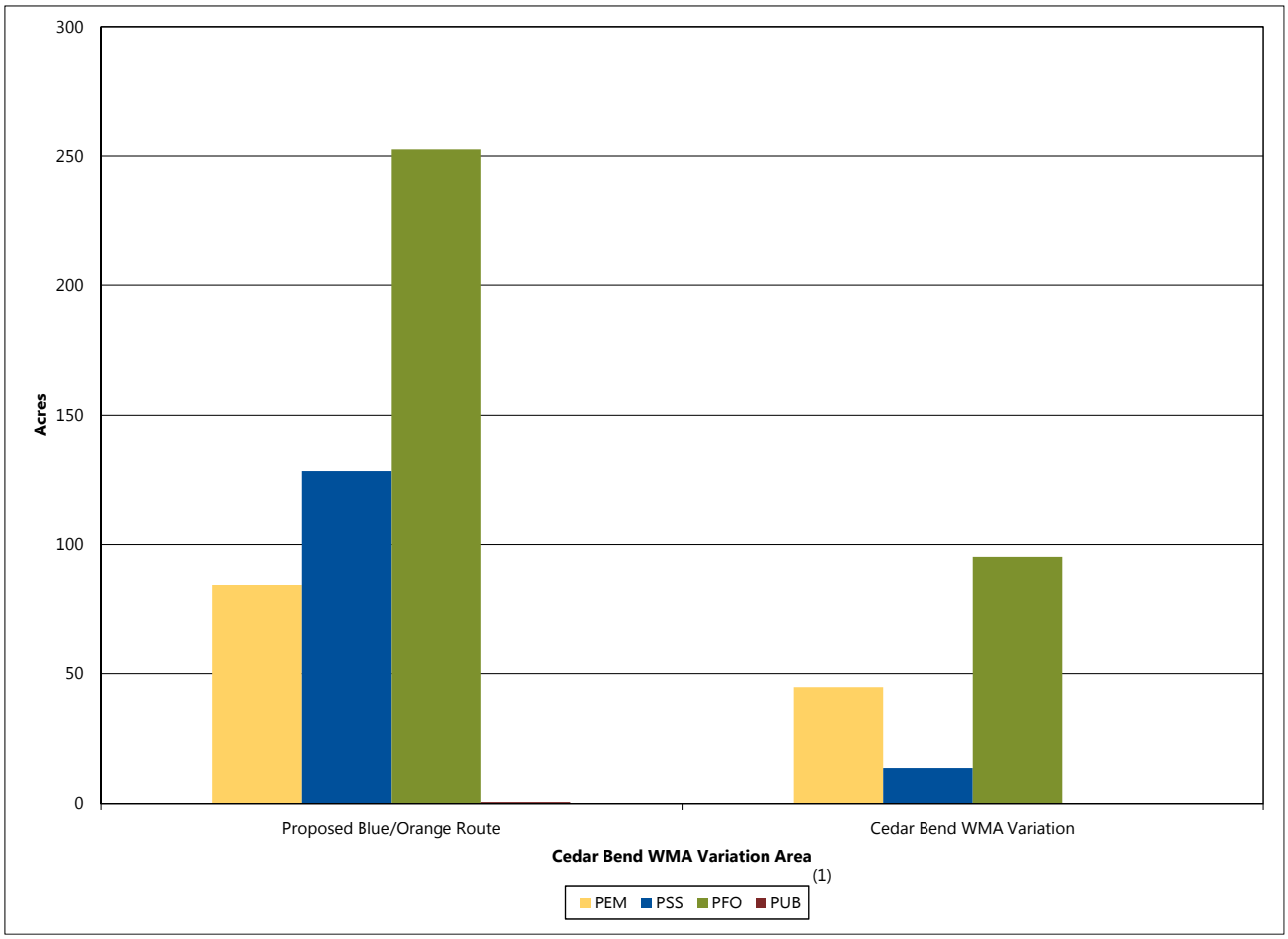
As indicated in Table 6-31 and Figure 6-30, the Proposed Blue/Orange Route would pass through more forested land, including state forest, therefore resulting in more permanent removal of forested vegetation relative to the Cedar Bend WMA Variation. However, both the Proposed Blue/Orange Route and the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

Figure 6-29 Acres of Wetland by Type within the Anticipated ROW in the Cedar Bend 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), palustrine unconsolidated bottom pond (PUB).

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).

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

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 & 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 & 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.

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

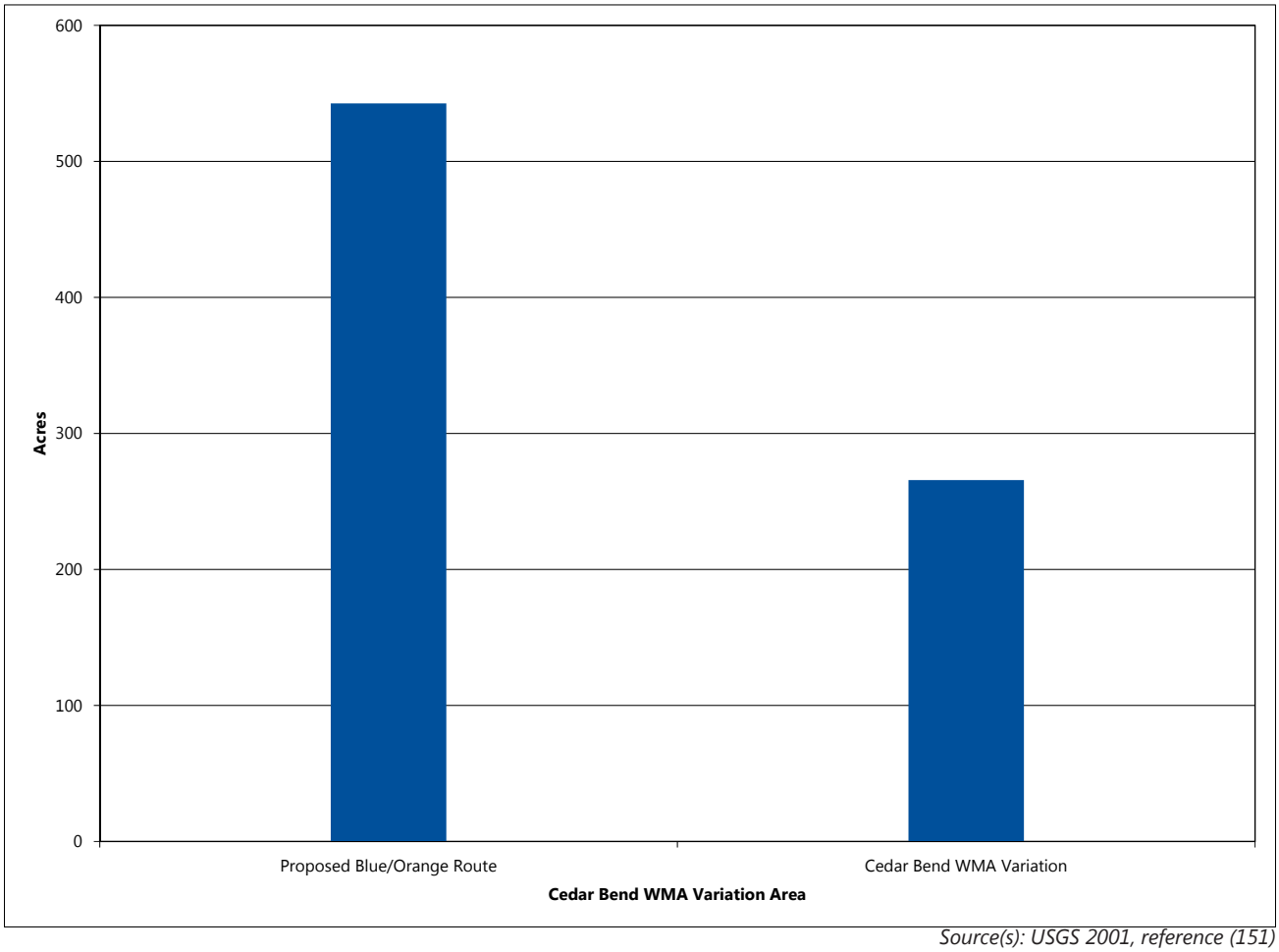
Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally-listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, 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.

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
Cypripedium arietinum	Ram's-head Lady's-slipper	None	Threatened	Vascular Plant	X	
Botrychium simplex	Least Moonwort	None	Special Concern	Vascular Plant	X	
Ichthyomyzon fossor	Northern Brook Lamprey	None	Special Concern	Fish		X

Source(s): MnDNR 2014, reference (132)

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

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, two 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 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 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 passes 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

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.

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.

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 (may include 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)	Cost (per mile)	Length (mi)
Cedar Bend WMA	Proposed Blue/ Orange Route	$27,197,650	$1,101,119	24.7
	Cedar Bend WMA Variation	$21,235,417	$1,084,970	19.6

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

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

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.

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.

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.

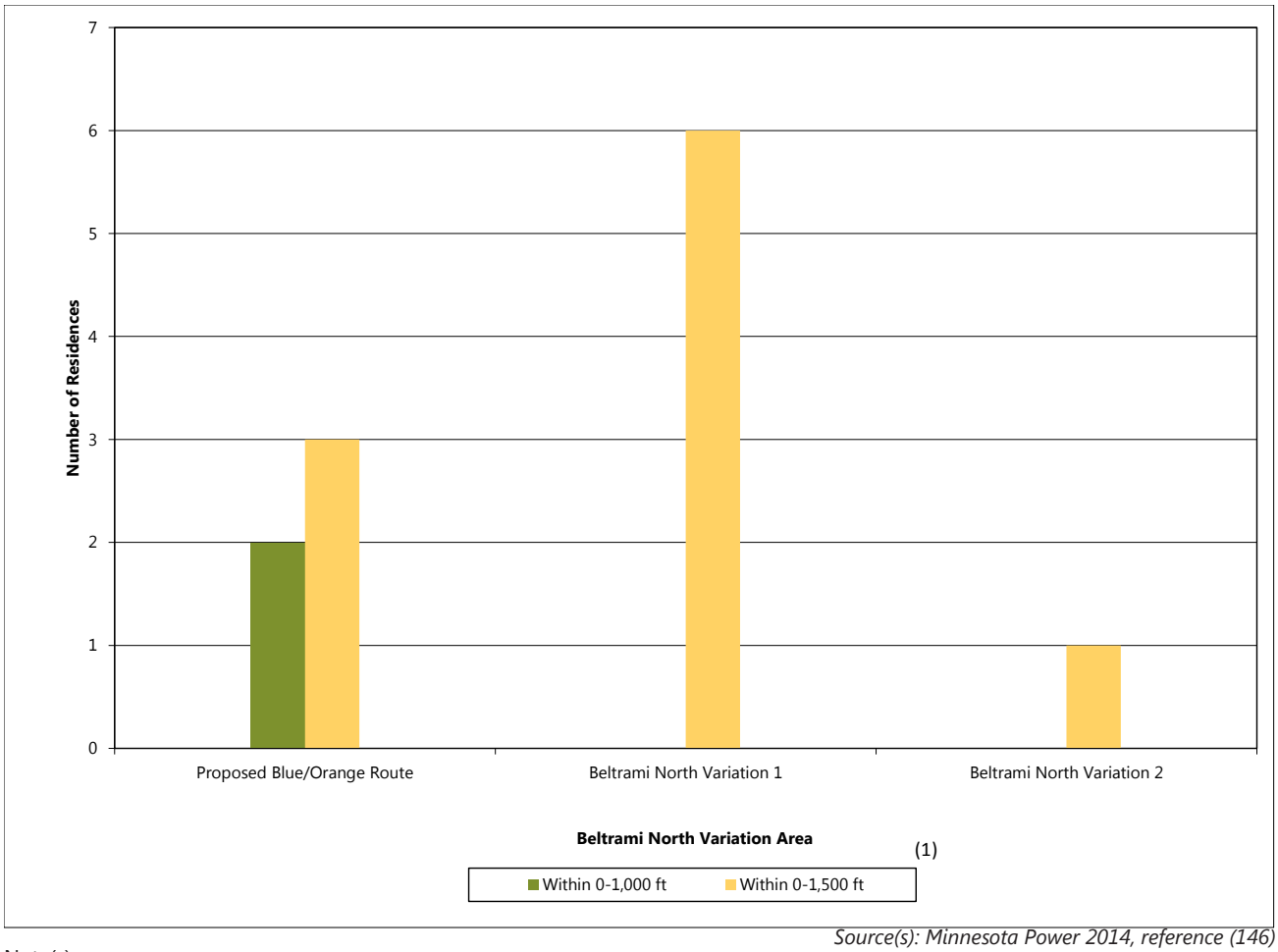
Aesthetics

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) 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

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.

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.

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 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
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

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.

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

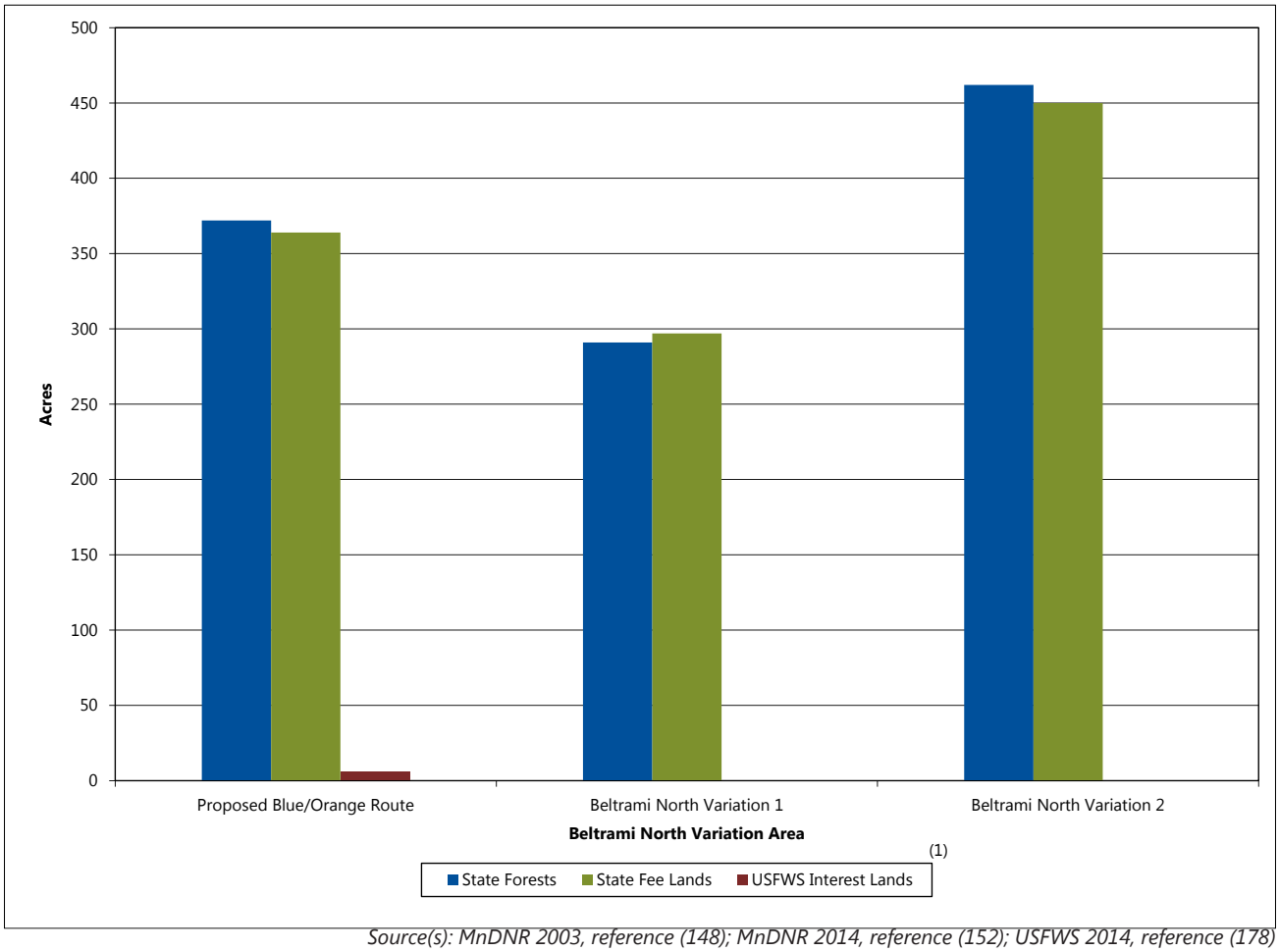
Table 6-38 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue/Orange Route, Beltrami North Variation 1, and Beltrami North Variation 2 in the Beltrami North Variation Area. The various land uses present in the variation area are shown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

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.

Figure 6-32 Land Ownership 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.

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 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

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 Statewide 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	--	Acres within ROW	97	97	152

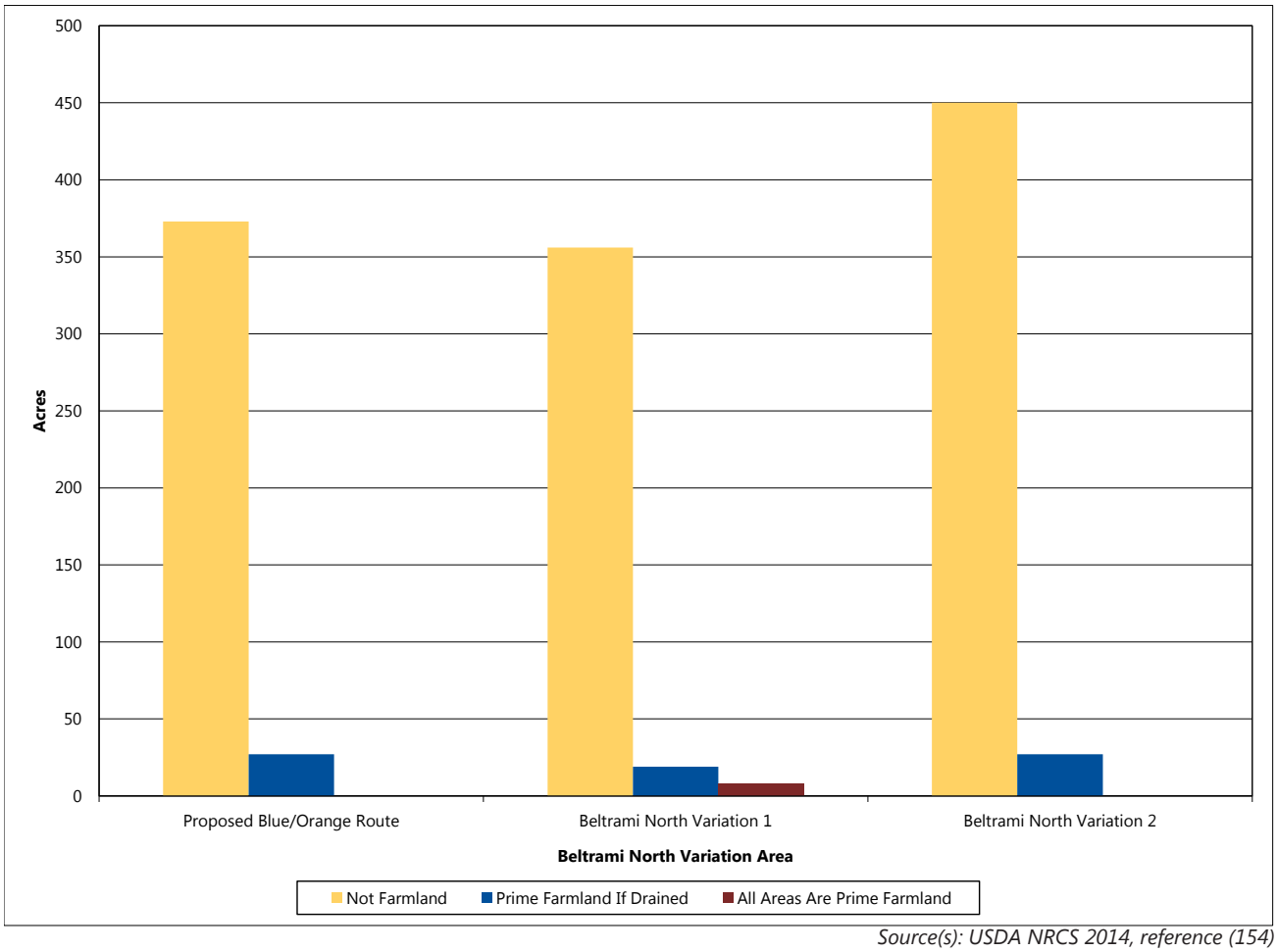
Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

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.

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

Blue/Orange Route and Beltrami North variations in the ROI.

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.

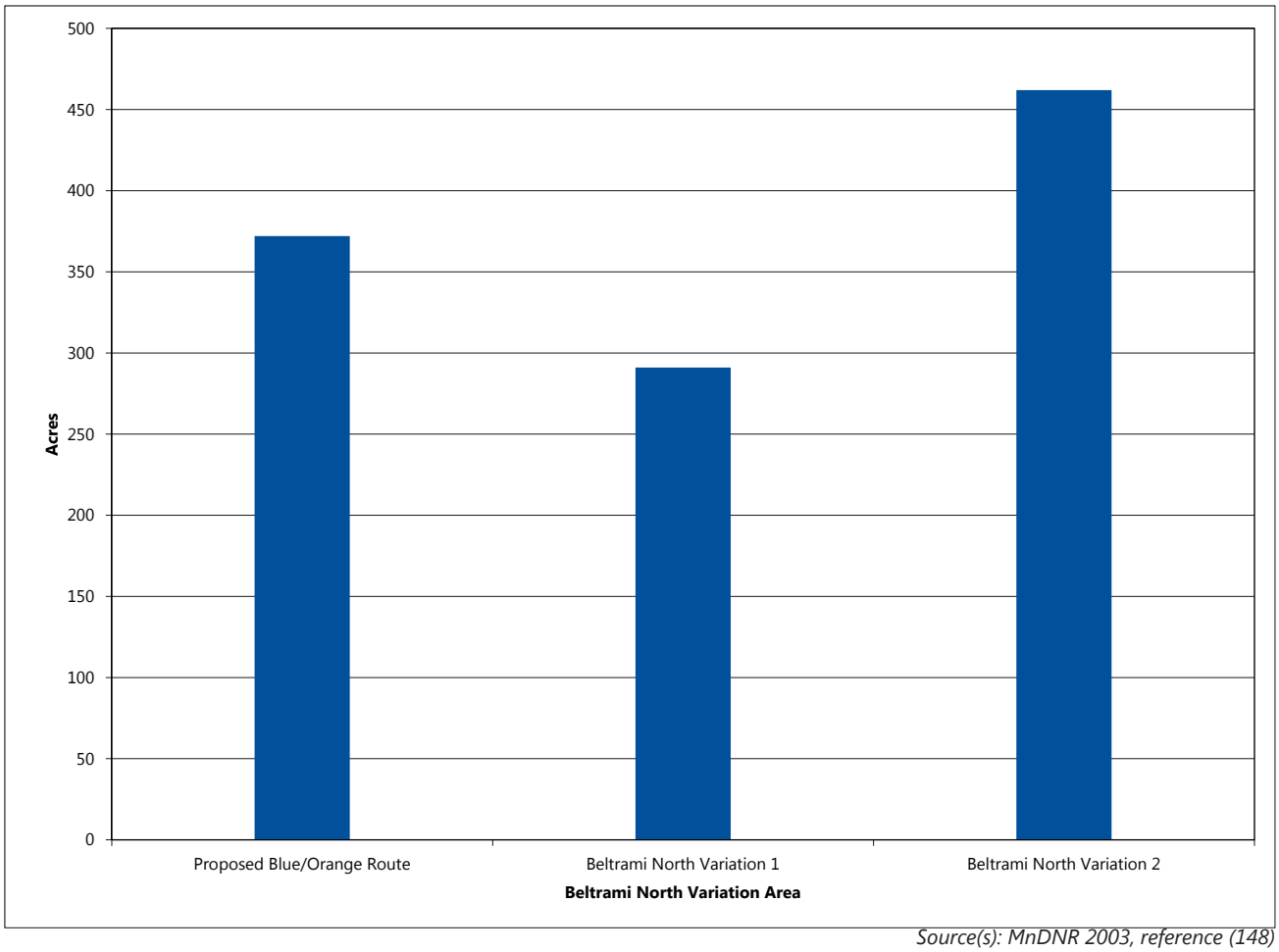
Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

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).

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

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 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.

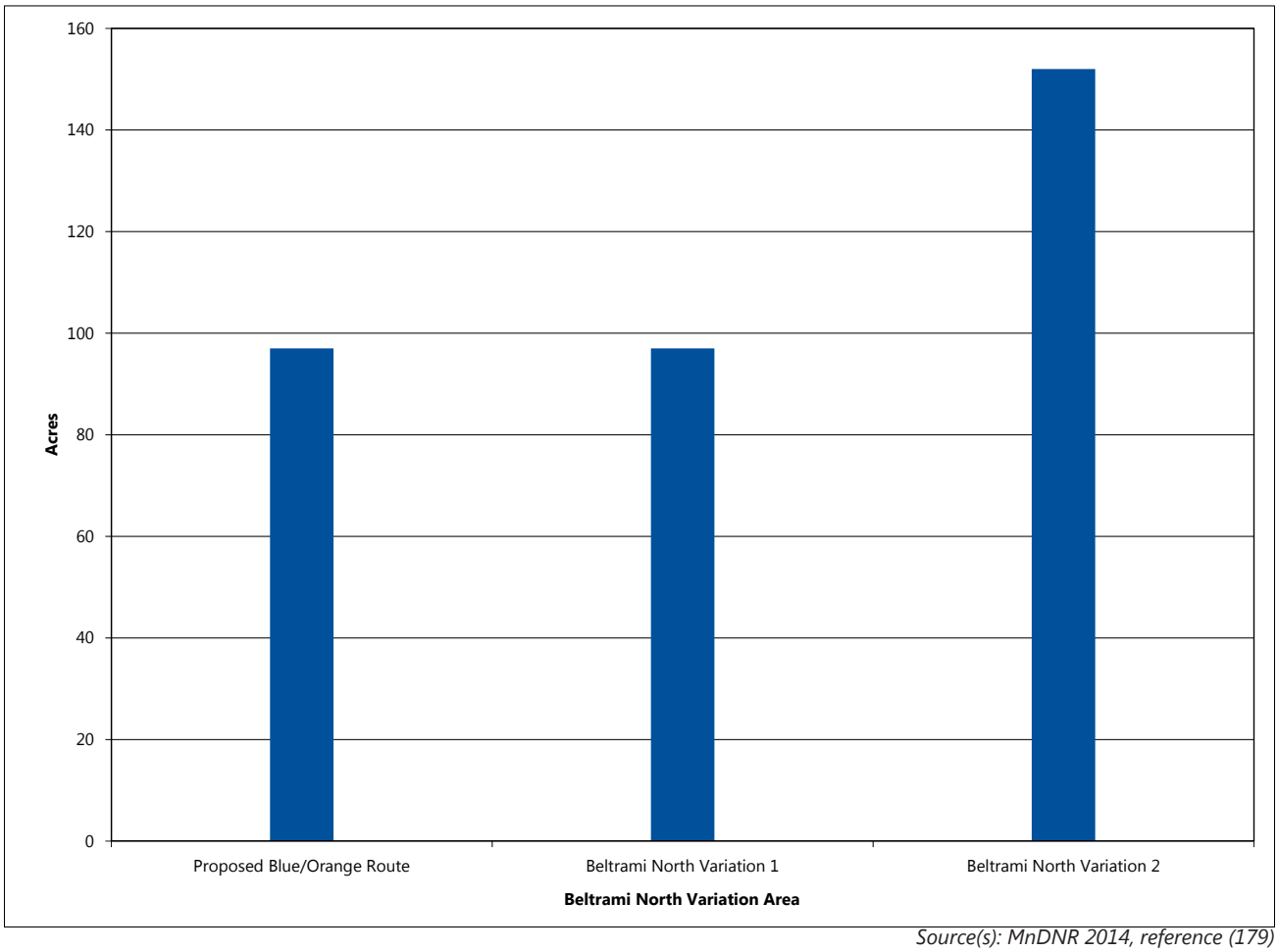
Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

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 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 held by Houston Oil and Minerals Exploration Company. Beltrami North Variation 2 would require traversing the most acres of state mineral lease lands

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



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

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

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.

(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 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 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 site. Table 6-41 provides a summary the previously recorded archaeological 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.

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 effects 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 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. 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 eligible for NRHP listing.

There is currently no identified potential for direct, long-term, adverse effects 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 significant 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 effects to the resource that could be considered an adverse effect under Section 106 of the NHPA if this archaeological resource is determined NRHP-eligible. For Beltrami North Variation 2, indirect, long-term, adverse visual effects 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 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.

As The Proposed Blue/Orange Route and Beltrami North Variations 1 and 2 have not been surveyed, historic architectural site surveys, inventories, or assessments will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural site. These cultural resources investigations will be implemented as part of the DOE's proposed PA 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 on cultural resource during Project construction and operation.

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.

6.2.4.4 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.

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	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.

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.

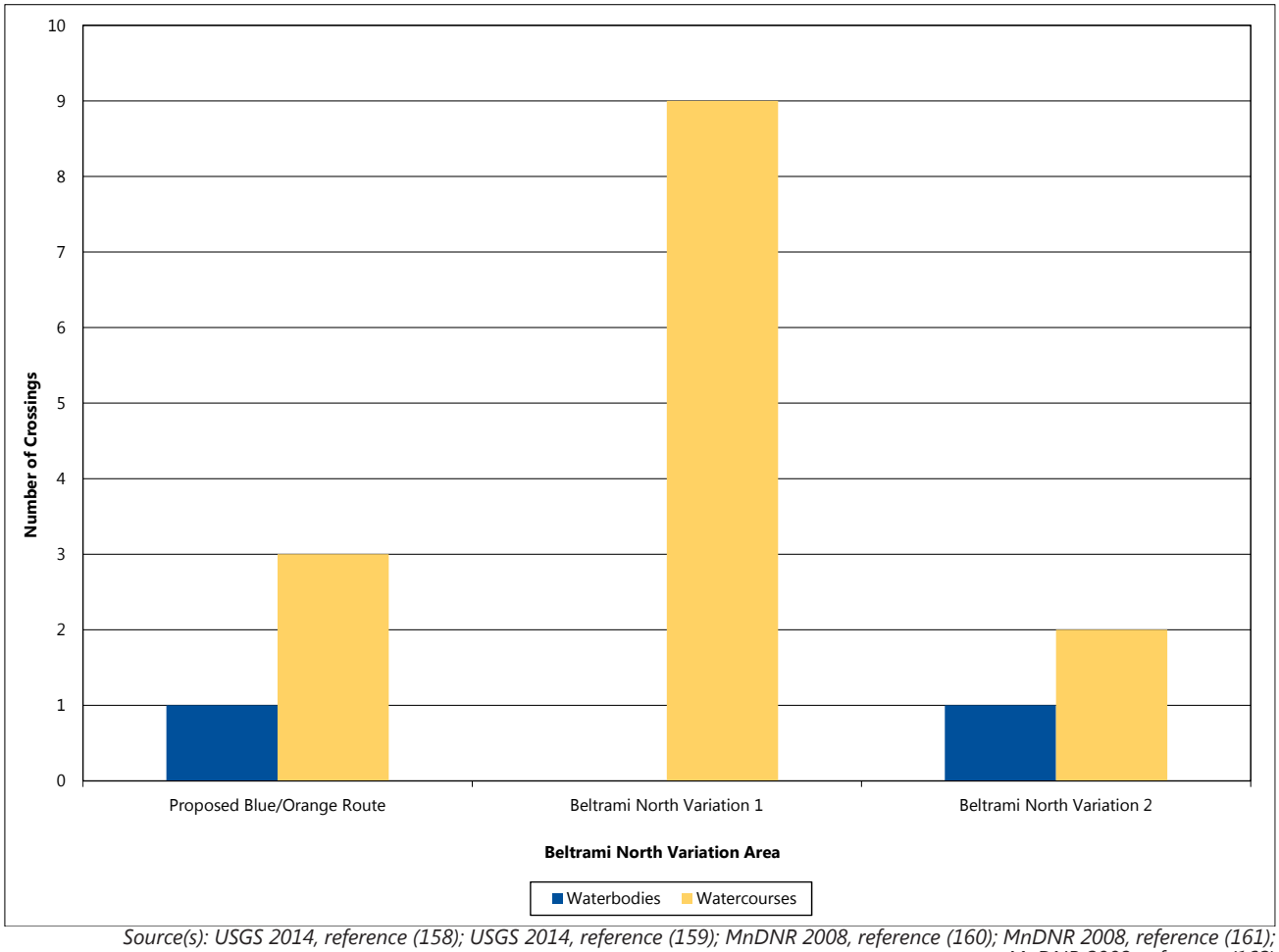
The Proposed Blue/Orange Route and both Beltrami North variations would require crossing multiple non-PWI waters, as shown in Figure 6-37. Crossings would primarily be ditches and smaller watercourses, including Clausner Creek and several smaller, unnamed streams. The Proposed Blue/Orange Route would 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 5-24. Beltrami North Variation 1 would require eight impaired water crossings, including three crossings of the East 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

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

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.

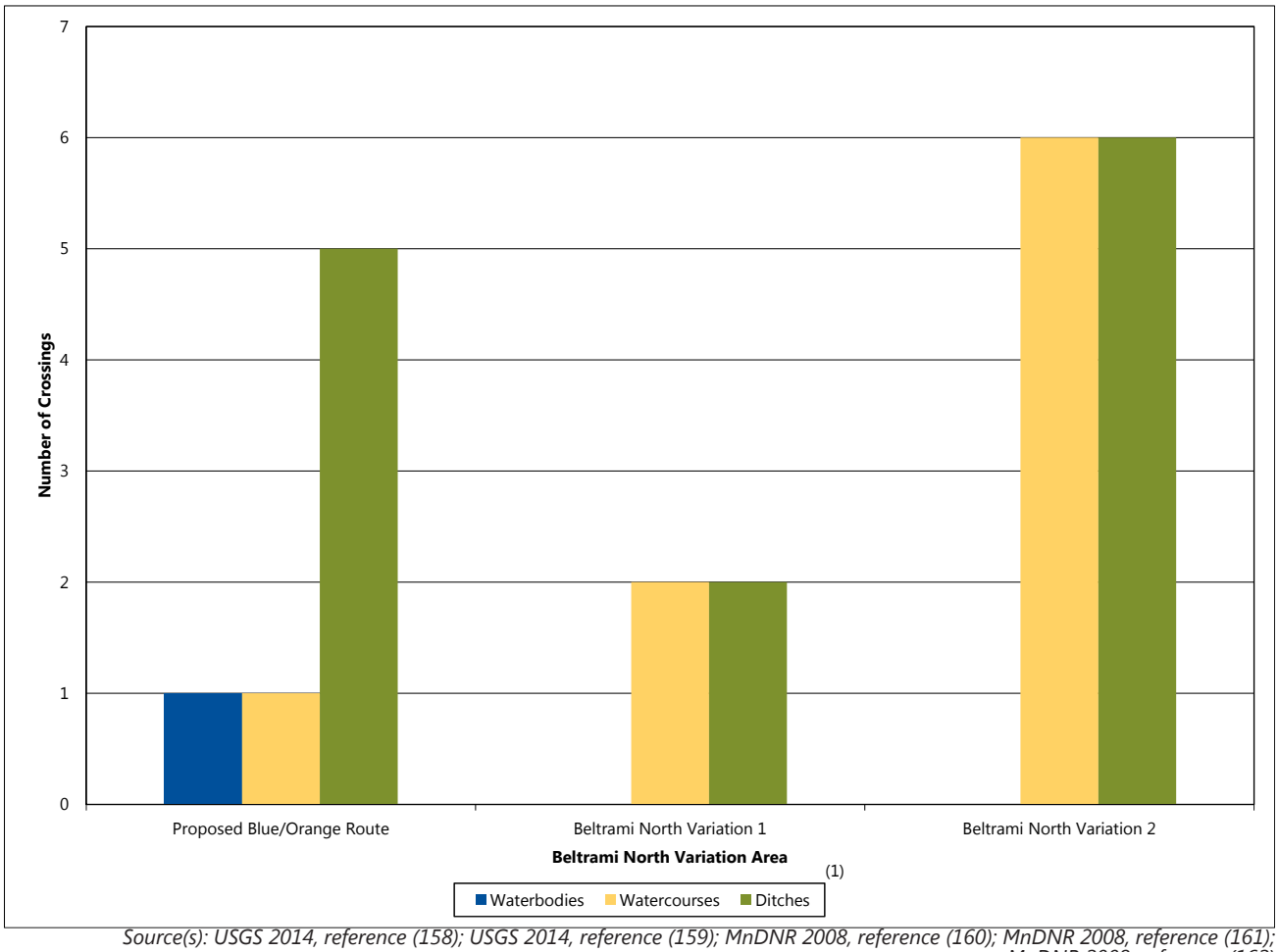
Vegetation

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 Table 6-43 and Figure 6-39, Beltrami North Variation 2 would pass through more forested land, including State Forest; therefore resulting in

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.

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 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.

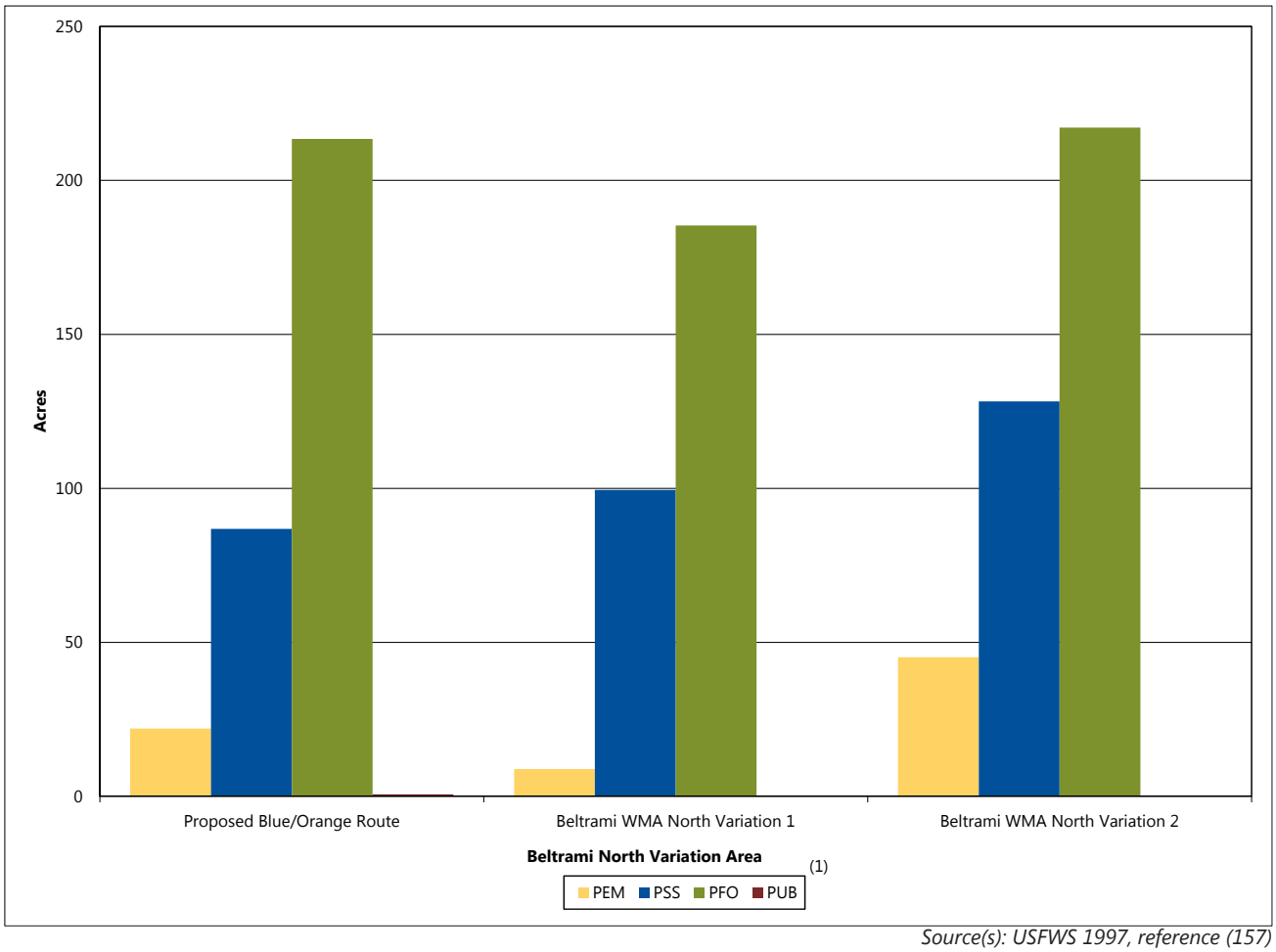
The primary impacts on wildlife resources that would differ across the Proposed Blue/Orange Route and the Beltrami North variations include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue/Orange Route and the Beltrami North variations to these areas. 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, 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,

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



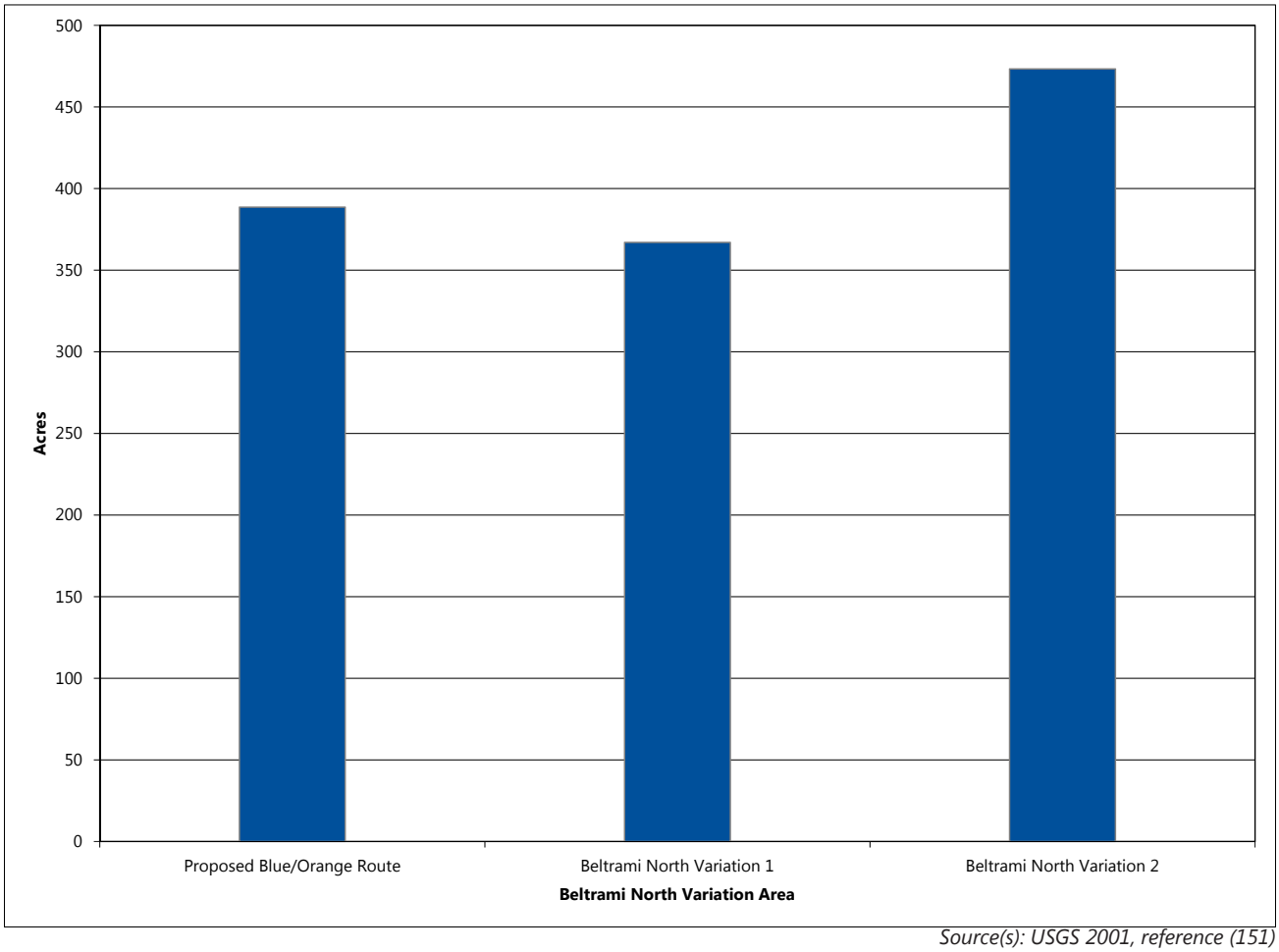
Source(s): USFWS 1997, reference (157)

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

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

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 & 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 & 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.

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 6-45, 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 passes through more rare communities and resources, relative to the Proposed Blue/Orange Route and the Beltrami North Variation 1.

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;

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
Botrychium ascendens	Upward-lobed Moonwort	None	Endangered	Vascular Plant			X
Botrychium lunaria	Common Moonwort	None	Threatened	Vascular Plant			X
Cypripedium arietinum	Ram's-head Lady's-slipper	None	Threatened	Vascular Plant	X		X
Botrychium minganense	Mingan Moonwort	None	Special Concern	Vascular Plant			X
Botrychium pallidum	Pale Moonwort	None	Special Concern	Vascular Plant			X
Botrychium rugulosum	St. Lawrence Grapefern	None	Special Concern	Vascular Plant			X
Botrychium simplex	Least Moonwort	None	Special Concern	Vascular Plant	X	X	X

Source(s): MnDNR 2014, reference (132)

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

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.

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.

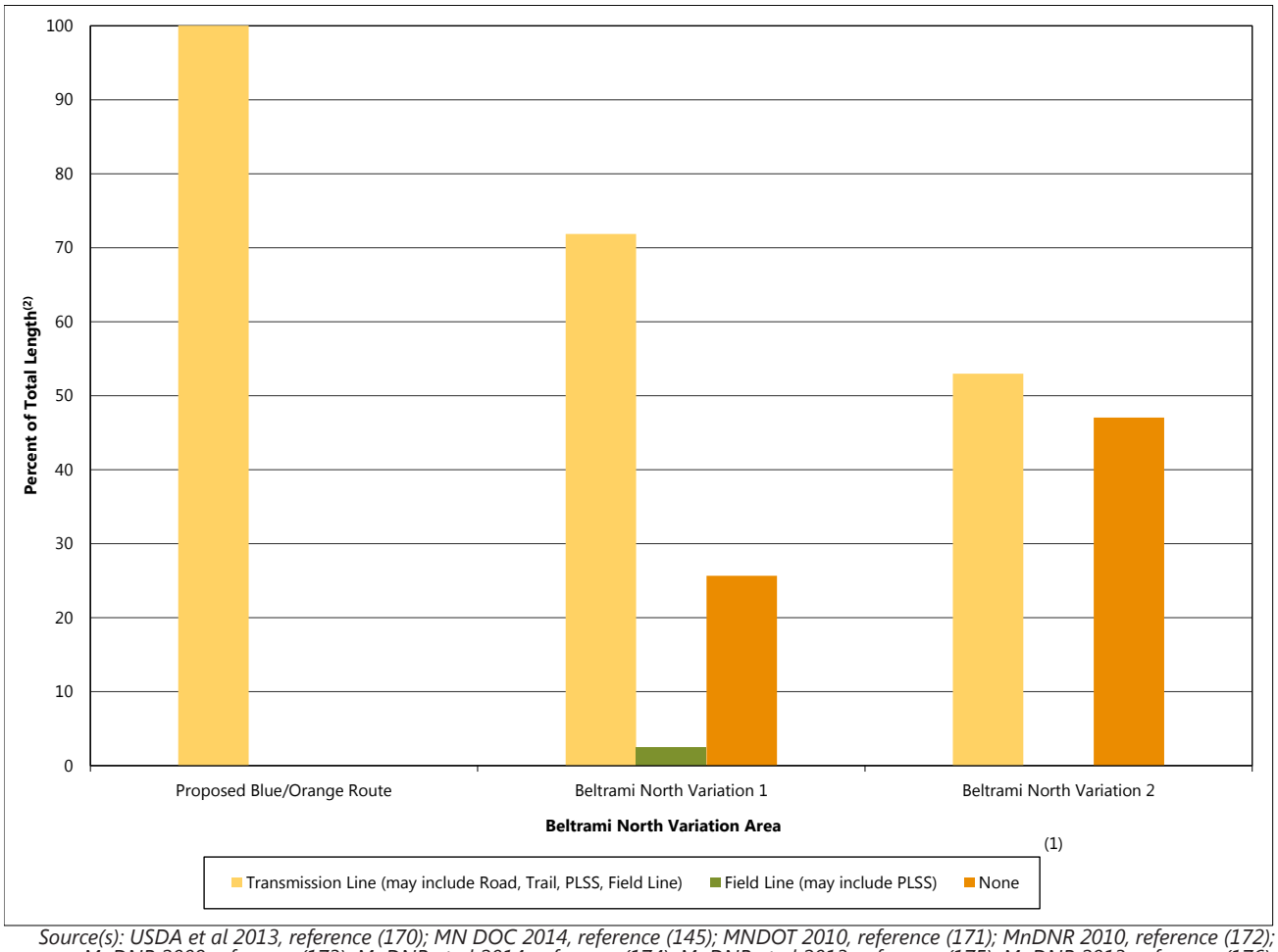
Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

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.

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) 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 6-47 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 (may include Road, Trail, PLSS, Field Line)	Percent of Total Length(2)	100	72	53
Field Line (may include 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.

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 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 coss 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.

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 6.2.1.1.1), 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

Table 6-48 Construction Costs in the Beltrami North Variation Area

Variation Area	Name in the EIS	Cost (Total)	Cost (per mile)	Length (mi)
Beltrami North	Proposed Blue/ Orange Route	$18,984,370	$1,150,568	16.5
	Beltrami North Variation 1	$18,411,668	$1,165,295	15.8
	Beltrami North Variation 2	$24,571,721	$1,247,295	19.7

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

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

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.

(Map6-23 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 andBeltrami 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.

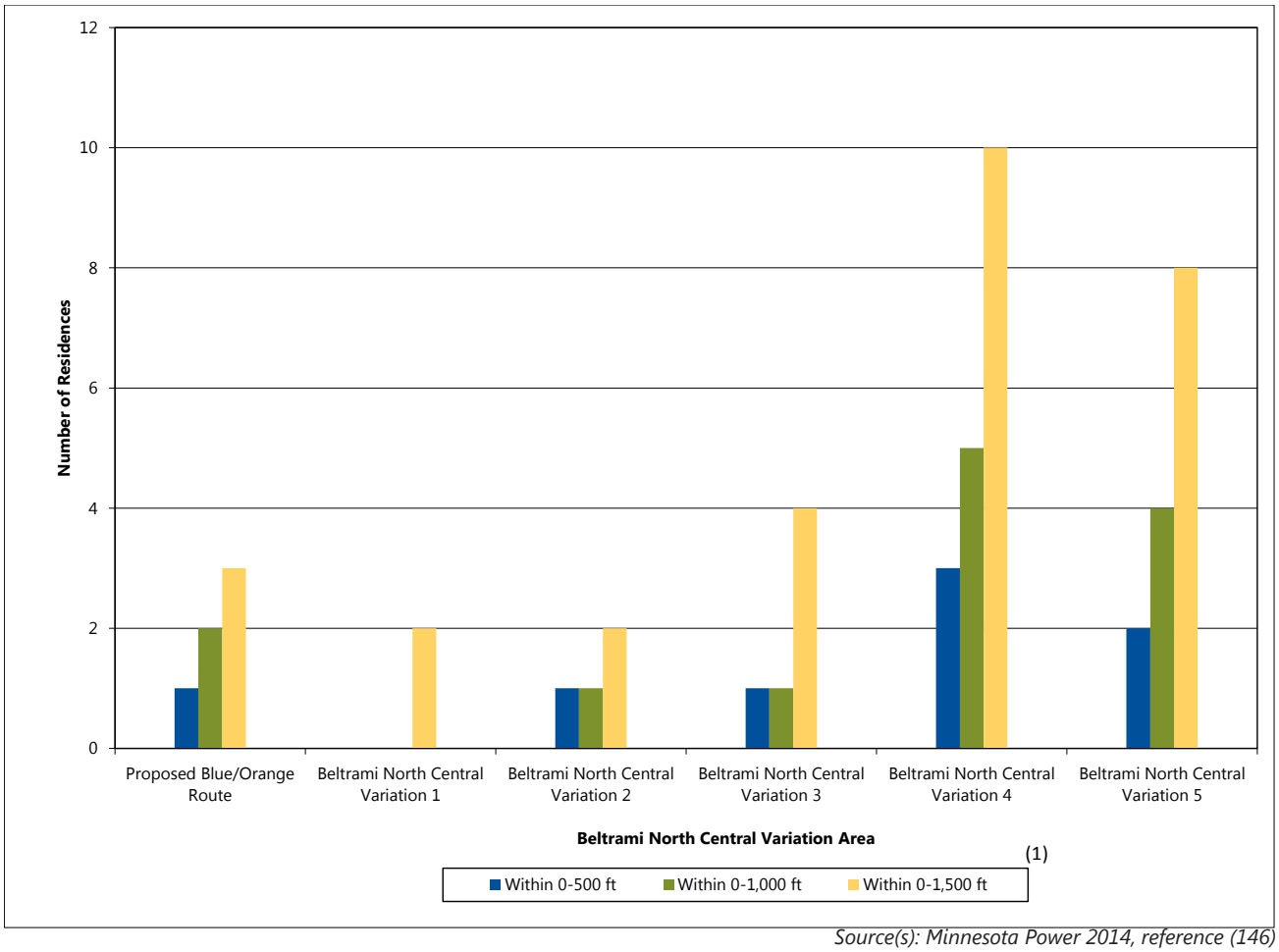
The Proposed Blue/Orange Route and Beltrami North Central variations all cross state forest lands (two each) and affect similar numbers of acres that would be cleared for the ROW (Table 6-49). Beltrami North Central Variation 3 and Beltrami North Central

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 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

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.

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 & 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 6-51 Land Ownership 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
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

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.

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 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

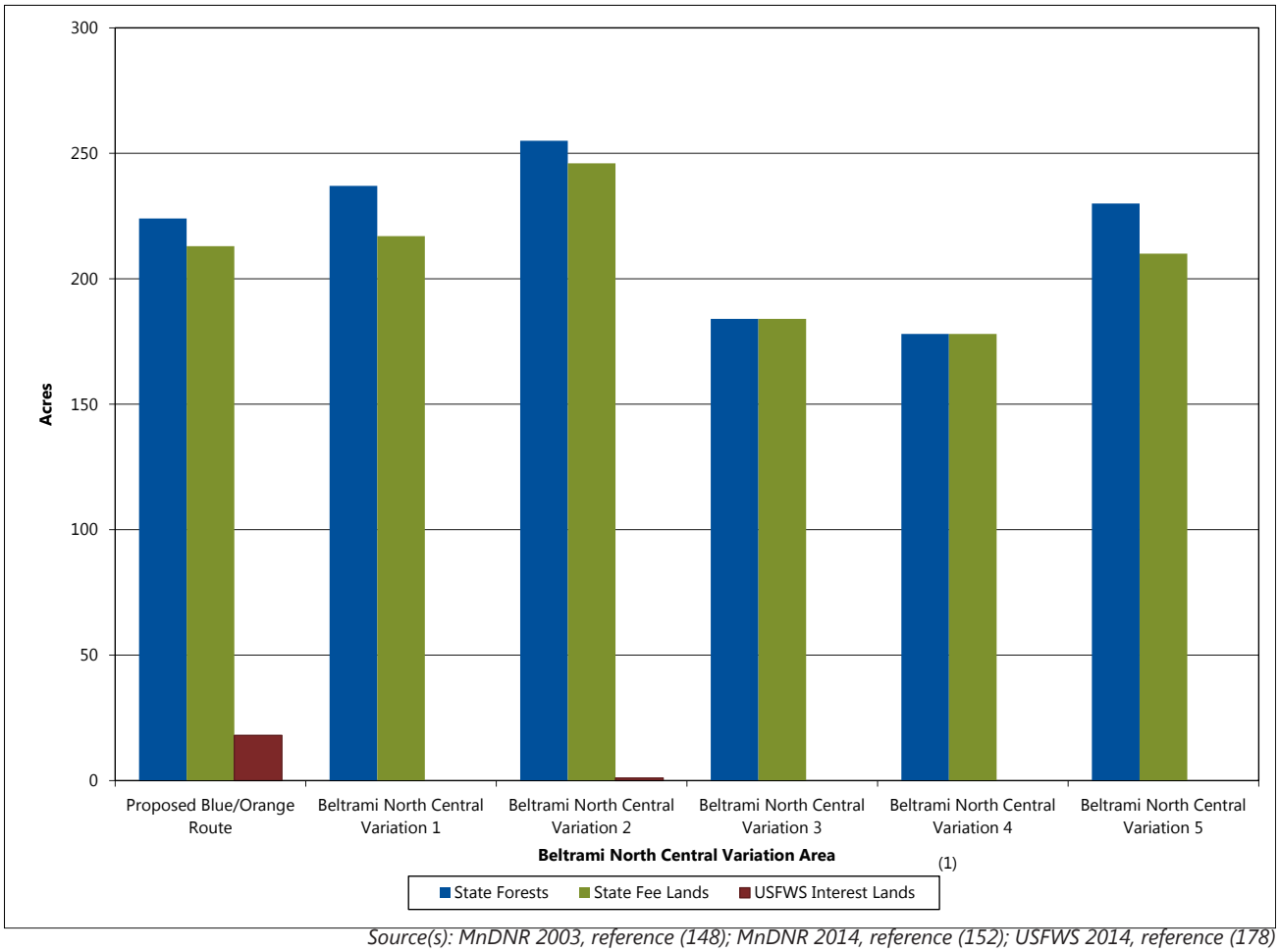
As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignment of the proposed Project.

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 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

Figure 6-42 Land Ownership within the ROI in the Beltrami North 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.

the largest amount of agricultural land, while the Proposed Blue/Orange Route and Beltrami North Central Variation 2 would impact the least amount of agricultural land within their respective ROI.

Land Ownership

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.

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 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

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 Statewide 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.

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

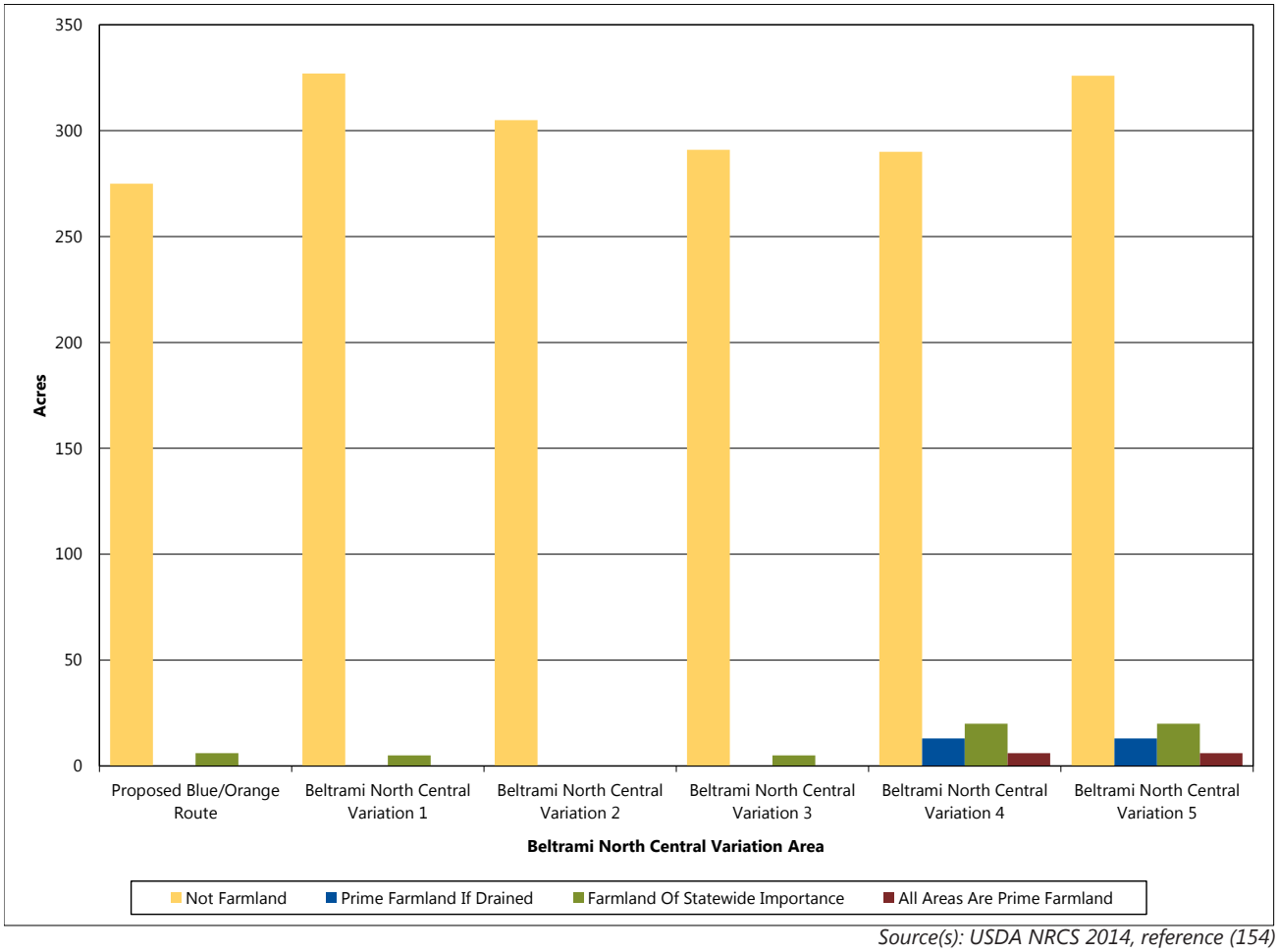
As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-52 and Figure 6-44 identify the acreage of state forest land that would be impacted in the ROI by the Proposed Blue/Orange Route and variations. There are no 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 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.

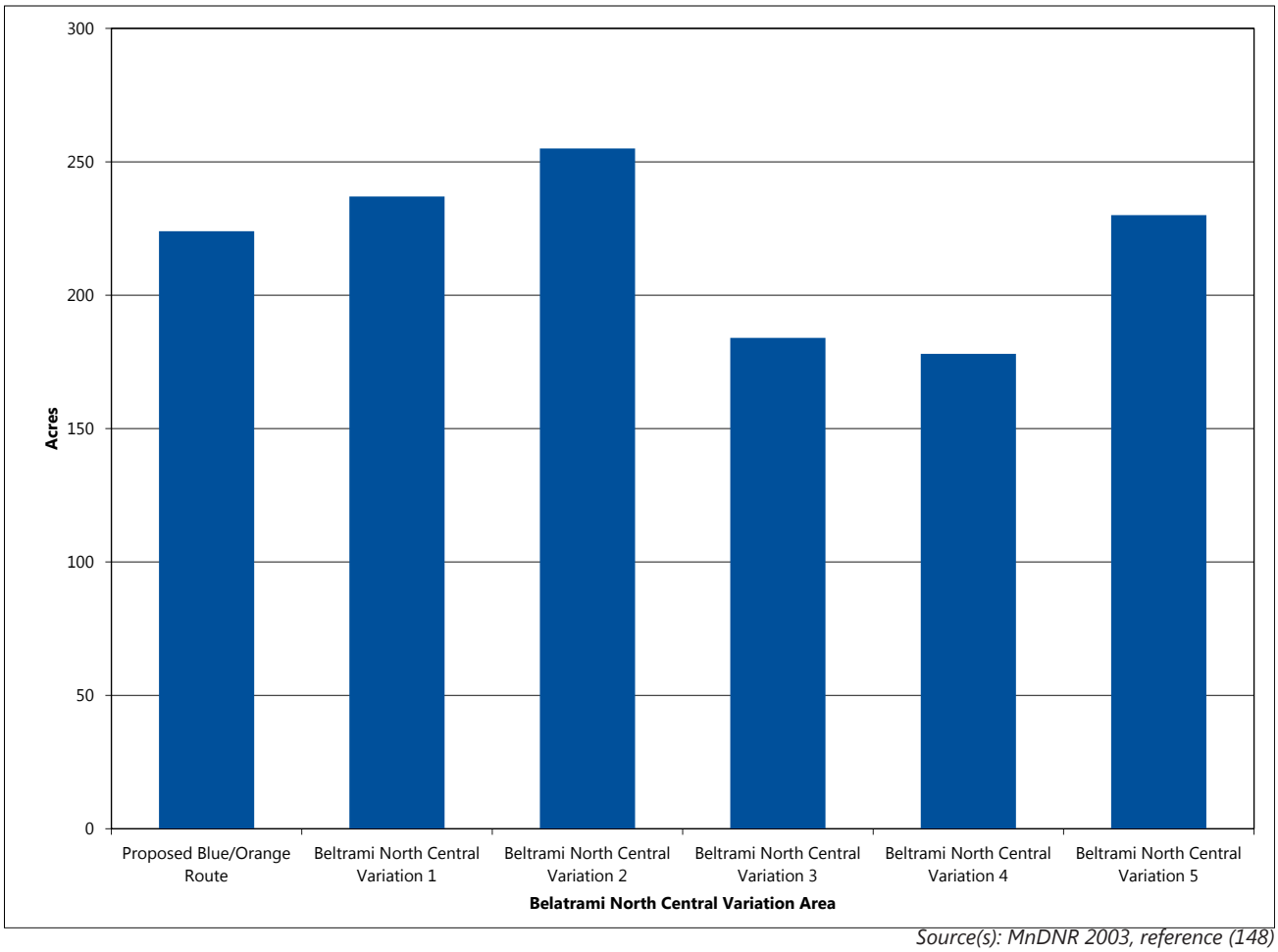
Figure 6-43 Acres of Farmland by Type within the Anticipated ROW in the Beltrami North Central Variation Area



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

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

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

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 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 site.

Table 6-53 provides a summary of the previously recorded archaeological 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

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 are described in the text and figure below.

Phase IA cultural resources survey report located in Appendix P.

No previously recorded archaeological or historic architectural sites 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 Variation 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.

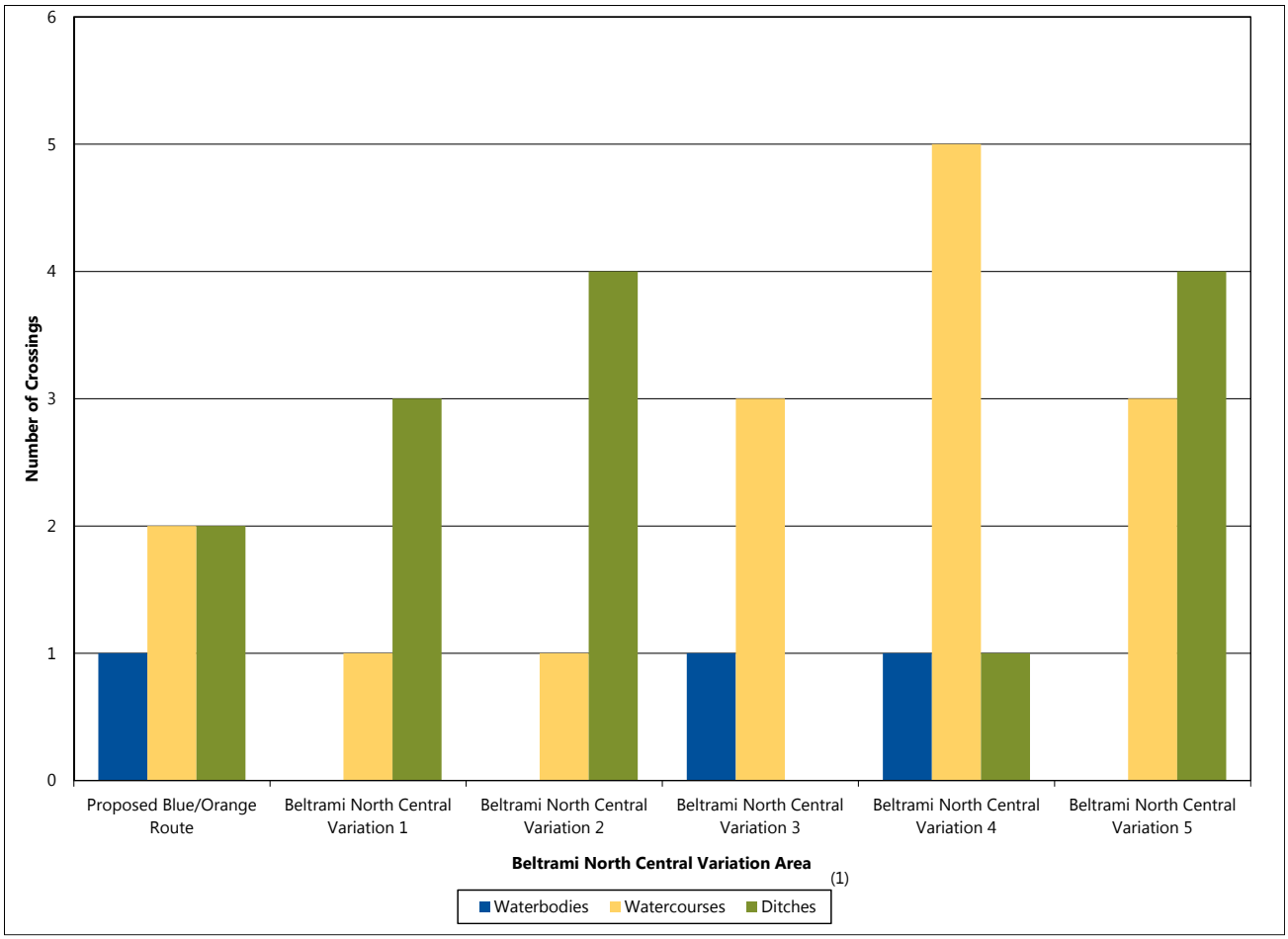
There is currently no identified potential for direct, adverse, long-term impacts on archaeological or historic architectural sites as there were no sites located within the direct APE in the Beltrami North Central Varation Area routes or variations, although cultural resource investigations have not yet occurred for the Proposed Route or variations.

Indirect, long-term, adverse visual effects on architectural resources within the indirect APE 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 resources. 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 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.

As the proposed route and variations have not been surveyed, historic architectural site surveys, inventories, or assessments will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural site. These cultural resources investigations will be implemented as part of DOE's proposed PA 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 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.

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.

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

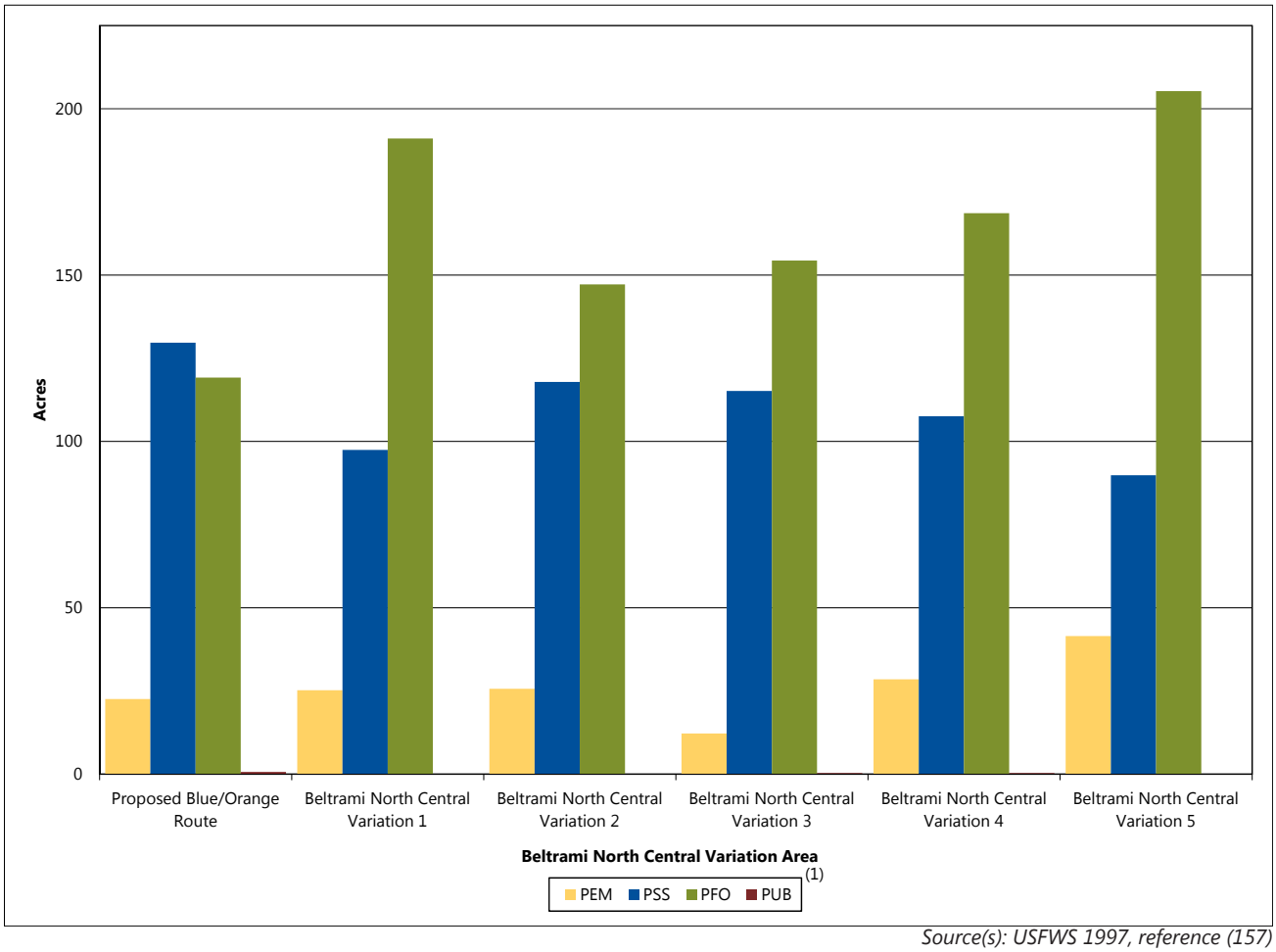
As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to ROI for the water resources in the Beltrami North Central Variation Area are summarized in Table 6-54 and shown on Map 6-23. Additional, water resources data beyond those 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 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.

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).

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 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

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 & 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 & 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.

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 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

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.

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 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.

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
Botrychium ascendens	Upward-lobed Moonwort	None	Endangered	Vascular Plant	X	X	X	X		
Botrychium lunaria	Common Moonwort	None	Threatened	Vascular Plant	X	X	X	X		X
Botrychium pallidum	Pale Moonwort	None	Special Concern	Vascular Plant	X	X	X	X		X
Botrychium simplex	Least Moonwort	None	Special Concern	Vascular Plant	X	X	X	X		X

Source(s): MnDNR 2014, reference (132)

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

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 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).

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.

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 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, the Beltrami North Central Variation 4 would parallel an existing transmission line for over 90 percent of itsand the remaining variations would

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 (may include Road, Trail, PLSS, 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

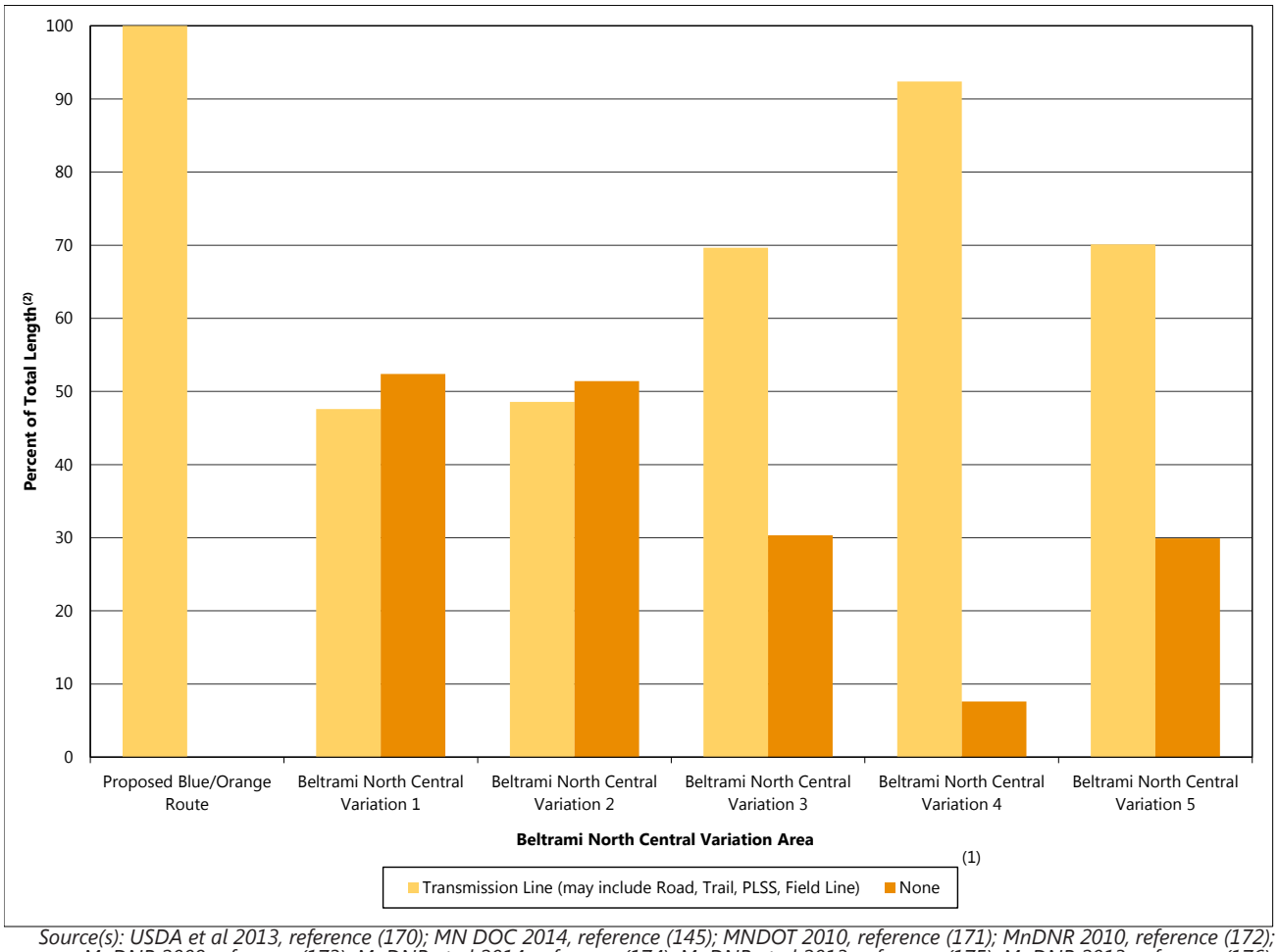
Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

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

(1) More than one feature 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 6-47 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) 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 6-60 Construction Costs in the Beltrami North Central Variation Area

Variation Area	Name in the EIS	Cost (Total)	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	$13,708,602	$1,000,628	13.7
	Beltrami North Central Variation 2	$14,478,550	$1,149,091	12.6
	Beltrami North Central Variation 3	$16,155,266	$1,324,202	12.2
	Beltrami North Central Variation 4	$17,168,969	$1,188,164	13.5
	Beltrami North Central Variation 5	$16,636,730	$1,109,115	15

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

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

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.

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.

Based on the environmental and human impacts detailed in this EIS, the relative merits evaluation examines 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.

The relative merits discussion in this chapter focuses on 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 architectural resources;
- Effects on the natural environment, including effects on air and water quality resources and flora and fauna;
- Effects on rare and unique natural resources;
- 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; and
- Costs of constructing, operating, and maintaining the facility which are dependent on design and route.

The remaining five routing factors are not considered in the 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) it is assumed all proposed routes and variations are 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.

The discussion in the relative merits section of this EIS uses text and a stoplight motif graphic to describe the relative merits of each alternative. For routing factors where impacts are anticipated to vary with alternatives, the graphic represents these anticipated impacts and compares them across the 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 graphic represents the consistency of alternatives with these interests and compares the alternatives.

6.2.6.1 Border Crossing Variation Area

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

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

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

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

Table 6-61 provides an overview of this relative merits assessment for the alternatives in the Border Crossing Variation AreaRoseau Lake WMA Variation Area

Similar to the Border Crossing Variation Area, the analysis of the Roseau Lake WMA Variation Area indicates a tradeoff between impacts to human settlement factors and impacts to natural environment factors. Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 would both have fewer impacts on all three elements of natural environment and on the rare communities element of the rare and unique resource factor than the Roseau Lake WMA Proposed Blue/Orange Route as they would avoid crossing the Roseau Lake WMA, MBS Sites of Biodiversity Significance ranked moderate, and extensive wetland areas. However, the Roseau Lake WMA variations, particularly Roseau Lake WMA Variation 1, would impact the aesthetic element of the human settlement factor and the agricultural element of the land-based economies factor more than the Proposed Blue/Orange Route. Roseau Lake WMA Variation 1 and Roseau Lake WMA Variation 2 would pass through agricultural land and are located near more residences. Roseau Lake WMA Variation 1 would also have more impact on the elements of human settlement and land-based economies because it would parallel a minimal amount of existing corridors and therefore, it would create new aesthetic impacts and a new encumbrance on farmland. Both variations are longer than the Proposed Blue/Orange Route and would result in a greater total area of impact and higher impact in terms of the cost of construction factor.

Impacts to the cultural resources factor are expected to be greater for Roseau Lake WMA Variation 2 than

for the other two alternatives in this variation area, as the Roseau Lake WMA Variation 2 passes near or through more sections identified with known cultural resources.

Table 6-62 provides an overview of this relative merits assessment for the alternatives in the Roseau Lake WMA Variation Area.

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 fauna element of the natural environment factor) along the Proposed Blue/Orange Route, and would make the Cedar Bend WMA Variation less conspicuous in terms of potential impacts to the aesthetic element of human settlement, the analysis indicates a tradeoff between impacts to human settlement factors and impacts to natural environment factors between the two alternatives in this variation area.

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

Table 6-63 provides an overview of this relative merits assessment for the alternatives in the Cedar Bend WMA Variation Area.

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

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

Table 6-64 provides an overview of this relative merits assessment for the alternatives in the Beltrami North Variation Area.

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 would have more impacts to the land use compatibility element of the human settlement factor because it would pass through USFWS lands; however it would do so while paralleling an existing transmission line corridor.

Table 6-61 Relative Merits Assessment for the Border Crossing Variation Area

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 500kV Variation	Border Crossing 230kV Variation	Notes
Human settlement	Aesthetics						Proposed Border Crossing-Blue/Orange Route and Border Crossing Pine Creek pass by the greatest number of residences within 1,000 feet of the anticipated alignment and parallel the least amount of existing transmission line corridor.
	Land use compatibility						An airstrip would be located within 1,500 feet from the anticipated alignment for Border Crossing Hwy 310 Variation.
Land-Based economies	Agriculture						Border Crossing Pine Creek would cross the most farmland (by 60 acres). Proposed Border Crossing-Blue/Orange Route and Border Crossing Hwy 310 Variation would cross the least farmland. Border Crossing 230kV Variation and Border Crossing 500kV would parallel existing corridors resulting in marginal impacts to farmland.
	Forestry						Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation would cross more forest land than the other two alternatives.
Archaeological and historic architectural resources							Border Crossing 500kV and Border Crossing Pine Creek Variation would cross sections identified as containing known archaeological and historic architectural resources; the other alternatives do any cross any of these sections.
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 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 would have the most forested and shrub wetland; therefore, would require the most wetland type conversion.
	Vegetation						Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation cross many more wetlands, state forest land, Grassland Bird Conservation Areas, and MBS Sites of Biodiversity Significance, while paralleling minimal existing corridor to minimize habitat fragmentation.
	Wildlife						Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation either cross close to SNAs, cross many more wetlands, and state forest land, Grassland Bird Conservation Areas, and Outstanding MBS Sites of Biodiversity Significance while paralleling minimal existing corridor to minimize habitat fragmentation. Border Crossing Hwy 310 Variation has a Gray Owl Management Area located within 1,500 feet, but none of this area is within the ROW.
Rare and unique natural resources	Federally- and state-listed species						Proposed Border Crossing-Blue/Orange Route, Border Crossing Pine Creek Variation, and Border Crossing Hwy 310 Variation have a NHIS record for a federal candidate species (Sprague's pipit) within one mile. Proposed Border Crossing-Blue/Orange Route has more documented NHIS records within one mile.
	State rare communities						Proposed Border Crossing-Blue/Orange Route would be located within 1,500 feet of an SNA and SNA Watershed Protection Areas (WPAs); would cross the most MBS Sites of Biodiversity Significance (including those ranked outstanding and high), MnDNR High Conservation Value Forest areas, and MBS native plant communities. Border Crossing Pine Creek Variation and Border Crossing Hwy 310 Variation would cross SNA WPAs and would cross more MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest areas, and MBS native plant communities than the other two variations and would parallel less existing corridor. Border Crossing 500kV Variation and Border Crossing 230kV Variation would parallel existing corridor, which would minimize the impacts of fragmentation.
Paralleling of existing ROWs							Border Crossing 230kV and Border Crossing 500kV variations parallel existing transmission line corridors for their entire lengths. The other alternatives would share about half of their length with existing corridors and less than 10% with existing transmission line corridors.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route							Border Crossing 500kV and Border Crossing 230kV variations would have the shortest length and least cost to build, but Border Crossing 230kV would cost the most per mile to construct.

(1) Colors represent least impacts (green), moderate impacts (orange), and greatest impacts (red) relative to the specific Factor.

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Table 6-62 Relative Merits Assessment for the Roseau Lake WMA Variation Area

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				Roseau Lake WMA Variation 1 would pass by the most residences and parallel the least existing corridor.
Land-Based economies	Agriculture				Roseau Lake WMA Variation 1 would cross the most amount of farmland and parallel the least existing corridor.
	Forestry				Proposed Blue/Orange Route would cross more state forest land and forested land cover.
Archaeological and historic architectural resources					Roseau Lake WMA Variation 2 would cross more sections identified as containing known archaeological sites.
Natural environment	Water resources				Roseau Lake WMA Variation 1 would cross the most watercourses and/or waterbodies; however, all crossings are expected to be spanned. Roseau Lake WMA Variation 1 would cross the least FEMA-designated floodplain. Proposed Blue/Orange Route would have the most forested and shrub wetland; therefore, would require the most wetland type conversion.
	Vegetation				Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would cross more wetlands, forest, Grassland Bird Conservation Area, and a WMA.
	Wildlife				Proposed Blue/Orange Route and the Roseau Lake WMA Variation 2 cross more wetlands, forest, Grassland Bird Conservation Area, and a WMA.
	Wildlife				Proposed Blue/Orange Route and Roseau Lake WMA Variation 2 would cross more wetlands, forest, Grassland Bird Conservation Area, and a WMA.
Rare and unique natural resources	Federally- and state-listed species				Proposed Blue/Orange Route has a NHIS record for a federal candidate species (Sprague's pipit) within one mile and more documented NHIS records within one mile of it, including an endangered and threatened species.
	State rare communities				Proposed Blue/Orange Route would cross SNA WPAs, more MBS Sites of Biodiversity Significance (including outstanding and high), High Conservation Value Forest, and MBS native plant communities. Roseau Lake WMA Variation 2 would cross more MBS Sites of Biodiversity Significance (including outstanding and high) and MBS native plant communities.
Paralleling existing ROWs					Roseau Lake WMA Variation 2 would parallel more existing corridor.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route					Proposed Blue/Orange Route would have the shortest length, lower total cost, and lower cost per mile to construct.

(1) Colors represent least impacts (green), moderate impacts (orange), and greatest impacts (red) relative to the specific Factor.

Table 6-63 Relative Merits Assessment for the Cedar Bend WMA Variation Area

Relative Merits[1]		Cedar Bend WMA		
Factor	Element	Proposed Blue/ Orange Route	Cedar Bend WMA Variation	Notes
Human settlement	Aesthetics			Cedar Bend WMA Variation 1 would pass by the most residences. Both alternatives parallel transmission line corridors for the entire length.
Land-Based economies	Agriculture			Cedar Bend WMA Variation would cross more farmland.
	Forestry			Proposed Blue/Orange Route would cross more state forest land.
	Mining and mineral resources			Proposed Blue/Orange Route would cross mineral leases; Cedar Bend WMA Variation would not cross any mineral leases.
Archaeological and historic architectural resources				Cedar Bend WMA Variation would cross more sections identified as containing known archaeological and historic architectural resources.
Natural environment	Water resources			Proposed Blue/Orange Route and Cedar Bend WMA Variation would cross FEMA-designated floodplain that cannot be spanned; Proposed Blue/Orange Route would cross the least FEMA-designated floodplain. Proposed Blue/Orange Route and Cedar Bend WMA Variation would cross wetlands that are too large to span. Proposed Blue/Orange Route would have the most forested and shrub wetland; therefore, would require the most wetland type conversion.
	Vegetation			Proposed Blue/Orange Route crosses more wetlands, forest (including state forest), Grassland Bird Conservation Area, a WMA, High Conservation Value Forest, MBS Sites of Biodiversity Significance, and MBS native plant communities.
Rare and unique natural resources	Federally- and state-listed species			There are no federally-listed species identified for these alternatives. Cedar Bend WMA Variation has fewer documented NHIS records within one mile.
	State rare communities			Proposed Blue/Orange Route would cross more MBS Sites of Biodiversity Significance (including outstanding and high rank), High Conservation Value Forest, and more MBS native plant communities.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				Cedar Bend WMA Variation would have the shortest length and cost the least to construct.

(1) Colors represent least impacts (green), moderate impacts (orange), and greatest impacts (red) relative to the specific Factor.

Table 6-64 Relative Merits Assessment for the Beltrami North Variation Area

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				Proposed Blue/Orange Route and Beltrami North Variation 1 pass by the most residences. Proposed Blue/Orange would parallel existing corridor for its entire length.
	Land use compatibility				Proposed Blue/Orange Route would cross USFWS land.
Land-Based economies	Forestry				Beltrami North Variation 2 would cross more state forest land and forested land cover types, while paralleling the least amount of existing corridor.
	Mining and mineral resources				Beltrami North Variation 2 would cross more mining leases and parallel the least amount of existing transmission line corridor.
Archaeological and historic architectural resources					Beltrami North Variation 2 passes near more sections identified as containing known archaeological and historic architectural resources.
Natural environment	Water resources				Proposed Blue/Orange Route would require the least watercourse/waterbody crossings; however, all crossings are expected to be spanned. The alternatives would cross wetlands that are too large to span. Beltrami North Variation 2 would have the most forested and shrub wetland; therefore, would require the most wetland type conversion.
	Vegetation				Beltrami North Variation 2 would cross more forest (including state forests), MBS Sites of Biodiversity Significance (including outstanding and high rank), and MBS native plant communities, while paralleling the least amount of existing corridor.
	Wildlife				Beltrami North Variation 2 would cross an Important Bird Area and would not parallel existing corridor in this area. Proposed Blue/Orange Route and Beltrami North Variation 1 cross a shallow lake, but would parallel an existing corridor.
Rare and unique natural resources	Federally- and state-listed species				Beltrami North Variation 2 has more documented NHIS records within one mile compared to the other alternatives.
	State rare communities				Beltrami North Variation 2 would cross more MBS Sites of Biodiversity Significance (including those ranked outstanding and high), High Conservation Value Forest, and the most MBS Native Plant Communities. Proposed Blue/Orange Route would cross High Conservation Value Forest.
Paralleling of existing ROWs					Proposed Blue/Orange Route would parallel existing transmission line corridor for the entire length. Beltrami North Variation 1 and Beltrami North Variation 2 would parallel existing transmission line corridors for 53% and 74% of their lengths, respectively.

(1) Colors represent least impacts (green), moderate impacts (orange), and greatest impacts (red) relative to the specific Factor.

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

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

Table 6-65 provides an overview of this relative merits assessment for the alternatives in the Beltrami North Central Variation Area.

Table 6-65 Relative Merits Assessment for the Beltrami North Central Variation Area

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							Beltrami North Central Variation 4 and Beltrami North Central Variation 5 pass by the most residences and would impact more farmland. Beltrami North Central Variation 4 would parallel existing corridor for more of its length than Beltrami North Central Variation 5.
	Land use compatibility							Proposed Blue/Orange Route would cross USFWS land (4,000 feet), but parallel an existing transmission line corridor. Beltrami North Central Variation 2 would cross USFWS land (1 acre), but create new corridor.
Land-Based economies	Agriculture							Beltrami North Central Variation 4 and Beltrami North Central Variation 5 would cross prime farmland; but Beltrami North Variation 4 would parallel existing corridor for 92% of its length.
	Forestry							Proposed Blue/Orange Route and Beltrami North Central variations 1, 2, and 4 would cross the most state forest land. Beltrami North Central variations 1, 2, 4, and 5 would cross the most forested land cover types. Beltrami North Central variations 1 and 2 would parallel the least existing corridor.
Natural environment	Water resources							Proposed Blue/Orange Route would require the least watercourse/waterbody crossings; however, all crossings are expected to be spanned. All alternatives would cross wetlands that are too large to span. Beltrami North Central Variation 5 would have the least forested and shrub wetland; therefore, would require the least wetland type conversion.
	Vegetation							The Proposed Blue/Orange Route and Beltrami North Central variations 1, 2, and 4 would cross the most state forest. Beltrami North Central variations 1, 2, 4, and 5 would cross the most forested land cover types. Proposed Blue/Orange Route and Beltrami North Central Variation 3 would cross the most MBS Sites of Biodiversity Significance, but would parallel existing corridor through these areas. Beltrami North Central Variation 2 would not parallel existing corridor through MBS Sites of Biodiversity Significance ranked high. Beltrami North Central Variation 1, and 2, and 3 parallel the least existing corridor.
	Wildlife							Proposed Blue/Orange Route and Beltrami North Central Variation 2 cross more of the Big Bog Important Bird Area. 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	Federally- and state-listed species							Beltrami North Central Variation 5 does not have any documented NHIS records within one mile, while the other alternatives have 3 to 4 records.
	State rare communities							Beltrami North Central Variation 2 would cross a SNA WPA and MBS Sites of Biodiversity Significance ranked high, but would not parallel existing corridor through these MBS sites. Proposed Blue/Orange Route and Beltrami North Central Variation 3 would cross more MBS Sites of Biodiversity Significance, but would parallel existing corridor through these areas.
Paralleling of existing ROWs State rare communities								Proposed Blue/Orange and Beltrami North Central Variation 4 would parallel existing transmission line corridor for their entire lengths. Beltrami North Central Variation 1 and Beltrami North Central Variation 2 would parallel existing transmission line corridor for about half of their lengths.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route								Proposed Blue/Orange Route and Beltrami North Central Variation 1 would have shorter lengths, lower costs to build, and lower cost per mile to build. Proposed Blue/Orange Route and Beltrami North Central Variation 4 would parallel an existing transmission line corridor for the entire length.

(1) Colors represent least impacts (green), moderate impacts (orange), and greatest impacts (red) relative to the specific Factor.

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