

6.3 Central Section

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

As described in Section 4.4 and identified on Map 4-8, the Central Section is composed of eight variation areas: Pine Island, Beltrami South Central, Beltrami South, North Black River, C2 Segment Option, J2 Segment Option, Northome, and Cutfoot. Section 5.4 previously described, in general, the human settlement, land-based economies, archaeological and historic architectural resources, natural environment, rare and unique natural resources, corridor sharing, electric system reliability, costs of constructing, operating, and maintaining the facilities as they relate to the Central Section and the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project. The following sections provide a more detailed description and analysis of the resources present and potential impacts from the proposed Project within the variation areas in the Central Section.

6.3.1 Pine Island Variation Area

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

6.3.1.1 Human Settlement

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

Aesthetics

Impacts on aesthetic resources within the Pine Island Variation Area would be determined based largely on the level of increased contrast in views by

sensitive viewers as a result of the proposed Project. These impacts are based on the number of visual resources, including residences, with high visual sensitivity in close proximity to the transmission line that are likely to have views of and be affected by the proposed Project. Aesthetic impacts are likely to be greatest for views of the proposed Project by sensitive viewers at close distances (e.g., in the foreground distance zone), but may also be substantial for views from greater distances. The vegetation surrounding high visual sensitivity areas can also affect the degree of aesthetic impact from the proposed Project. Areas with high visual sensitivity located in densely forested areas may be less likely to have views of the transmission line, even at a close distance, than high visual sensitivity areas located in open, agricultural areas and at greater distances from the transmission line. Because of the difference in site-specific landscape characteristics (e.g., the amount of screening provided by vegetation or terrain) among areas deemed as having a high visual sensitivity, the actual impact of the proposed Project could vary widely.

Residences and other aesthetic resources within 1,500 feet from the anticipated alignment of the proposed Project would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI for aesthetic resources. Also, within this distance, there is a high probability that the proposed Project would produce high contrast in the landscape. If existing large transmission lines would be followed, a new transmission line would not require clearing of new corridors, but rather an expansion of existing corridors. By paralleling an existing transmission line with structures of similar design and height, a new transmission line would produce less contrast than a line that does not parallel an existing large transmission line.

Data related to aesthetic resources in the Pine Island Variation Area are summarized in Table 6-66 and shown on Maps 6-26, 6-27, 6-28, and 6-30.

The Proposed Orange Route would be located near the Big Bog State Recreation Area, east of State Route 72 and north of Upper Red Lake (Map 6-28). This state recreation area has trails, interpretive facilities, and other visitor facilities and is an aesthetic resource with high visual sensitivity. The Proposed Blue Route and Proposed Orange Route would be located within one mile of two and seven historic architectural sites, respectively, with high visual sensitivity (Map 6-27). In addition, both the Proposed Blue Route and Proposed Orange Route could be located within 1,500 feet of two or more residences, which also have high visual sensitivity

Table 6-66 Aesthetic Resources within the ROI in the Pine Island Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Pine Island Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line	Length (mi)	109.8	105.4
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	39	23
Residences	Count within 0–500 ft	1	0
	Count within 0–1,000 ft	9	0
	Count within 0–1,500 ft	14	2
Historic Architectural Sites	Count within 0–1,500 ft	2	0
	Count within 0–5,280 ft	2	7
State Trails	Count within 0–1,500 ft	1	1
State Forests	Count within 0–1,500 ft	4	6
Snowmobile Trails	Count within 0–1,500 ft	3	4
State Water Trails	Count within 0–1,500 ft	1	1

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2003, reference (182); MnDNR 2003, reference (148); MnDNR 2010 reference (150); MnDNR 2010, reference (183)

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

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

(Figure 6-48). Of the proposed alternatives in the Pine Island Variation Area, the Proposed Blue Route would affect the most residences within 1,500 feet of the anticipated alignment (14), including nine of those within 1,000 feet of the anticipated alignment and one within 500 feet. The Proposed Orange Route would only affect the two residences, none of which are within 1,000 or 500 feet of the anticipated alignment.

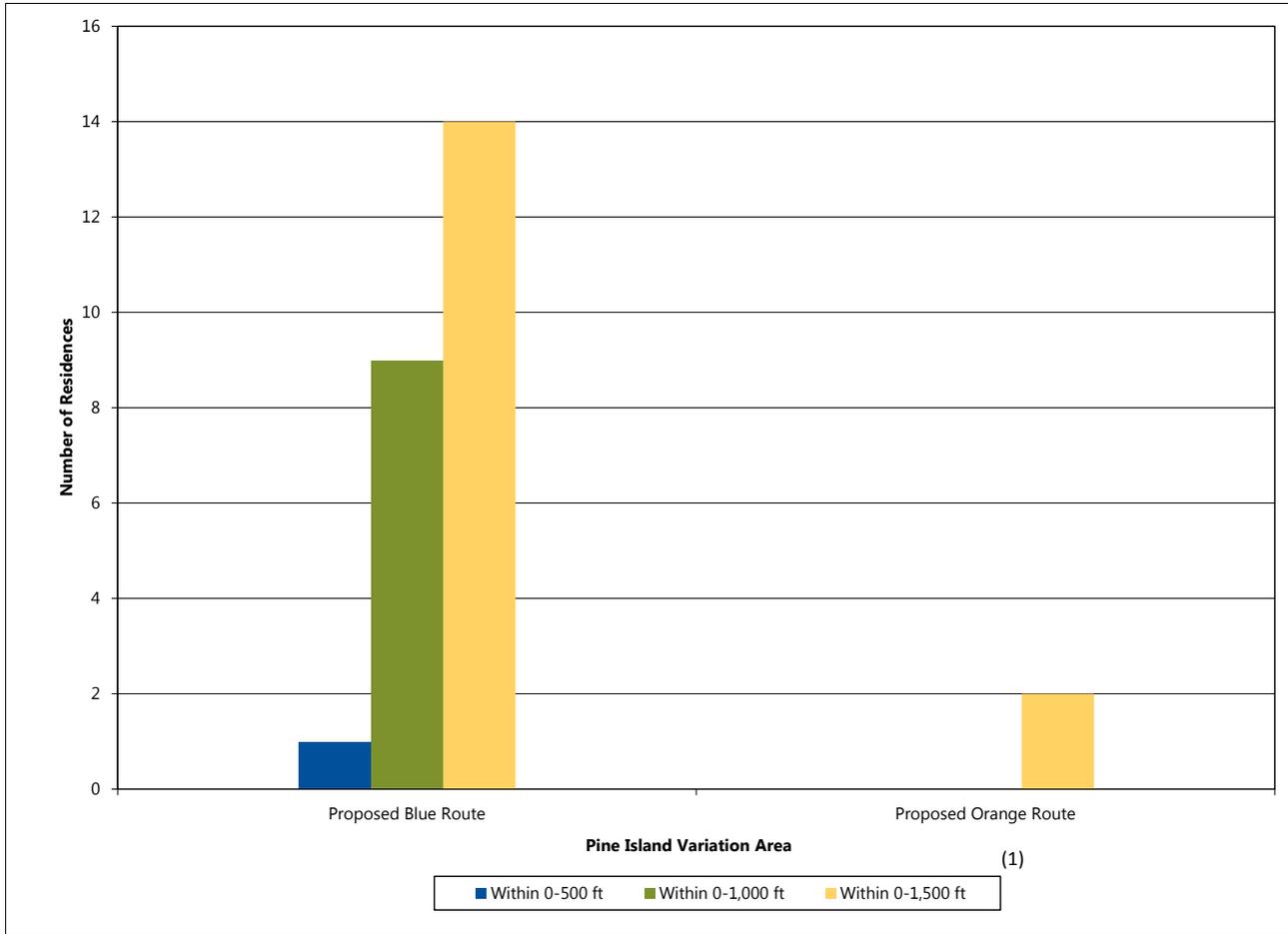
Because of concerns raised during the scoping period regarding potential aesthetic impacts to views from the Big Bog Boardwalk, photosimulations were generated to provide a more realistic indication of how the viewpoint would look if the proposed Project was constructed. Appendix N shows the existing view looking northeast (Viewpoint 01a) and looking east-northeast (Viewpoint 01b) from the Big Bog boardwalk and interpretive viewing location in the recreation area. In addition to the existing view, Viewpoints 01a and 01b show photosimulations of what the proposed constructed Project would look like as well as showing the constructed Proposed Orange Route, with the tower structures and wires indicated in yellow, for reference. In these views the Proposed Orange Route would be located approximately 1.6 miles away at its nearest point. As indicated in the photosimulations, the Proposed Orange Route would be screened from view from this viewpoint by dense forest and would not

diminish the visual character or quality of views from this area.

The Proposed Orange Route would also be located east of Upper Red Lake where a number of residences and other facilities are located. Viewpoint 02 in Appendix N shows the existing view looking east-southeast in the direction of the Proposed Orange Route from a fire lookout tower located just north of Waskish on the east side of Upper Red Lake. Similar to the series of existing views and proposed view simulations for Viewpoint 01a and 01b, Appendix N shows the existing view from the fire lookout tower (Viewpoint 02) as well as a photosimulation of the constructed proposed Project and the same view with the constructed Proposed Orange Route indicated in yellow. In this view the Proposed Orange Route would be located approximately 6.5 miles away at its nearest point. As indicated in the photosimulation, at this distance the Proposed Orange Route would appear very small on the horizon and be mostly screened from view by the dense and expansive forest. From this viewpoint, the Proposed Orange Route would not be noticeable to casual viewers and it would not diminish the visual character or quality of views from this area.

The Proposed Blue Route is slightly longer (109.8 miles) than the Proposed Orange Route (105.4

Figure 6-48 Residences within the ROI in the Pine Island Variation Area



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

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

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

miles; Table 6-66) and both proposed routes parallel existing large transmission lines for a portion of their entire lengths (39 and 23 percent, respectively). Although the Proposed Blue Route parallels an existing large transmission line for a greater percentage of its length than the Proposed Orange Route, the Proposed Orange Route parallels a 500 kV transmission line with similar structure design, while the Proposed Blue Route parallels a 230 kV transmission line which has a slightly different structure design. By paralleling an existing 500 kV transmission line of similar design, the Proposed Orange Route is likely to produce slightly less design contrast in terms of its form, line, and scale than the Proposed Blue Route. However, given that the Proposed Blue Route parallels an existing large transmission line for nearly twice the distance as the Proposed Orange Route, the Proposed Blue Route would likely produce less contrast overall than the Proposed Orange Route.

The Proposed Blue Route affects more residences within 1,500 feet (14) than the Proposed Orange Route (two), but affects slightly fewer aesthetic resources (one state trail, one snowmobile trail, one state water trails, and two historic architectural sites) than the Proposed Orange Route (one state trails each, six state forests, four snowmobile trails, one state water trail, and seven historic architectural sites), and would likely produce less contrast by paralleling an existing large transmission line for a substantially greater percentage of its length than the Proposed Orange Route. For these reasons, the Proposed Blue Route would result in less aesthetic impact than the Proposed Orange Route in the Pine Island Variation Area.

Although the Proposed Blue Route and the Proposed Orange Route affect relatively small numbers of residences and other sensitive visual resources, both proposed routes are long and only parallel existing transmission lines of similar size and design for somewhat moderate to moderately

Table 6-67 Land Uses within the ROI in the Pine Island Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	Pine Island Variation Area	
			Proposed Blue Route	Proposed Orange Route
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	40,046	38,457
	Developed or Disturbed	Acres within 0–1,500 ft	655	335
	Agricultural	Acres within 0–1,500 ft	985	308
	Forested and/or Swamp	Acres within 0–1,500 ft	38,203	37,685
	Other	Acres within 0–1,500 ft	203	129

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

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

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

short portions of their full lengths (23 to 39 percent, respectively). For these reasons, aesthetic impacts of both proposed routes are expected to be significant.

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

Land Use Compatibility

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

Land Uses

Table 6-67 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue Route and Proposed Orange Route in the Pine Island Variation Area. The various land uses present in the Pine Island Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the proposed routes are shown on Map 6-26.

Both the Proposed Blue Route and Proposed Orange Route are primarily located in forested and/or swamp land (Table 6-68). The Proposed Blue Route would impact more acres of forested and/or swamp land compared to the Proposed Orange Route.

Land Ownership and Management

Table 6-68 and Figure 6-49 shows that the Proposed Blue Route would impact more acres of state forest compared to the Proposed Orange Route, and the Proposed Orange Route would impact a greater amount of state fee lands compared to the

Proposed Blue Route. The Proposed Blue Route would impact a small number of acres of county land and a greater amount of state conservation land, while the Proposed Orange Route would not impact these land ownership categories. The Proposed Orange Route would impact a greater amount of USFWS Interest Lands (16 acres, crossing length of 3,493 feet) compared to the Proposed Blue Route (8 acres, 2,630 feet crossing length) (Map 6-26).

The Proposed Blue Route would parallel an existing corridor for 39 percent of its length, while the Proposed Orange Route would parallel an existing corridor for 23 percent of its length (see Section 6.3.1.6); therefore, the incompatibility with adjacent land uses would be minimal in some sections of both Proposed Routes.

Impacts to land use from the proposed Project in the Pine Island Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route and Proposed Orange Route would both result in long-term changes in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the alternative that would parallel an existing corridor is also important. The Proposed Blue Route avoids a greater amount of state forest and state fee lands than the Proposed Orange Route thereby avoiding long-term changes to land use and the Proposed Blue Route would also parallel a greater length of existing corridor compared to the Proposed Orange Route and would therefore avoid major indirect impacts to state forests and state fee lands such as forest fragmentation.

Table 6-68 Land Ownership/Management within the anticipated ROW in the Pine Island Variation Area

Resource	Type	Evaluation Parameter	Pine Island Variation Area	
			Proposed Blue Route	Proposed Orange Route
Total Lands	--	Acres within ROW	2,661	2,556
State Forests	--	Acres within ROW	2,291	1,980
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	2,095	2,310
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	836	956
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	326	640
	Trust Fund	Acres within ROW	934	698
	Federal - State Lease	Acres within ROW	0	16
County Lands	--	Acres within ROW	4	0
State Conservation Easements	--	Acres within ROW	120	<0.5
USFWS Interest Lands	--	Acres within ROW	8	16
Private Lands ⁽²⁾	--	Acres within ROW	562	246

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); Itasca County 2014, reference (153); MnDNR 2010, reference (184); USFWS 2014, reference (178)

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

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

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

6.3.1.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Pine Island Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Pine Island Variation Area are summarized in Table 6-69.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-69 and Figure 6-50 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route and Proposed Orange Route in the ROI.

The Proposed Orange Route would pass through more acres of farmland, including the most acres of prime farmland if drained (Figure 6-50). The

Proposed Blue Route and Proposed Orange Route would each impact 70 acres of prime farmland. The Proposed Blue Route, which would parallel existing corridors for approximately half its length, would be expected to impact the fewest acres of farmland.

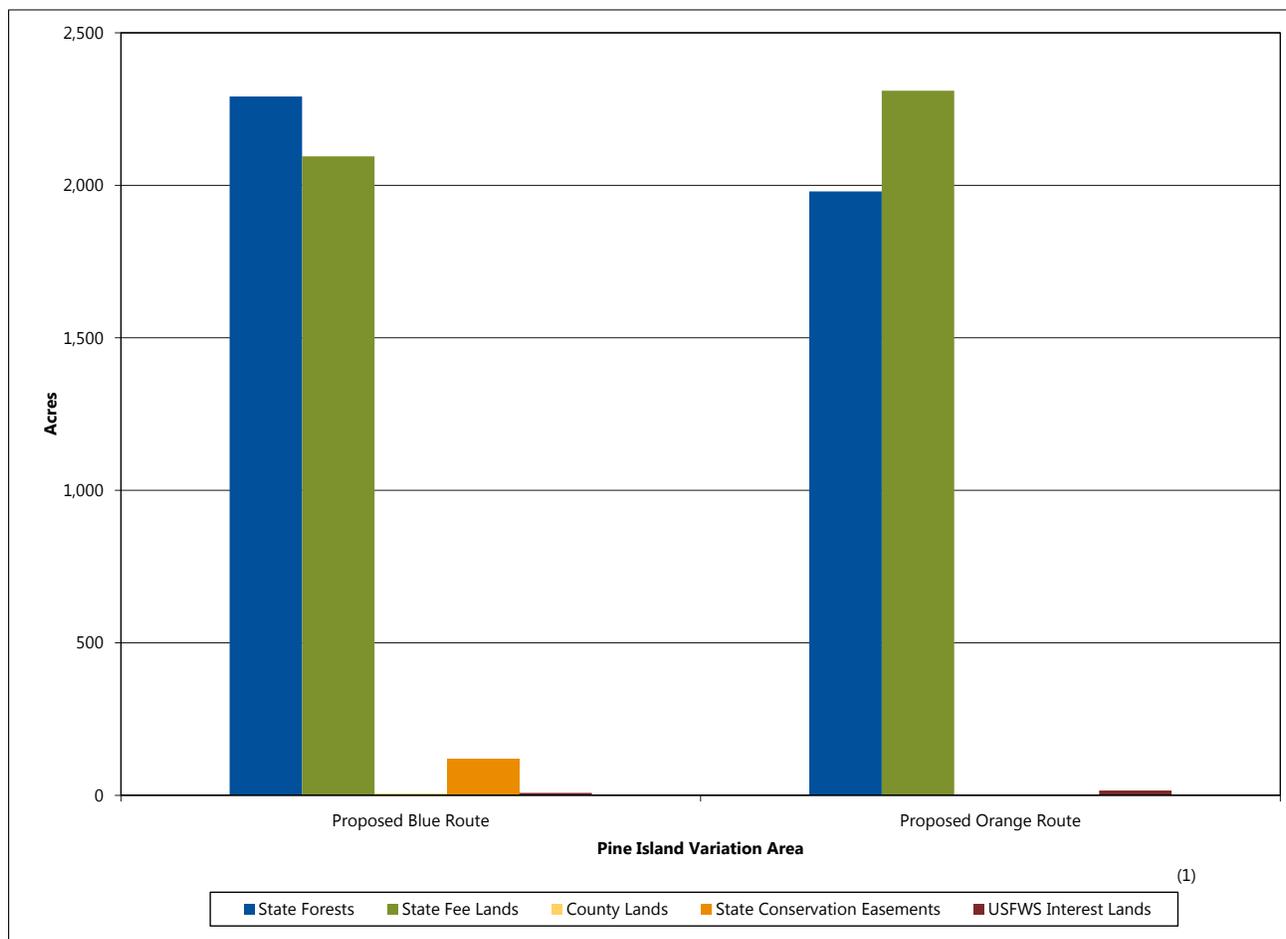
As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential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

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

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed

Figure 6-49 Public Land Ownership/Management within the ROI in the Pine Island Variation Area



Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); Itasca County 2014, reference (153); MnDNR 2010, reference (184); USFWS 2014, reference (178)

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

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

Project is the ROW of the transmission line. Table 6-69 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Blue Route and Proposed Orange Route. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue Route or Proposed Orange Route in the Pine Island Variation Area.

The Proposed Blue Route would pass through more acres of state forest lands - Beltrami Island, Lake of the Woods, Pine Island, Koochiching, and George Washington State Forests (Figure 6-51, Map 6-28). The Proposed Orange Route would have less impact on these state forest lands as it would cross fewer acres of forest lands.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct

adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and soil compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

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

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the

Table 6-69 Land-Based Economy Resources within the Anticipated ROW in the Pine Island Variation Area

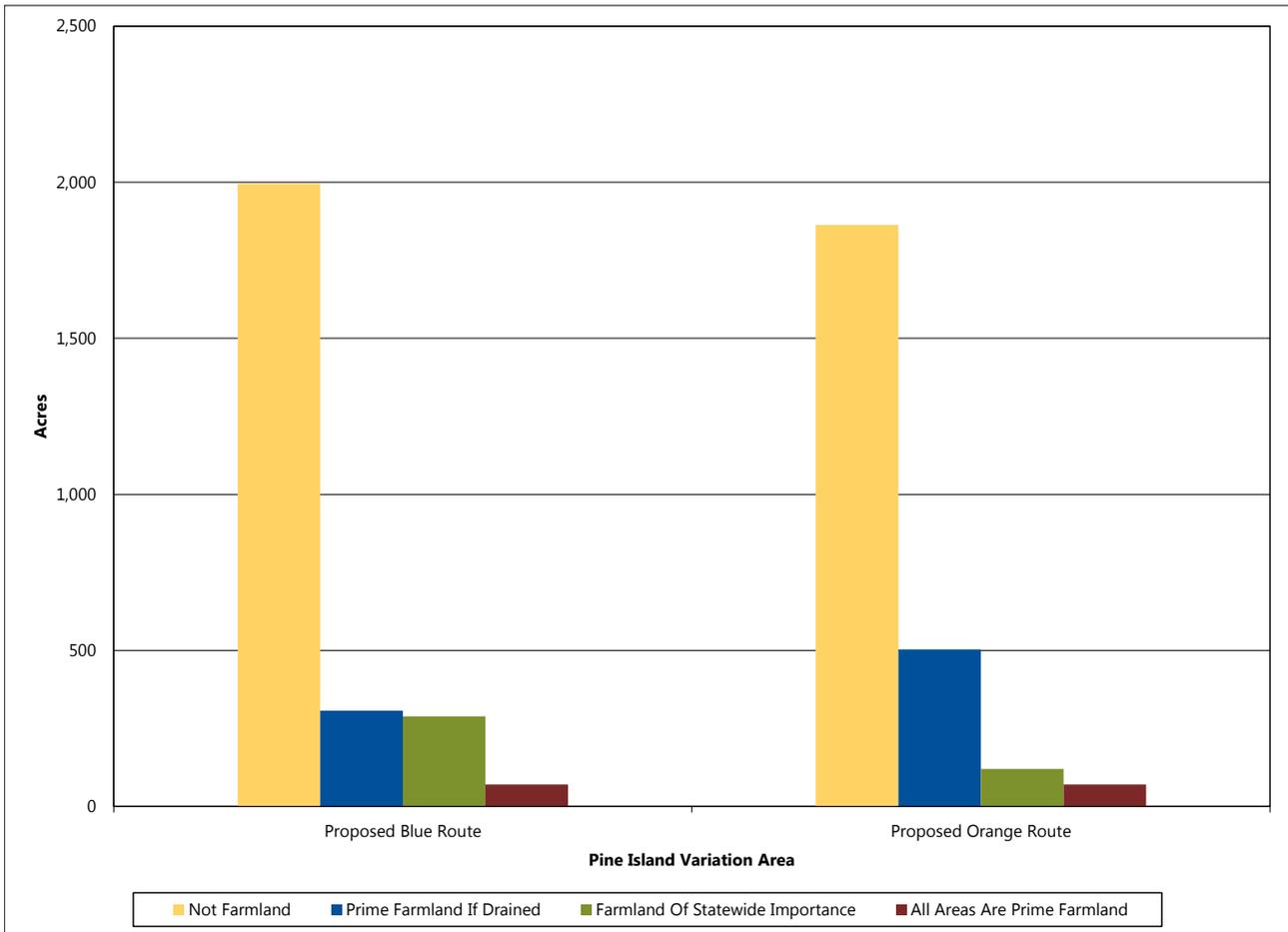
Resource	Type	Evaluation Parameter	Pine Island Variation Area	
			Proposed Blue Route	Proposed Orange Route
Transmission Line	--	Length (mi)	109.8	105.4
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	39	23
Farmland	Not Prime Farmland	Acres within ROW	1,995	1,863
	Farmland if Drained	Acres within ROW	307	503
	Farmland of Statewide Importance	Acres within ROW	289	120
	All Areas are Prime Farmland	Acres within ROW	70	70
State Forest	--	Acres within ROW	2,291	1,980
State Mineral Leases (active and/or terminated/expired)	--	Acres within ROW	1,205	370

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

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

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

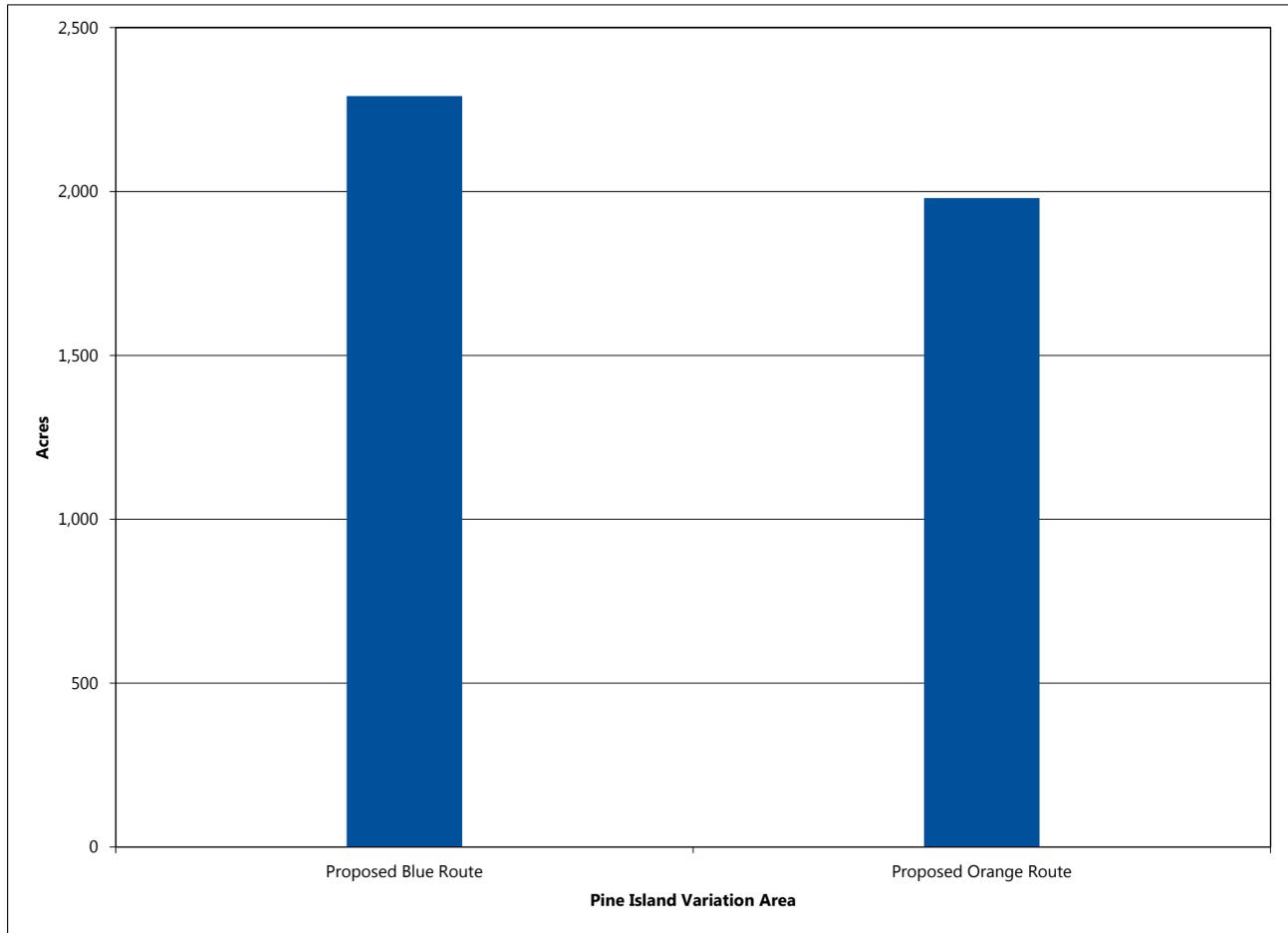
Figure 6-50 Acres of Farmland by Type within the Anticipated ROW in the Pine Island Variation Area



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

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

Figure 6-51 Acres of State Forest Land within the Anticipated ROW in the Pine Island Variation Area



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

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

transmission line. Table 6-69, Figure 6-52, and Map 6-26 identify the acreage of mining lands with state mineral leases that may be impacted in the Pine Island Variation Area. Map 6-26 identifies the state aggregate resources that may be impacted in the Pine Island Variation Area.

As indicated in Table 6-69 and Figure 6-52, both the Proposed Blue Route and the Proposed Orange Route would traverse several acres of mining lands with state terminated/expired mineral leases, **but no active mineral leases**. The Pine Island proposed Blue Route **would pass** through more of these lands. While both of the proposed routes could potentially interfere with future mining activities in this area, the Proposed Blue Route could have more potential impacts on future mining activity because it crosses through more acres of state mineral lease lands.

According to the Minnesota Department of Transportation Aggregate Source Information System data, aggregate resources are present within the vicinity of both proposed routes (Map 6-26). Based on review of the aggregate resource data in

conjunction with 2013 aerial photographs (described in Section 5.3.2.3, Land-based Economies), there are two aggregate resources within the ROI of the Proposed Orange Route and no aggregate resources within the ROI of the Proposed Blue Route. The Proposed Orange Route could interfere with current or future aggregate mining activities. However, the full extent of impacts on aggregate resources in the Pine Island Variation Area cannot be determined without field surveys.

As discussed in Section 5.3.2.3, construction of transmission lines could affect current and future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. Generally, routes impacting fewer acres of state mineral leases and state aggregate resources are likely to cause fewer of these impacts than routes that impact more acres of state mineral leases.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on mining and mineral resources

are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

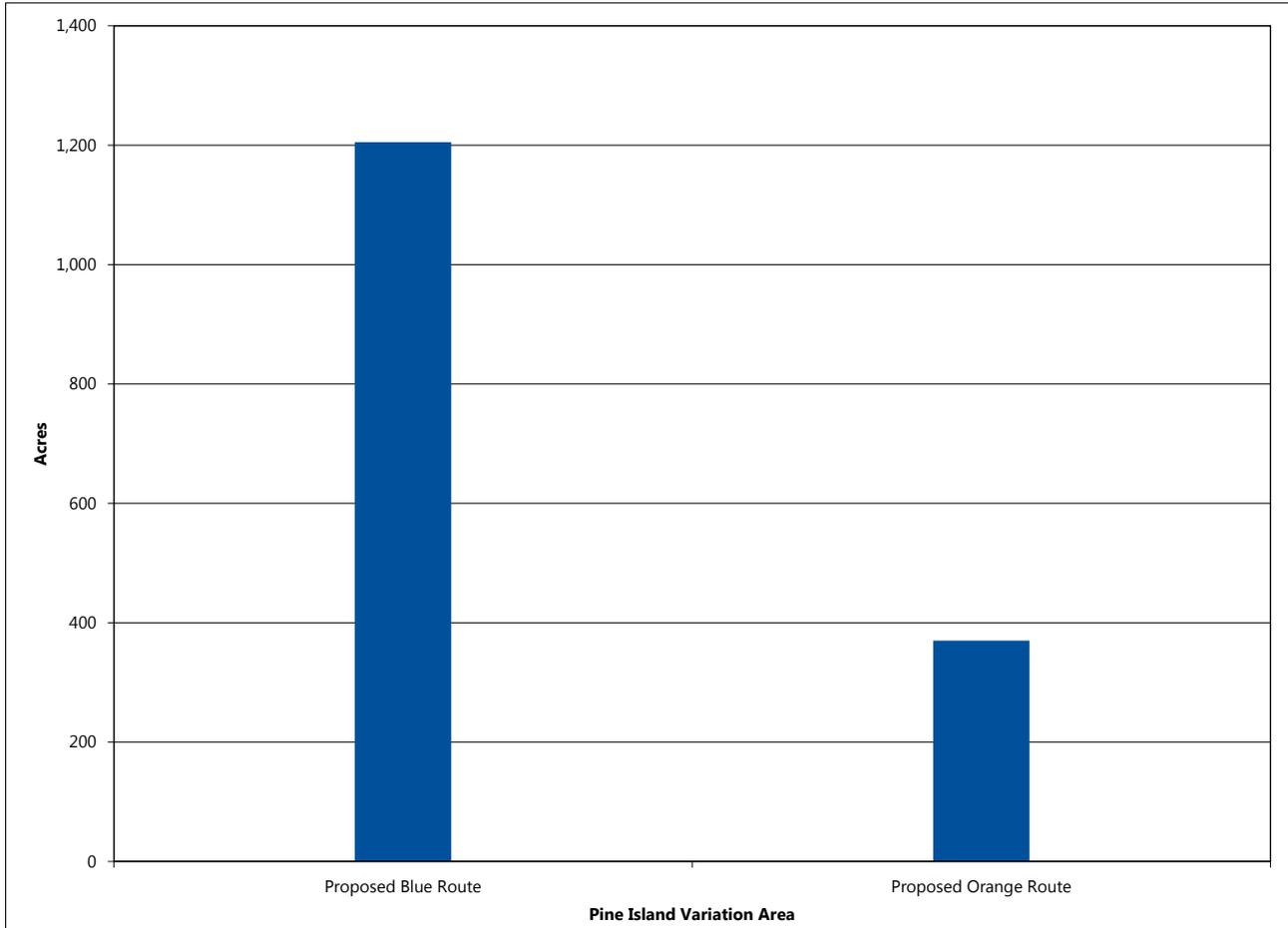
6.3.1.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the proposed transmission line, however, potential indirect effects to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites. Table 6-70 and Map 6-27 provide a summary of the archaeological **sites** and historic **architectural** resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignment (indirect APE) for the Proposed Blue Route and Proposed Orange Route in the Pine Island Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

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

Within the Pine Island Variation Area, there are no previously recorded historic architectural or archaeological sites located within the ROW of either the Proposed Blue Route or the Proposed Orange Route, although cultural resource investigations have not yet occurred for either route. The Proposed Orange Route has a higher number of historic architectural sites in the indirect APE than does the Proposed Blue Route. Five of the seven historic architectural sites identified within the Proposed Orange Route (IC-UOG-044, IC-UOG-045, IC-UOG-046, KC-UOG-031, and KC-UOG-035) have not been evaluated for NRHP eligibility. One site,

Figure 6-52 Acres of State Mineral Leases within the Anticipated ROW in the Pine Island Variation Area



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

Table 6-70 Archaeological and Historic Resources within the Pine Island Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Pine Island Variation Area	
		Proposed Blue Route	Proposed Orange Route
Historic Architectural Sites	Count within ROW	0	0
	Count within 0–1,500 ft	2	0
	Count within 0–5,280 ft	2	7
Archaeological Sites	Count within ROW	0	0
	Count within 0–1,500 ft	1	0

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

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

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

IC-UOG-043, was determined to be NRHP eligible if it is moved, while IC-UOG-086 was previously determined not to be eligible for NRHP listing. For the Proposed Blue Route, the two sites, IC-CAR-009 and KC-UOG-070, were recommended as not NRHP eligible and determined not NRHP eligible, respectively.

There is currently no known potential for direct, long-term, adverse impacts on cultural resources within the direct APEs for either route within the Pine Island Variation Area, as no previously recorded cultural resources were identified, although cultural resource surveys or inventories have not, yet, occurred for either route. Indirect, long-term, adverse visual impacts on five of the previously recorded historic architectural resources within the indirect APE are likely to occur for the Proposed Orange Route if the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since the Proposed Orange Route has historic architectural sites documented within the indirect APE that have not been evaluated for NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse effect under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource. For the Proposed Blue Route, none of the architectural resources are determined or recommended NRHP-eligible.

The Proposed Blue Route and Proposed Orange Route have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for cultural

resources. These cultural resources investigations will be implemented as part of DOE’s Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate adverse effects to cultural resources during construction and operation of the proposed Project.

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

6.3.1.4 Natural Environment

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

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Pine Island Variation Area are summarized in Table 6-71 and shown on Map 6-28. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

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

Table 6-71 Water Resources within the Anticipated ROW in the Pine Island Variation Area

Resource	Evaluation Parameter	Pine Island Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line	Length (mi)	109.8	105.4
PWI Waters ⁽¹⁾	Number of Crossings	18	25
Non-PWI Waters ⁽²⁾	Number of Crossings	48	46
Impaired Waters	Number of Crossings	1	1
Trout Streams	Number of Crossings	1	0
Floodplains ⁽³⁾	Acres within ROW	20	11
NWI Wetlands	Acres within ROW	2,102	1,875

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

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

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

The Proposed Blue Route and the Proposed Orange Route would each cross the Big Fork River and the Rapid River, which are both PWI watercourses. Additional PWI watercourses crossed by the Proposed Blue Route include the Baudette River, West Fork of the Baudette River, Black River, East Branch of the Black River, Deer Creek, Peppermint Creek, Pitt Grade Creek, three tributaries to the Big Fork River, three tributaries to the Black River, and two tributaries to the Rainy River. The Proposed Blue Route would also cross Deer Lake, a PWI waterbody, while the Proposed Orange Route would not cross any PWI waterbodies. Additional PWI watercourses crossed by the Proposed Orange Route include the North Branch of the Rapid River, Tamarac River, ten crossings of the Little Tamarac River, Troy Creek, Chase Brook, three tributaries to Deer Creek, and eight unnamed watercourses. Neither the Proposed Blue Route nor the Proposed Orange Route would cross PWI wetlands (Figure 6-53).

The Proposed Blue Route and the Proposed Orange Route would both require crossing non-PWI waters. The Proposed Blue Route would primarily cross ditches, while the Proposed Orange Route would cross ditches and watercourses equally (Figure 6-54).

The Proposed Blue Route and the Proposed Orange Route would each require crossing the Big Fork River, a MPCA-listed impaired water (Table 5-28), once.

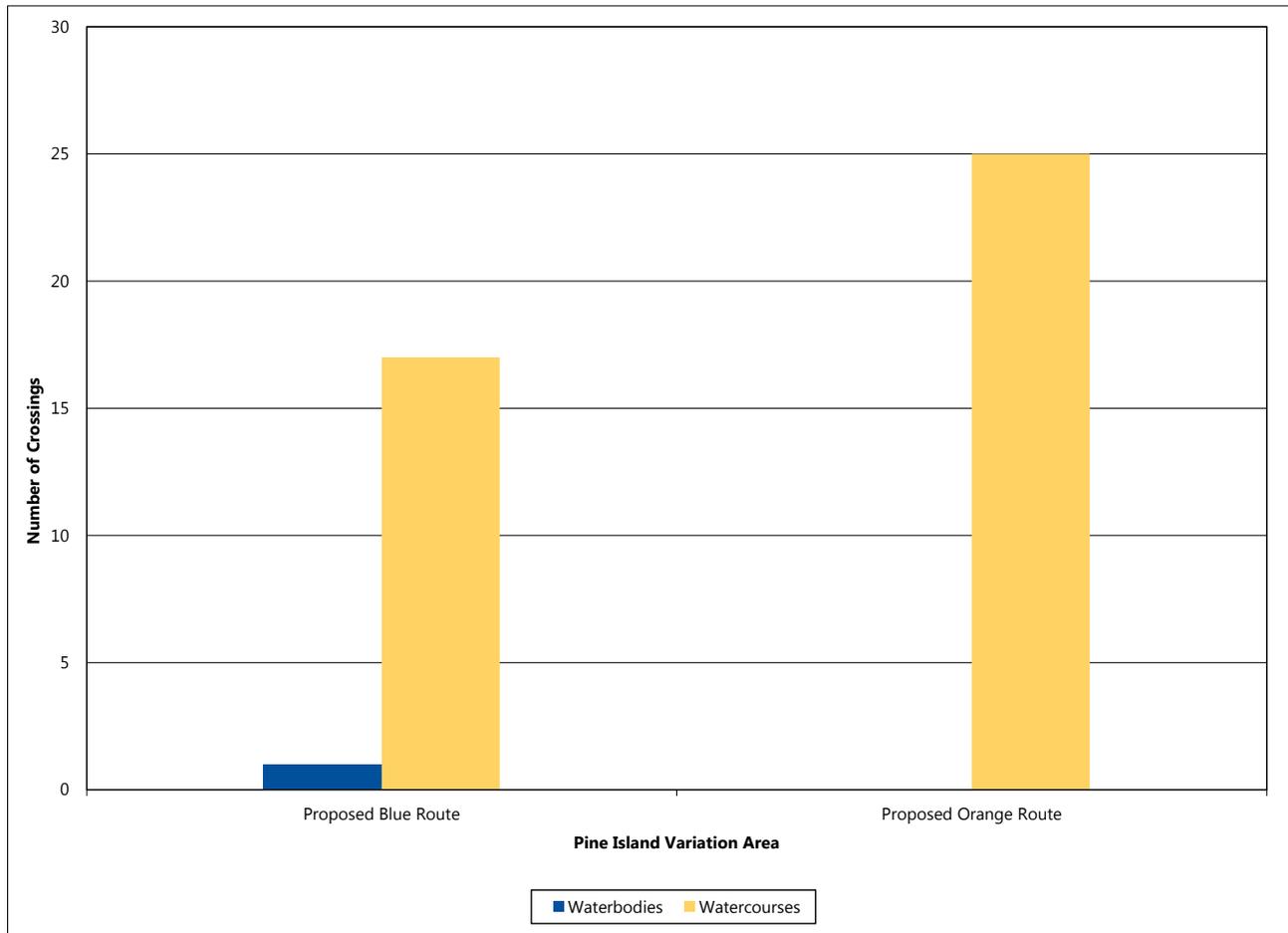
The Proposed Blue Route would require one crossing of Pitt Grade Creek, a MnDNR-designated trout stream. The Proposed Orange Route would not cross any designated trout streams.

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

Both the Proposed Blue Route and the Proposed Orange Route would require crossing Zone A floodplains of the Rapid River, East Branch of the Rapid River, Black River, Big Fork River, and Reilly Brook. Though both routes would cross floodplains, the crossings would be less than the average spanning length of 1,250 feet. Therefore, it would be expected they would be spanned and transmission structures would not be placed within floodplains.

Based on the NWI, the Proposed Blue Route and the Proposed Orange Route would both require conversion of forested and shrub wetland areas to herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-55, the Proposed Blue Route and the Proposed Orange Route contain similar total forested and shrub wetland acreage and would result in similar quantities of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed Blue Route and the Proposed Orange Route would require placement of fill in wetlands

Figure 6-53 PWI Water Crossings by Type in the Pine Island Variation Area



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

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

for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed Blue Route and the Proposed Orange Route would both require temporary construction access through wetlands, which is also likely 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.

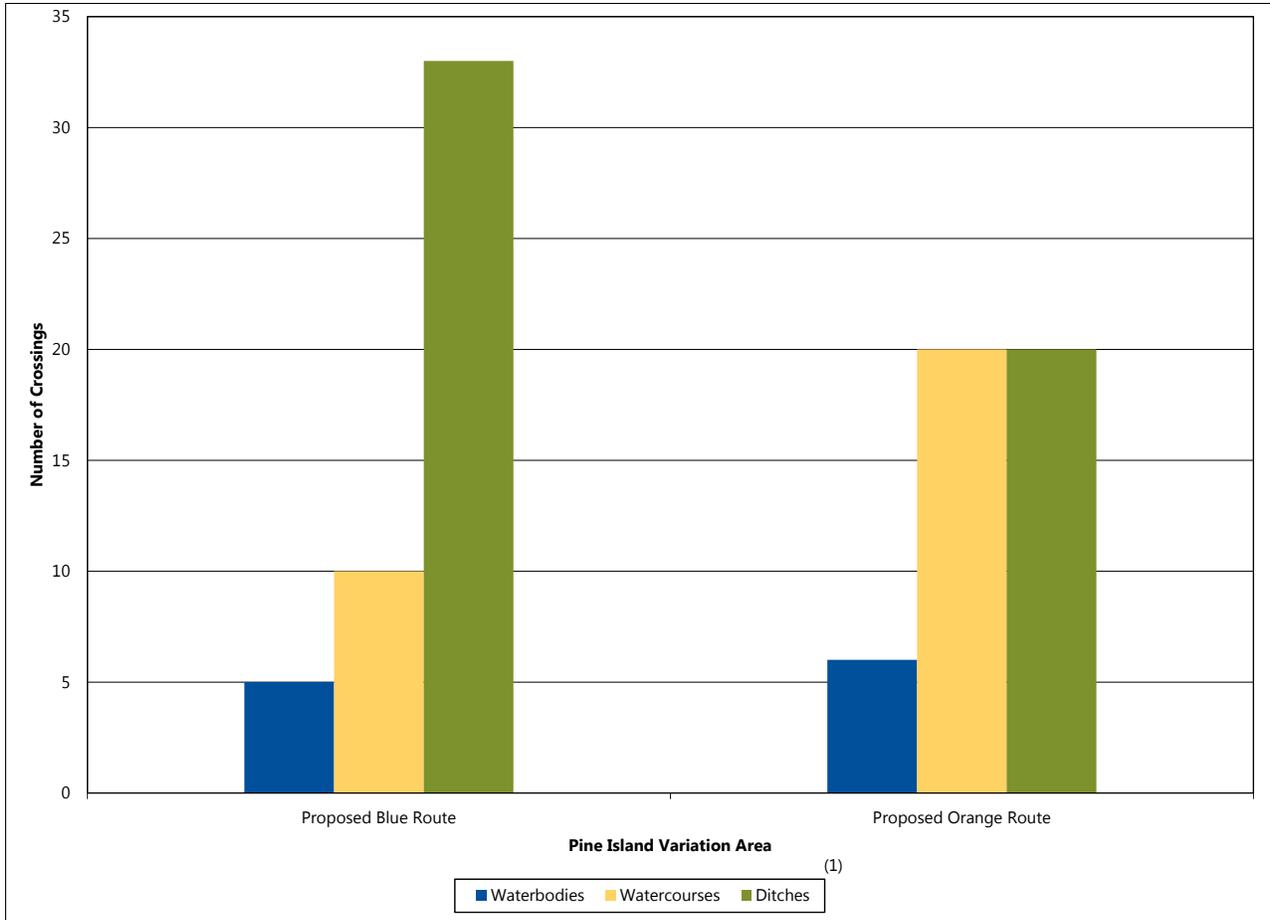
Vegetation

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 Pine Island Variation Area are summarized in Table 6-72 and shown on Maps 5-12 and 6-28. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

In general, loss or fragmentation of forest would be similar with the Proposed Blue Route or the Proposed Orange Route in the Pine Island Variation Area. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-72, although the Proposed Blue Route is over four miles longer than the Proposed Orange Route, both routes would pass

Figure 6-54 Non-PWI Water Crossings by Type in the Pine Island Variation Area



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

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

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

through similar amounts of forested land, including state forest land (Map 6-28). The Proposed Blue Route would parallel existing transmission line corridor for more of its length relative to the Proposed Orange Route; because of this, the Proposed Blue Route may result in less impact on intact forested areas. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

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

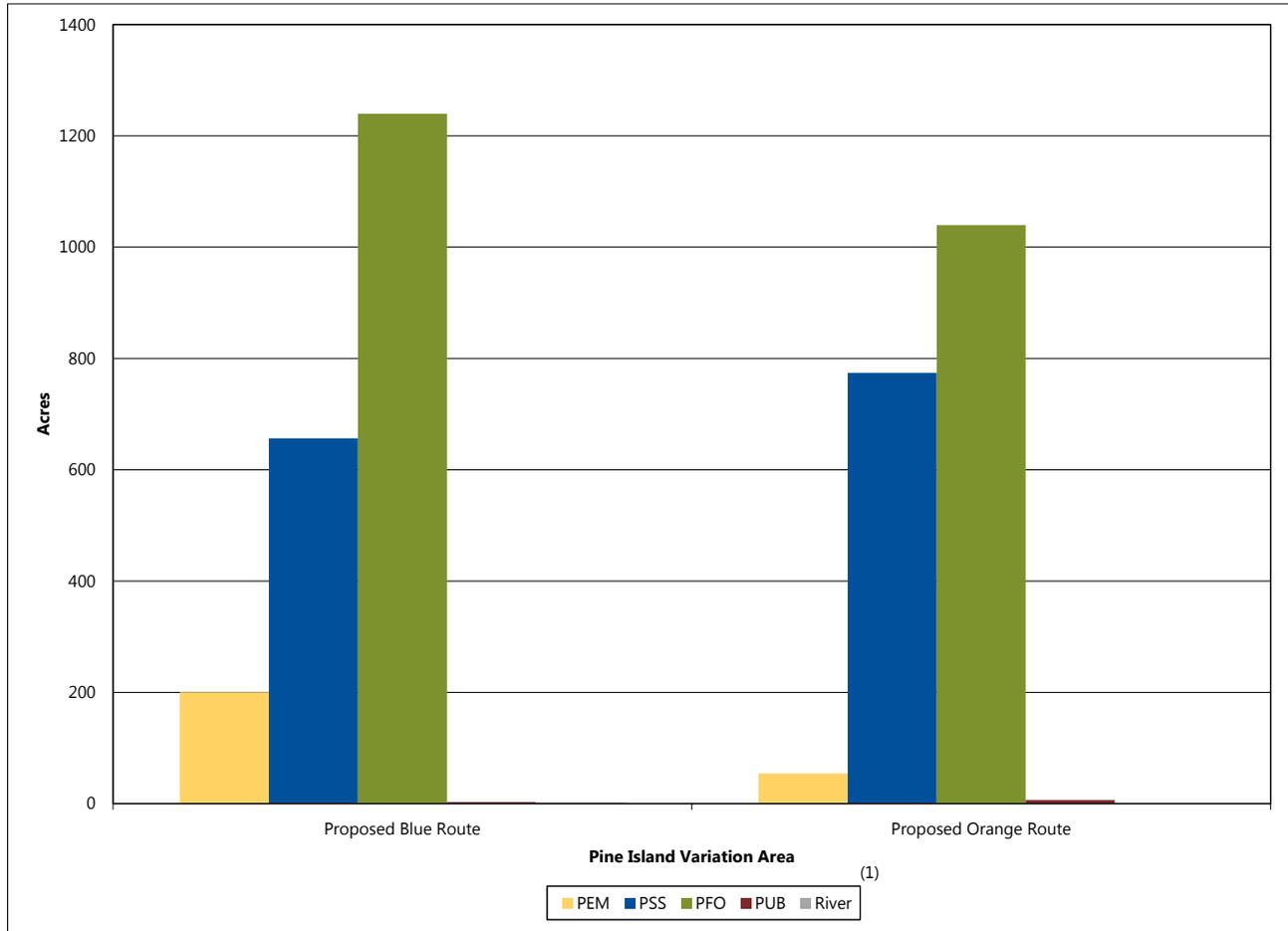
Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed

transmission line. Data related to wildlife resources in the Pine Island Variation Area are summarized in Table 6-73 and shown on Map 6-28. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Blue Route and the Proposed Orange Route in the Pine Island Variation Area include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue Route and Proposed Orange Route to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.1.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue Route and the Proposed Orange Route.

Figure 6-55 Acres of Wetland by Type within the Anticipated ROW in the Pine Island Variation Area



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

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

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

The Proposed Blue Route would traverse the northern portion of the Carp Swamp WMA adjacent to an existing transmission line corridor while the Proposed Orange Route would traverse a greater component of the Red Lake WMA and require creation of new corridor (Table 6-73; Map 6-28). Because of this, the Proposed Orange Route would result in more fragmentation of forested habitats in a WMA and subsequent displacement of wildlife species associated with those forest communities. A detailed description of fragmentation is found in Section 5.3.4.3, but, in general, an increase in habitat fragmentation would result in the reduction in habitat connectivity. This reduction in habitat connectivity could impact wildlife movement across the landscape and would have a greater impact on smaller species, such as turtles, and have less of an impact on larger animals, such as deer. These indirect, long-term adverse impacts are expected to be minimal because of the available contiguous habitat in the region.

While both the Proposed Blue Route and Proposed Orange Route would pass through the Big Bog Important Bird Area, the Proposed Orange Route would traverse more of this resource and would require new corridor for a greater length in the Big Bog Important Bird Area relative to the Proposed Blue Route (Table 6-73; Map 6-28). The Proposed Orange Route may result in more short-term indirect and long-term direct adverse impacts on birds and other wildlife associated with the Big Bog Important Bird Area because it would require creation of more new corridor in this area and subsequent fragmentation of habitat. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat, from forested or shrub communities to open habitats. Long-term direct impacts would be associated with the operation of the Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding

Table 6-72 Vegetation Resources within the Anticipated ROW in the Pine Island Variation Area

Resource	Evaluation Parameter	Pine Island Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line	Length (mi)	109.8	105.4
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	39	23
State Forest	Acres within ROW	2,291	1,980
Total Forested GAP Land Cover	Acres within ROW	2,554	2,520
GAP Land Cover - Dominant Types ⁽³⁾			
North American Boreal Flooded and Swamp Forest	Acres within ROW	1,372	1,323
North American Boreal Forest	Acres within ROW	785	769
Eastern North American Flooded and Swamp Forest	Acres within ROW	366	358

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

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

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

Table 6-73 Wildlife Resources within the Vicinity of the Pine Island Variation Area

Resource	Evaluation Parameter	Pine Island Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line	Length (mi)	109.8	105.4
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	39	23
Wildlife Management Areas	Acres within ROW	49	274
Important Bird Areas	Acres within ROW	1,405	1,722

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Audubon Society 2014, reference (181); MnDNR 2006, reference (165)

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

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

region, and the long-term direct impacts would be minimized through use of Applicant-proposed minimization measures (Section 2.13).

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

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

6.3.1.5 Rare and Unique Natural Resources

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

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile

Table 6-74 Rare Species Documented within One Mile of the Anticipated ROW in the Pine Island Variation Area

Scientific Name ⁽¹⁾	Common Name	Federal Status	State Status	Type	Pine Island Variation Area	
					Proposed Blue Route	Proposed Orange Route
<i>Botrychium ascendens</i>	Upward-lobed Moonwort	None	Endangered	Vascular Plant	X	X
<i>Botrychium lunaria</i>	Common Moonwort	None	Threatened	Vascular Plant	X	X
<i>Carex sterilis</i>	Sterile Sedge	None	Threatened	Vascular Plant		X
<i>Eleocharis rostellata</i>	Beaked Spike-rush	None	Threatened	Vascular Plant		X
<i>Rhynchospora capillacea</i>	Hair-like Beak-rush	None	Threatened	Vascular Plant		X
<i>Asio flammeus</i>	Short-eared Owl	None	Special Concern	Bird		X
<i>Botrychium pallidum</i>	Pale Moonwort	None	Special Concern	Vascular Plant	X	X
<i>Botrychium simplex</i>	Least Moonwort	None	Special Concern	Vascular Plant	X	X
<i>Carex exilis</i>	Coastal Sedge	None	Special Concern	Vascular Plant		X
<i>Cladium mariscoides</i>	Twig-rush	None	Special Concern	Vascular Plant		X
<i>Coturnicops noveboracensis</i>	Yellow Rail	None	Special Concern	Bird		X
<i>Drosera anglica</i>	English Sundew	None	Special Concern	Vascular Plant		X
<i>Juncus stygius var. americanus</i>	Bog Rush	None	Special Concern	Vascular Plant	X	
<i>Lasmigona compressa</i>	Creek Heelsplitter	None	Special Concern	Mussel	X	X
<i>Ligumia recta</i>	Black Sandshell	None	Special Concern	Mussel	X	
<i>Oxyethira itascae</i>	A Caddisfly	None	Special Concern	Insect		X
Colonial Waterbird Nesting Area	Colonial Waterbird Nesting Site	--	--	Animal Assemblage	X	

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

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

buffer surrounding the proposed routes and variations. Data related to rare species in the Pine Island Variation Area are summarized in Table 6-74; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species differs between the Proposed Blue Route and the Proposed Orange Route in the Pine Island Variation Area. As discussed in Section 5.3.5, potential long-term impacts on rare species from

the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation, including critical habitat designated for gray wolf.

As indicated in Table 6-74, the Proposed Orange Route has more documented rare species within one mile of its ROW, including the state-endangered upward-lobed moonwort, and the state-threatened common moonwort, sterile sedge, beaked spikerush, and hair-like beakrush. Both state-threatened moonworts were also documented within one mile of the Proposed Blue Route (Table 6-74). Two colonial waterbird nesting sites have been documented within one mile of the

Proposed Blue Route; both of which are located within 1,500 feet of the anticipated alignment. There are no documented colonial waterbird nesting sites within one mile of the Proposed Orange Route. The Proposed Blue Route would likely result in more impacts to colonial waterbirds, due to the proximity of its ROW to these sites.

Both the Proposed Blue Route and the Proposed Orange Route would cross critical habitat designated for gray wolf, with the Proposed Blue Route crossing this habitat for approximately 60 miles and the Proposed Orange Route crossing it for approximately 85 miles. Both proposed routes would parallel an existing transmission line corridor for approximately 15 miles, where critical habitat designated for gray wolf has already been fragmented. The Proposed Blue Route would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross less of this resource than the Proposed Orange Route.

Many rare species documented within one mile of the Proposed Orange Route are associated with calcareous fen habitats. Due to the higher concentration of rare species documented within one mile of the Proposed Orange Route, this route would likely result in more impacts on rare species. Any indirect impacts, such as loss of habitat, to rare species from the proposed Project are not expected to be significant because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. The full extent of potential impacts from either the Proposed Blue Route or the Proposed Orange Route, however, cannot be

determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

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

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Pine Island Variation Area are summarized in Table 6-75 and shown on Map 6-29; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Blue Route and the Proposed Orange Route in the Pine Island Variation Area is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the

Table 6-75 Rare Communities and Resources within the Vicinity of the Pine Island Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Pine Island Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line	Length (mi)	109.8	105.4
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	39	23
Scientific and Natural Areas	Acres within 0–1,500 ft	100	50
MBS Sites of Biodiversity Significance ⁽⁴⁾	Acres within ROW	1,514	1,639
Ecologically Important Lowland Conifers	Acres within ROW	29	5

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167); MnDNR 2014, reference (185)

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

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (4) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-29 and in Table 6-75, SNAs are adjacent to both proposed routes. Approximately 100 acres of the Myrtle Lake Peatland SNA is located within 1,500 feet of the anticipated alignment for the Proposed Blue Route and approximately 50 acres of the Red Lake Peatland SNA is located within 1,500 feet of the anticipated alignment for the Proposed Orange Route (Table 6-75; Map 6-29). However, the Proposed Blue Route would follow an existing transmission line corridor adjacent to the Myrtle Lake Peatland SNA, while the Proposed Orange Route would require creation of new corridor adjacent to the Red Lake Peatland SNA (Map 6-29). As discussed in Section 5.3.5, SNAs typically contain native plant communities that may harbor rare plants or animals; creation of new corridor adjacent to this area could result in impacts on rare species associated with the SNA.

Both the Proposed Blue Route and the Proposed Orange Route pass through large areas of MBS Sites of Biodiversity Significance; however, the Proposed Orange route would pass through more acres (Table 6-75; Map 6-29). The Proposed Orange Route could potentially result in more impacts on MBS Sites of Biodiversity Significance and the rare communities and species associated with them.

The Proposed Blue Route would pass through more MnDNR Ecologically Important Lowland Conifer stands; however many of these stands are located adjacent to the Myrtle Lake Peatland SNA, where the Proposed Blue Route would run parallel to an existing transmission line corridor.

One of the calcareous fens documented in the Central Section is located within one mile of the Proposed Orange Route (Map 6-29). This fen is associated with one of the Lost River Peatland SNA units, which is located over one half mile from the Proposed Orange Route (Map 6-29). The Proposed Orange Route would not cross the SNA WPA (described in Section 5.3.5) that is associated with this fen, nor is the WPA present within the ROW (Map 6-29). The Proposed Orange Route is also located approximately two miles from another fen centroid point, which is associated with another Lost River Peatland SNA unit (Map 6-29). The WPA associated with this SNA would be crossed by the Proposed Orange Route. Impacts to SNA WPAs and associated impacts to calcareous fen hydrology are discussed under Water Resources in Section 6.3.1.4.

The rare communities and resources listed in Table 6-75 and detailed above show that the Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

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

6.3.1.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-30 shows areas where the Proposed Blue Route and the Proposed Orange Route would parallel corridors with existing transportation, transmission line, or other linear features in the Pine Island Variation Area.

Table 6-76 identifies the percentage of total transmission line length that the Proposed Blue Route or the Proposed Orange Route parallel an existing corridor or linear feature in the Pine Island Variation Area.

The Proposed Blue Route would parallel an existing transmission line corridor for less than half of the length (Figure 6-56). The Proposed Orange Route would parallel an existing transmission line for less than one quarter of the length. The proposed routes both would parallel existing corridors (i.e., road/trail, field line, and other) for less than 10 percent of their lengths.

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

Table 6-76 Corridor Sharing in the Pine Island Variation Area

Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	Pine Island Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS)	Percent of Total Length ⁽²⁾	39	23
Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line)	Percent of Total Length ⁽²⁾	1	0
Field Line (other linear features, but not transmission lines or road/trails, may be present within the field line corridor; i.e., PLSS)	Percent of Total Length ⁽²⁾	1	1
PLSS Only	Percent of Total Length ⁽²⁾	7	4
None	Percent of Total Length ⁽²⁾	53	72

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

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

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

or mitigate impacts on corridor sharing from the proposed Project.

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

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-77 summarizes the costs associated with constructing the Proposed Blue Route and the Proposed Orange Route in the Pine Island Variation Area. As indicated in Table 6-77, the Proposed Blue Route would cost more to construct relative to the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$169,000 to \$176,000 annually for these alternatives in the Pine Island Variation Area.

6.3.2 Beltrami South Central Variation Area

The Beltrami South Central Variation Area encompasses two route alternatives: the Proposed Orange Route and the Beltrami South Central Variation. This section provides a comparison of

the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Beltrami South Central Variation Area, depending on the route or variation considered.

6.3.2.1 Human Settlement

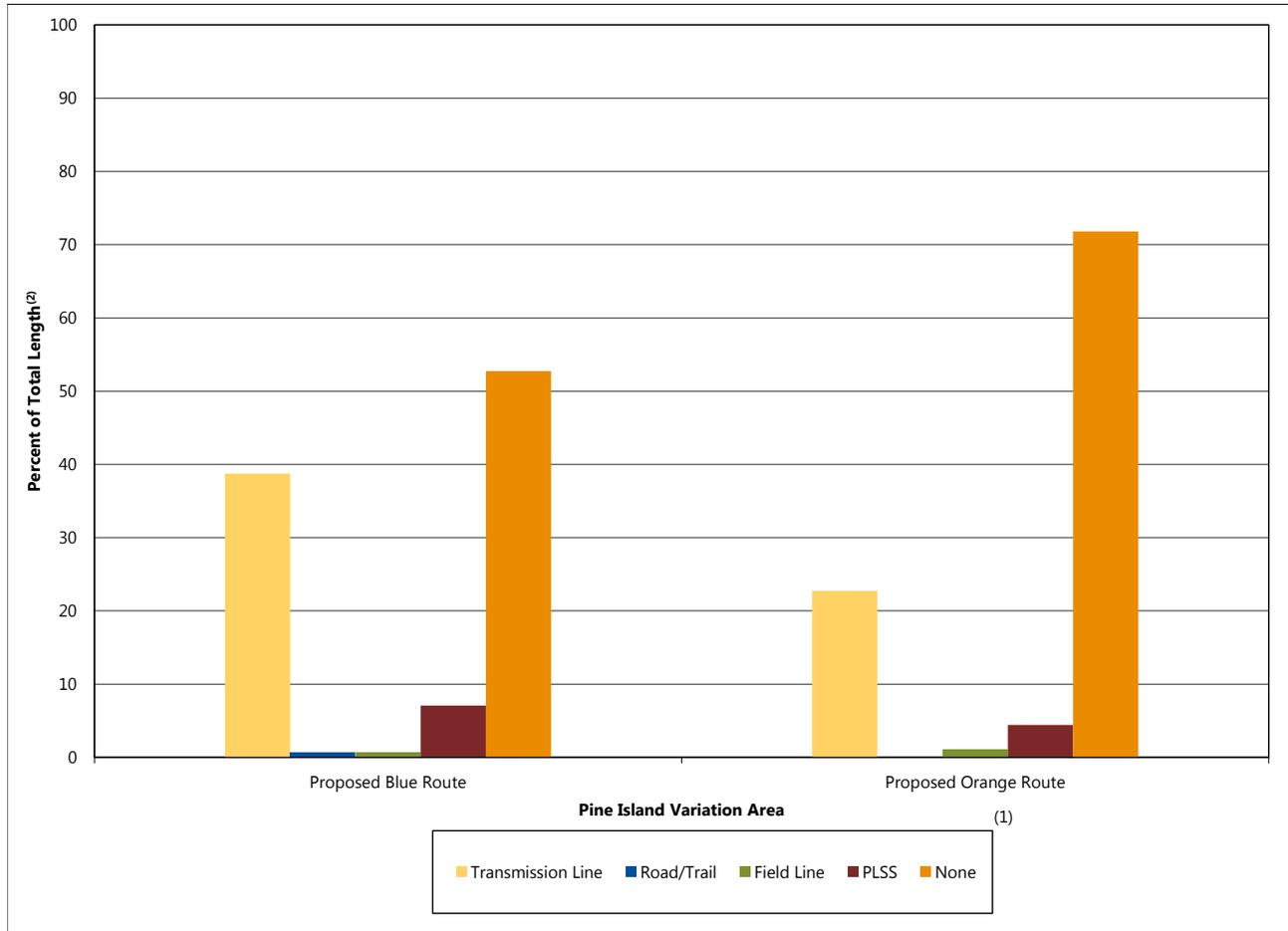
This section describes the aesthetic resources and zoning and land use compatibility within the Beltrami South Central Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Beltrami South Central Variation Area are summarized in Table 6-78 and shown on Maps 6-31, 6-32, 6-33, and 6-35.

As indicated in Table 6-78 for the Beltrami South Central Variation Area, the Proposed Orange Route and Beltrami South Central Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including one

Figure 6-56 Corridor Sharing in the Pine Island Variation Area



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

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

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

snowmobile trail and two state forests (Maps 6-33 and 6-35). Neither the proposed route nor variations would be located within 1,500 feet of any residences or within one mile of any historic architectural sites, which would also have high visual sensitivity.

The Beltrami South Central Variation is slightly longer (1.7 miles) than the Proposed Orange Route (1.2 miles; Table 6-78). Also, the Proposed Orange Route parallels an existing large 500 kV transmission line for its entire length, whereas the Beltrami South Central Variation does not parallel an existing transmission line. By paralleling an existing 500 kV transmission line of similar design and being slightly shorter in length, the Proposed Orange Route would produce substantially less contrast than the Beltrami South Central Variation. For these reasons, the Proposed Orange Route would result in less

aesthetic impact than the Beltrami South Central Variation.

Because the Proposed Orange Route is short in length, parallels an existing transmission line of similar size and design for its full length, and affects no residences and very few other sensitive visual resources (two state forests and one snowmobile trail), potential aesthetic impacts of the Proposed Orange Route are expected to be minimal. Although the Beltrami South Central Variation does not parallel an existing large transmission line, it is short in length and affects no residences and very few other sensitive visual resources (two state forests and one snowmobile trail). For these reasons, potential aesthetic impacts of the Beltrami South Central Variation are also expected to be minimal.

Table 6-77 Construction Costs in the Pine Island Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
Pine Island	Proposed Blue Route	\$118,876,237	\$1,082,662	109.8
	Proposed Orange Route	\$113,672,041	\$1,078,482	105.4

Source(s): Minnesota Power 2015, reference (9); Minnesota Power 2015, reference (186)

Table 6-78 Aesthetic Resources within the ROI in the Beltrami South Central Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Beltrami South Central Variation Area	
		Proposed Orange Route	Beltrami South Central Variation
Transmission Line	Length (mi)	1.2	1.7
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	100	0
State Forests	Count within 0–1,500 ft	2	2
Snowmobile Trails	Count within 0–1,500 ft	1	1

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

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

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

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

Land Use Compatibility

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

Land Uses

Table 6-79 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Route and Beltrami South Central Variation in the Beltrami South Central Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the Beltrami South Central Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Routes are shown on Map 6-31.

The Proposed Orange Route and Beltrami South Central Variation are both primarily located in forested and/or swamp land. The Beltrami South Central variation would impact more acres of

forested and/or swamp land compared to the Proposed Orange Route (Table 6-79). The Proposed Orange Route would parallel an existing corridor for more of its length compared to the Beltrami South Central Variation (see Section 6.3.1.6); therefore, the incompatibility with adjacent land uses would be minimal in some sections of the Proposed Orange Route and Beltrami South Central variation.

Land Ownership and Management

Table 6-80 shows that the Beltrami South Central Variation would also impact more acres of state forest and state fee land compared to the Proposed Orange Route. No impacts to county lands or state conservation easements would occur under the Proposed Orange Route or Beltrami South Central Variation. The Proposed Orange Route would impact 16 acres of USFWS Interest Lands, with a crossing length of 3,493 feet, while the Beltrami South Central Variation would not impact this land ownership category (Map 6-31).

The Proposed Orange Route would parallel an existing corridor for its entire length, while the Beltrami South Central Variation would not parallel an existing corridor (see Section 6.3.2.6). Therefore, the Proposed Orange Route would be expected to have less incompatibility with existing land uses

Table 6-79 Land Uses within the ROI in the Beltrami South Central Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	Beltrami South Central Variation Area	
			Proposed Orange Route	Beltrami South Central Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	605	785
	Developed or Disturbed	Acres within 0–1,500 ft	7	6
	Agricultural	Acres within 0–1,500 ft	0	0
	Forested and/or Swamp	Acres within 0–1,500 ft	598	779
	Other	Acres within 0–1,500 ft	0	0

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

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

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

Table 6-80 Land Ownership and Management within the Anticipated ROW in the Beltrami South Central Variation Area

Resource	Type	Evaluation Parameter	Beltrami South Central Variation Area	
			Proposed Orange Route	Beltrami South Central Variation
Total Lands	--	Acres within ROW	30	43
State Forests	--	Acres within ROW	30	43
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	30	43
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	14	43
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	0	0
	Trust Fund	Acres within ROW	0	0
	Federal - State Lease	Acres within ROW	16	0
USFWS Interest Lands	--	Acres within ROW	16	0
Private Lands⁽²⁾	--	Acres within ROW	0	0

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

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

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

compared to the Beltrami South Central Variation (Figure 6-57).

Impacts to land use from the proposed Project in the Beltrami South Central Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Orange Route and Beltrami South Central Variation would both result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the Proposed Orange

Route or Beltrami South Central Variation that would parallel an existing corridor is also important. The Proposed Orange Route avoids a greater amount of state forest and state fee lands than the Beltrami South Central Variation thereby avoiding long-term changes to land use and the Proposed Orange Route would also parallel an existing corridor compared to the Beltrami South Central Variation which does not parallel an existing corridor.

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed

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

6.3.2.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Beltrami South Central Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Beltrami South Central Variation Area are summarized in Table 6-81.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-81 shows the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the

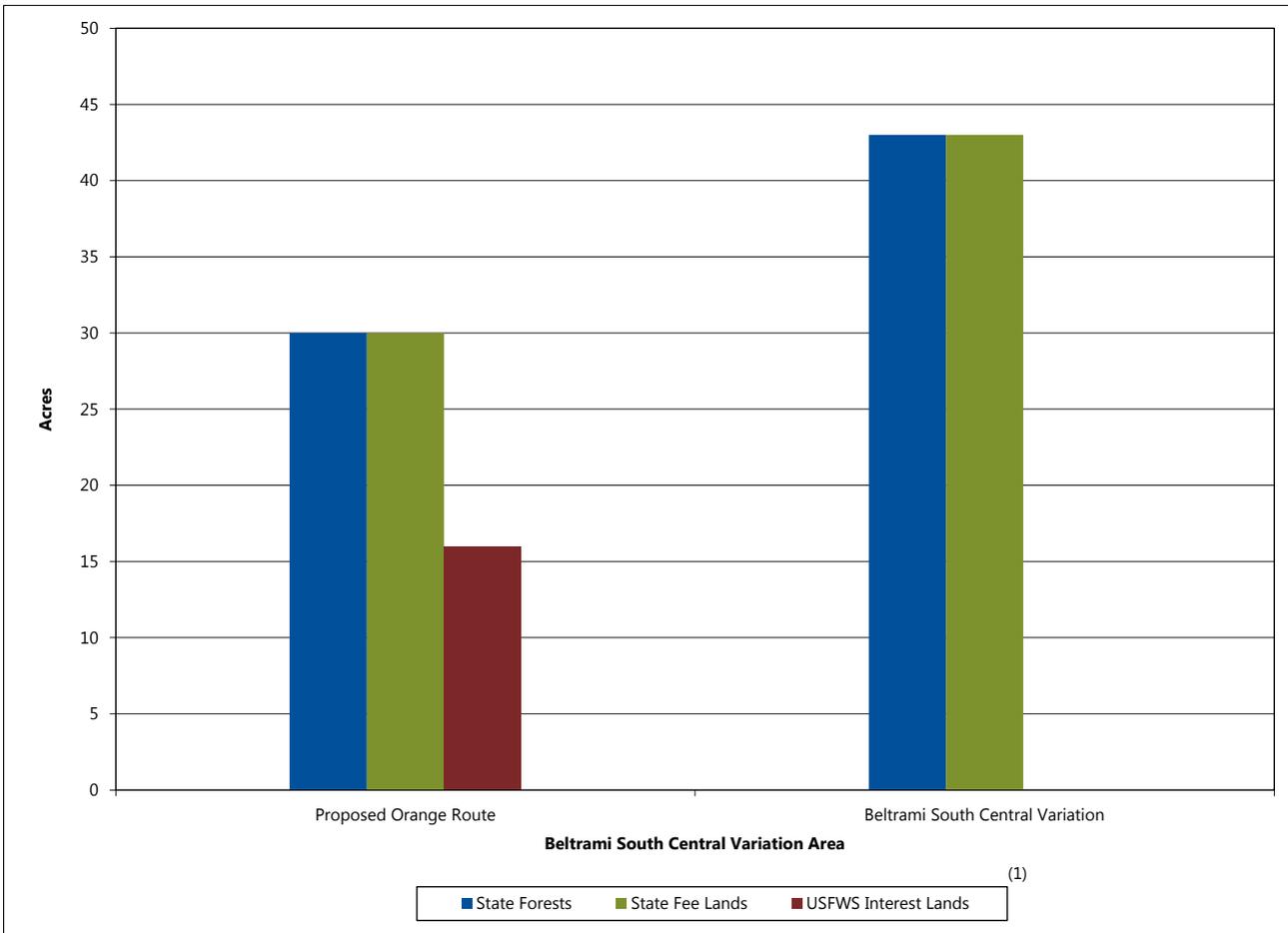
Proposed Orange Route and Beltrami South Central Variation in the ROI.

No prime farmland or farmland of statewide importance has been identified for the Proposed Orange Route or the Beltrami South Central Variation in the Beltrami South Central Variation Area.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-81 identifies the acreage of state forest land that would be impacted in the ROI of the Proposed Orange Route and Beltrami South Central Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Orange Route or the Beltrami South Central Variation in the Beltrami South Central Variation Area.

Figure 6-57 Public Land Ownership/Management within the ROI in the Beltrami South Central Variation Area



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

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

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

Table 6-81 Land-Based Economy Resources within the Anticipated ROW in the Beltrami South Central Variation Area

Resource	Type	Evaluation Parameter	Beltrami South Central Variation Area	
			Proposed Orange Route	Beltrami South Central Variation
Transmission Line	--	Length (mi)	1.2	1.7
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	100	0
Farmland	Not Farmland	Acres within ROW	30	43
	Prime Farmland if Drained	Acres within ROW	0	0
	Farmland of Statewide Importance	Acres within ROW	0	0
	All Areas are Prime Farmland	Acres within ROW	0	0
State Forest	--	Acres within ROW	30	43

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR 2003, reference (148)

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

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

The Beltrami South Central Variation, which has the longer length, would pass through more acres of state forest lands - the Beltrami State Forest (Figure 6-58, Map 6-33). The Proposed Orange Route, which parallels an existing transmission line for its entire length, would be expected to result in fewer impacts on timber activities in the Beltrami Island State Forest.

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

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

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the

transmission line. There are no active or expired/terminated state mineral leases, records of current mineral mining, or known aggregate resources that would be impacted by the Proposed Orange Route or Beltrami South Central Variation within the Beltrami South Central Variation Area.

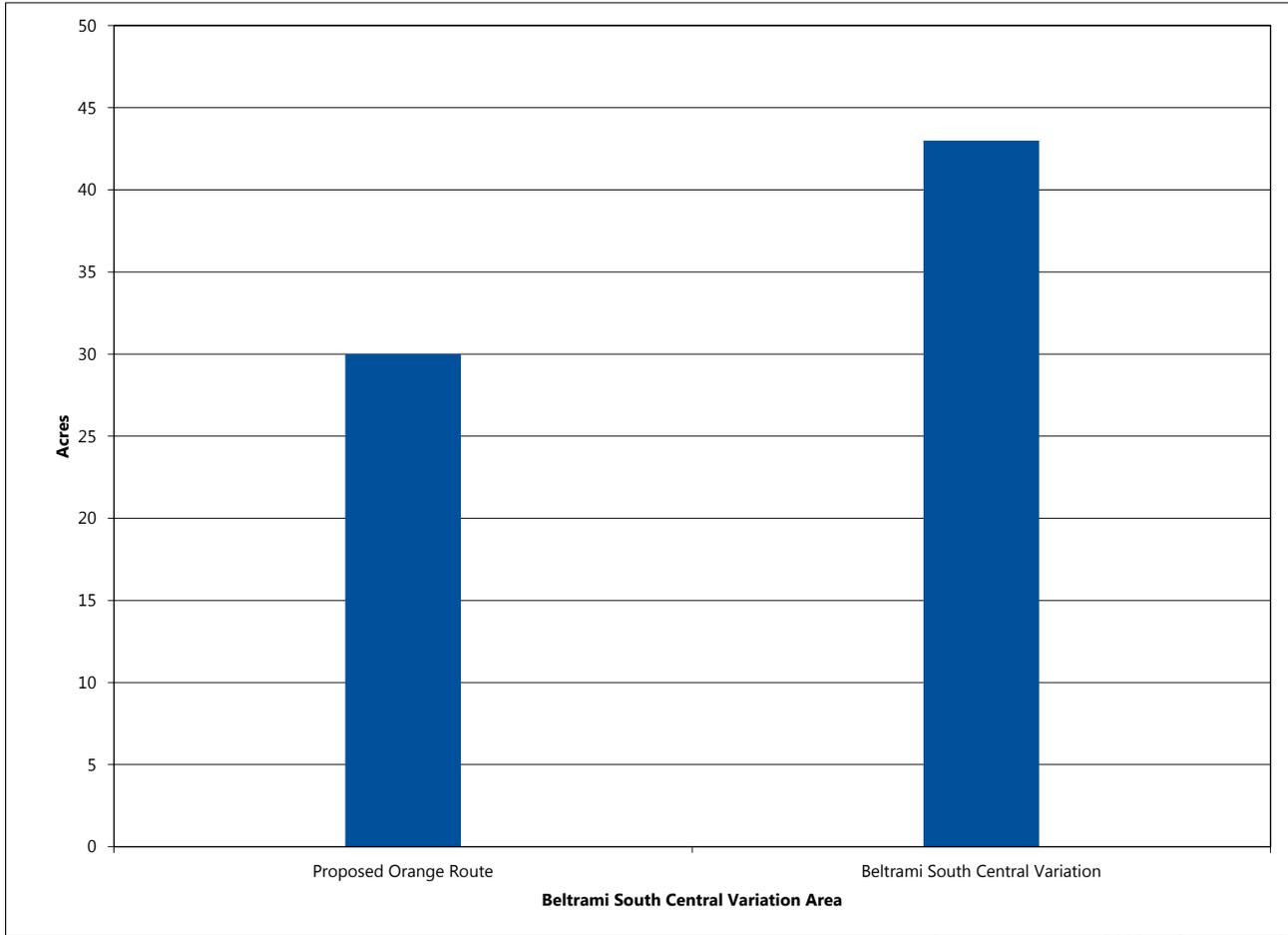
As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. However, such impacts are not expected from the proposed Project because such activities do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

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

6.3.2.3 Archaeology and Historic Architectural Resources

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

Figure 6-58 Acres of State Forest Land within the Anticipated ROW in the Beltrami South Central Variation Area



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

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

No previously recorded archaeological sites or historic architectural resources are present within the Beltrami South Central Variation Area (Map 6-32). Additionally, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Orange Route or Beltrami South Central Variation in the Beltrami South Central Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

The Proposed Route and Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required to comply with federal and/or state regulations for cultural resources. These cultural resources investigations

will be implemented as part of DOE’s Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate adverse effects to historic properties as a result of construction and operation of the proposed Project.

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

6.3.2.4 Natural Environment

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

Table 6-82 Water Resources within the Anticipated ROW in the Beltrami South Central Variation Area

Resource	Evaluation Parameter	Beltrami South Central Variation Area	
		Proposed Orange Route	Beltrami South Central Variation
Transmission Line	Length (mi)	1.2	1.7
NWI Wetlands	Acres within ROW	30	43

Sources: USFWS 1997, reference (157); Minnesota Power 2014, reference (144)

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

Key Findings

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Beltrami South Central Variation Area are summarized in Table 6-82 and shown on Map 6-33. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The need to place transmission structures in wetlands and quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Orange Route and the Beltrami South Central Variation. Neither the Proposed Orange Route nor the Beltrami South Central Variation ROWs contain PWIs, non-PWI waters, trout streams, impaired waters, or floodplains.

Based on the NWI, the Proposed Orange Route and the Beltrami South Central Variation would both require conversion of forested shrub and wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-59, the Beltrami South Central Variation contains more combined forested and shrub wetlands compared to the Proposed Orange Route and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed Orange Route and the Beltrami South Central Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are expected to be

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

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

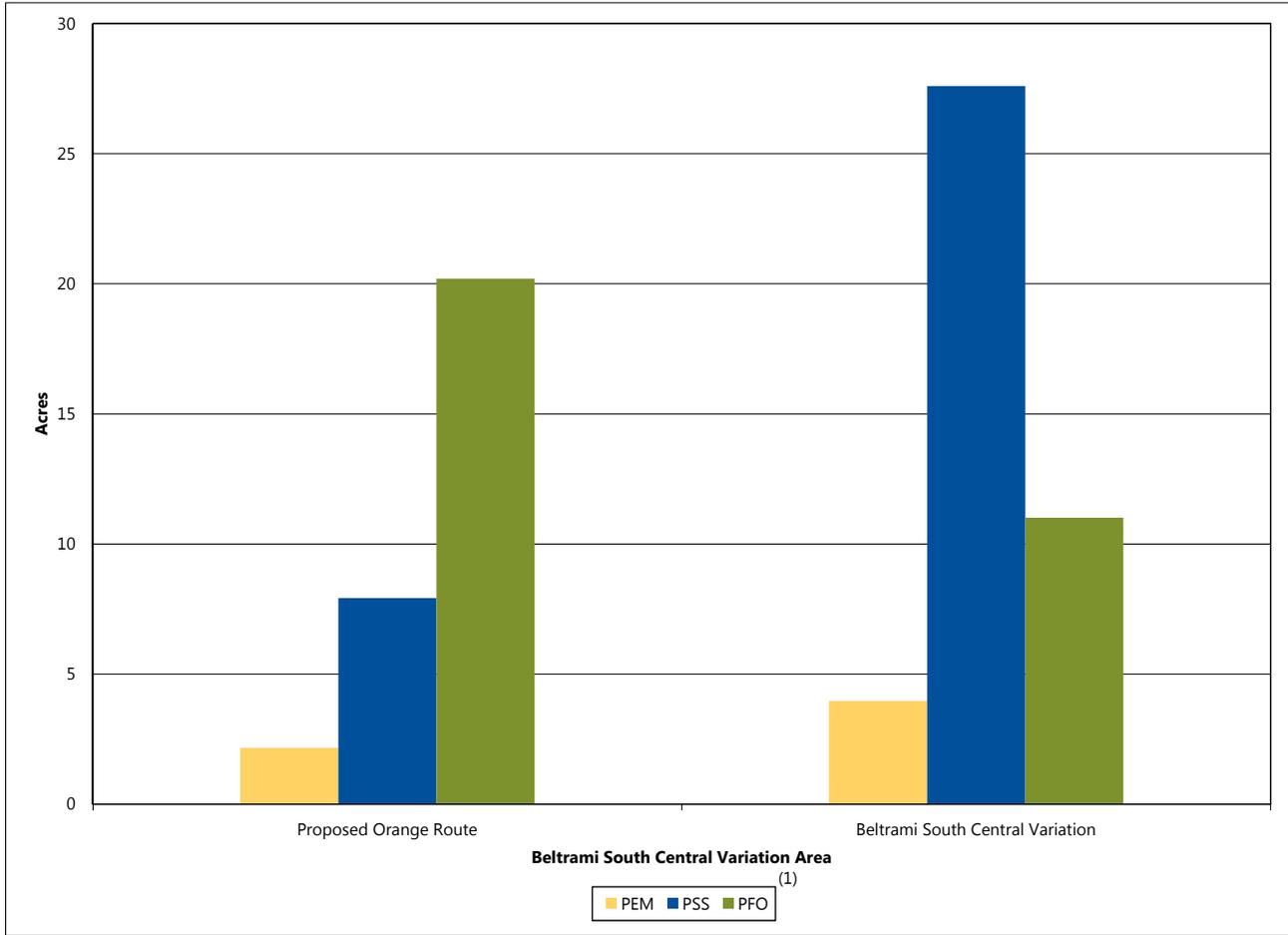
Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Beltrami South Central Variation Area are summarized in Table 6-83 and shown on Maps 5-12 and 6-33. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

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

As indicated in Table 6-83 and Figure 6-60, the Beltrami South Central Variation would pass through slightly more forested land, including state forest, relative to the Proposed Orange Route, therefore resulting in more permanent removal of forest vegetation. In addition, the Proposed Orange Route would parallel existing transmission line corridor for its entire length, while the Beltrami South Central

Figure 6-59 Acres of Wetland by Type within the Anticipated ROW in the Beltrami South Central Variation Area



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

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

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

Table 6-83 Vegetation Resources within the Anticipated ROW in the Beltrami South Central Variation Area

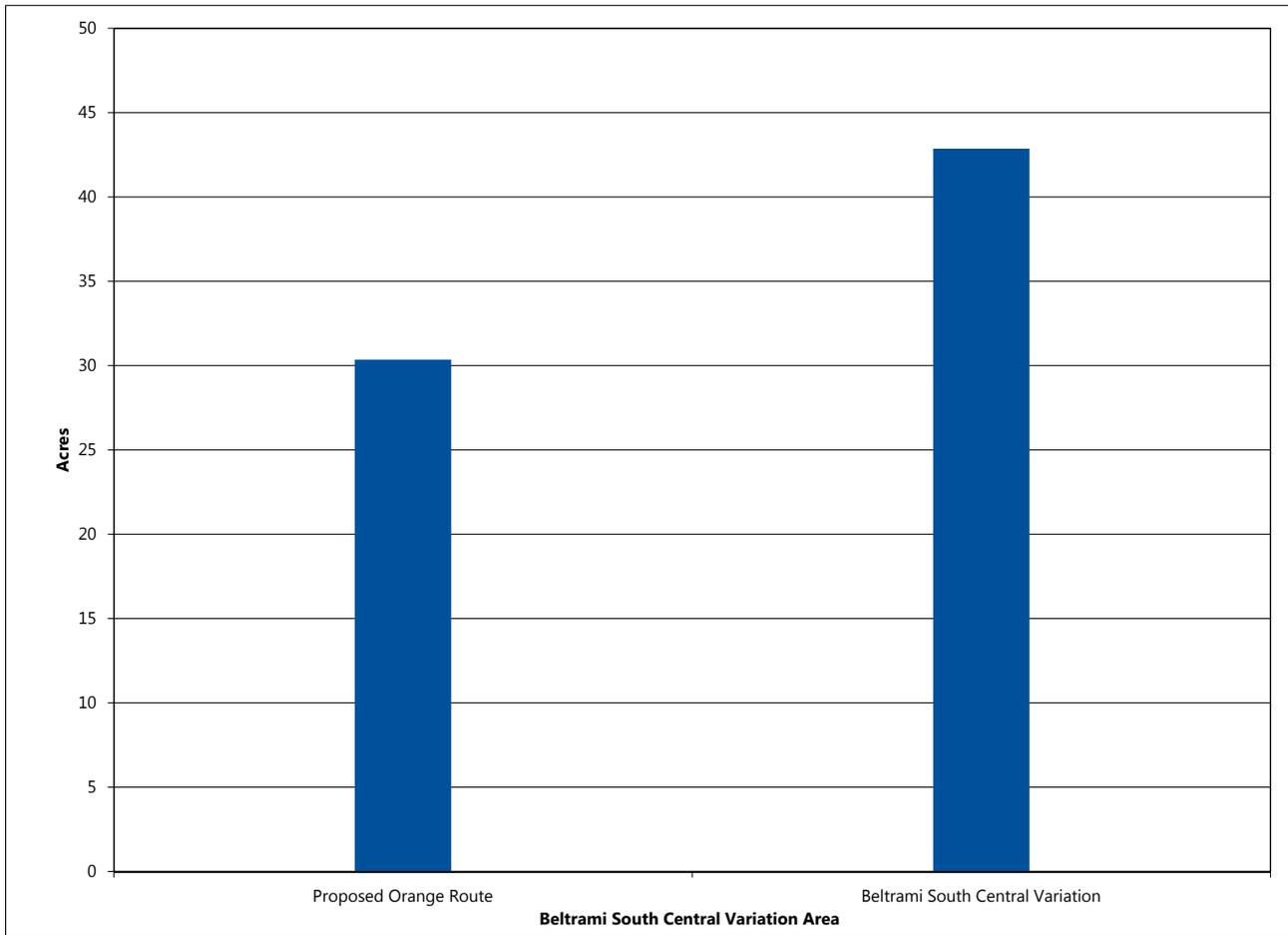
Resource	Evaluation Parameter	Beltrami South Central Variation Area	
		Proposed Orange Route	Beltrami South Central Variation
Transmission Line	Length (mi)	1.2	1.7
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	100	0
State Forest	Acres within ROW	30	43
Total Forested GAP Land Cover	Acres within ROW	30	43
GAP Land Cover - Dominant Types ⁽³⁾			
North American Boreal Flooded & Swamp Forest	Acres within ROW	24	32

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

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

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

Figure 6-60 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Beltrami South Central Variation Area



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

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

Variation would require creation of new corridor for its entire length (Table 6-83). Because of this, the Beltrami South Central Variation would result in more fragmentation of intact forest in areas where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

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

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Beltrami South Central Variation Area are summarized in Table 6-84 and shown on Map 6-33. Additional, more detailed data related to wildlife

resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Orange Route and Beltrami South Central Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Orange Route and Beltrami South Central Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.2.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Orange Route and Beltrami South Central Variation.

Both the Proposed Orange Route and the Beltrami South Central Variation would pass through the Big Bog Important Bird Area (Table 6-84; Map 6-33). However, the Beltrami South Central Variation

Table 6-84 Wildlife Resources within the Vicinity of the Beltrami South Central Variation Area

Resource	Evaluation Parameter	Beltrami South Central Variation Area	
		Proposed Orange Route	Beltrami South Central Variation
Transmission Line	Length (mi)	1.2	1.7
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	100	0
Important Bird Areas	Acres within ROW	30	43

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

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

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

would traverse a greater portion of the Big Bog Important Bird Area and require the creation of new transmission line corridor for its entire length, while the Proposed Orange Route would parallel an existing transmission line corridor for its entire length (Table 6-84; Map 6-33). Creation of a new corridor in the Big Bog Important Bird Area would likely result in both short-term and long-term direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13).

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

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

6.3.2.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features,

such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Beltrami South Central Variation Area are summarized in Table 6-85; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

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

As indicated in Table 6-85, four rare moonwort species have been documented within one mile of both the Proposed Orange Route and Beltrami South Central Variation. Although the Beltrami South Central Variation would require the creation of new corridor, while the Proposed Orange Route would parallel an existing transmission line corridor, species in this genus prefer disturbed habitats, including ROWs. Because of this, impacts on these rare species would likely be similar with either the Proposed Orange Route or Beltrami South Central Variation. However, the full extent of potential impacts from either the Proposed Orange Route or Beltrami South Central Variation cannot be determined without

Table 6-85 Rare Species Documented within One Mile of the Anticipated ROW in the Beltrami South Central Variation Area

Scientific Name ⁽¹⁾	Common Name	Federal Status	State Status	Type	Beltrami South Central Variation Area	
					Proposed Orange Route	Beltrami South Central Variation
<i>Botrychium ascendens</i>	Upward-lobed Moonwort	None	Endangered	Vascular Plant	X	X
<i>Botrychium lunaria</i>	Common Moonwort	None	Threatened	Vascular Plant	X	X
<i>Botrychium pallidum</i>	Pale Moonwort	None	Special Concern	Vascular Plant	X	X
<i>Botrychium simplex</i>	Least Moonwort	None	Special Concern	Vascular Plant	X	X

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

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

pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE’s informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

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

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Beltrami South Central Variation Area are summarized in Table 6-86 and shown on Map 6-34; additional, more detailed data on rare communities and resources is provided in Appendix E.

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

As indicated in Table 6-86 and on Map 6-34, the Proposed Orange Route would pass through fewer acres of MBS Sites of Biodiversity Significance relative to the Beltrami South Central Variation. In addition, the Proposed Orange Route would parallel existing transmission line corridor for its entire length, while the Beltrami South Central Variation would require creation of new corridor for its entire length (Table 6-86; Map 6-34). Because of this, the Beltrami South Central Variation would result in more fragmentation of intact forest in areas where forest vegetation is present.

The rare communities and resources listed in Table 6-86 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Table 6-86 Rare Communities and Resources within the Vicinity of the Beltrami South Central Variation Area

Resource	Evaluation Parameter	Beltrami South Central Variation Area	
		Proposed Orange Route	Beltrami South Central Variation
Transmission Line	Length (mi)	1.2	1.7
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	100	0
MBS Sites of Biodiversity Significance ⁽³⁾	Acres within ROW	30	43

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

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

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

6.3.2.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-35 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Beltrami South Central Variation Area.

Table 6-87 identifies the percentage of total transmission line length that the Proposed Orange Route and Beltrami South Central Variation parallel

an existing corridor or linear feature in the Beltrami South Central Variation Area.

The Proposed Orange Route would parallel existing transmission line for the entire length (Table 6-87). The Beltrami South Central Variation would not follow any existing corridors.

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

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

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-88 summarizes the costs associated with constructing

Table 6-87 Corridor Sharing in the Beltrami South Central Variation Area

Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	Beltrami South Central Variation Area	
		Proposed Orange Route	Beltrami South Central Variation
Transmission Line (other linear features may be present within the transmission line corridor, i.e., road, trail, field line, PLSS)	Percent of Total Length ⁽²⁾	100	0
None	Percent of Total Length ⁽²⁾	0	100

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

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

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

Table 6-88 Construction Costs in the Beltrami South Central Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
Beltrami South Central	Proposed Orange Route	\$1,214,573	\$995,551	1.2
	Beltrami South Central Variation	\$3,440,123	\$1,977,082	1.7

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

the Proposed Orange Route and Beltrami South Central Variation in the Beltrami South Central Variation Area. As indicated in Table 6-88, the Beltrami South Central Variation would be more expensive to construct, relative to the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$2,000 to \$2,700 annually for these alternatives in the Beltrami South Central Variation Area.

6.3.3 Beltrami South Variation Area

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

6.3.3.1 Human Settlement

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

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Beltrami South Variation Area are summarized in Table 6-89 and shown on Maps 6-31, 6-32, 6-33, and 6-35.

As indicated in Table 6-89 for the Beltrami South Variation Area, both the Proposed Orange Route and Beltrami South Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, consisting of one state forest. Neither the Proposed Orange Route nor the Beltrami South Variation would be located within 1,500 feet of any residences or within one mile of any historic architectural sites, which would also have high visual sensitivity.

The Beltrami South Variation is slightly longer (7.5 miles) than the Proposed Orange Route (5.6 miles; Table 6-89). Also, the Proposed Orange Route parallels an existing large 500 kV transmission line for its entire length, whereas the Beltrami South Variation does not parallel an existing transmission

Table 6-89 Aesthetic Resources within the ROI in the Beltrami South Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Beltrami South Variation Area	
		Proposed Orange Route	Beltrami South Variation
Transmission Line	Length (mi)	5.6	7.5
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	100	0
State Forests	Count within 0–1,500 ft	1	1

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

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

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

line. By paralleling an existing 500 kV transmission line of similar design and being slightly shorter in length, the Proposed Orange Route would produce substantially less contrast than the Beltrami South Variation. For these reasons, the Proposed Orange Route would result in less aesthetic impact than the Beltrami South Variation in the Beltrami South Variation Area.

Because the Proposed Orange Route is short in length, parallels an existing transmission line of similar size and design for its full length, and affects no residences and very few other sensitive visual resources (one state forest), potential aesthetic impacts of the Proposed Orange Route are expected to be minimal. Although the Beltrami South Variation does not parallel an existing large transmission line, it is also short in length and affects no residences and very few other sensitive visual resources (one state forest).

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

Land Use Compatibility

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

Land Uses

Table 6-90 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Orange Route and Variation in the Beltrami South Variation Area. Generally, the percentage of each land use is

representative of what is present within the ROW. The various land uses present in the variation area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Orange Route and Beltrami South Variation are shown on Map 6-31.

The Proposed Orange Route and Beltrami South Variation are both primarily located in forested and/or swamp land. The Beltrami South Variation would impact more acres of forested and/or swamp land compared to the Proposed Orange Route (Table 6-90). A small amount of developed or disturbed land would be impacted by both the Proposed Orange Route and the Beltrami South Variation.

Land Ownership and Management

Table 6-91 shows that Beltrami South Variation would impact a greater amount of state forest and state fee land compared to the Proposed Orange Route. No impacts to county lands, or state conservation easements would occur under the Proposed Orange Route or Beltrami South Variation.

The Proposed Orange Route would parallel an existing corridor for its entire length, while the Beltrami South Variation would not parallel an existing corridor (see Section 6.3.3.6). Therefore, the Proposed Orange Route would be expected to have less incompatibility with surrounding land uses compared to the Beltrami South Variation.

The Proposed Orange Route would parallel an existing corridor for its entire length, while the Beltrami South Variation would not parallel an existing corridor (see Section 6.3.3.6). Therefore, the Proposed Orange Route would be expected to have less incompatibility with surrounding land

Table 6-90 Land Uses within the ROI in the Beltrami South Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	Beltrami South Variation Area	
			Proposed Orange Route	Beltrami South Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	2,196	2,897
	Developed or Disturbed	Acres within 0–1,500 ft	11	10
	Agricultural	Acres within 0–1,500 ft	0	0
	Forested and/or Swamp	Acres within 0–1,500 ft	2,185	2,887
	Other	Acres within 0–1,500 ft	0	0

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

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

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

Table 6-91 Land Ownership/Management within the Anticipated ROW in the Beltrami South Variation Area

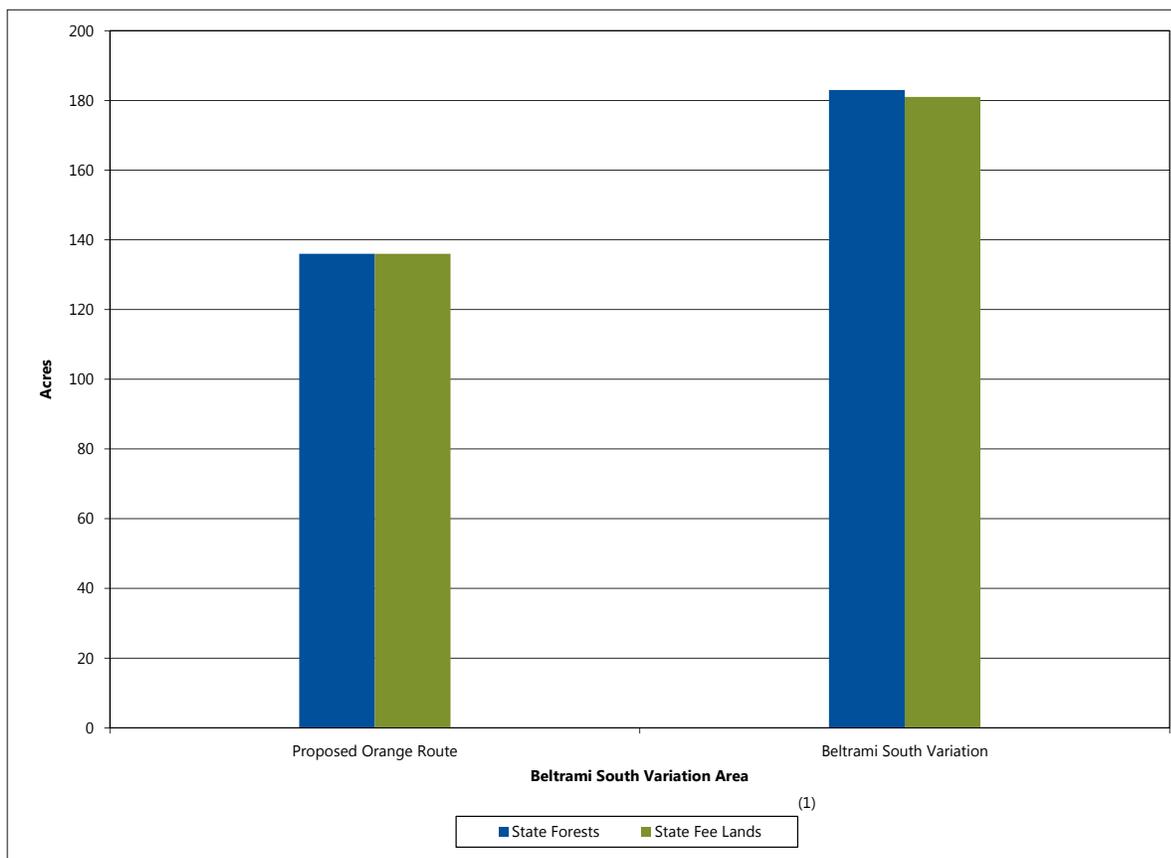
Resource	Type	Evaluation Parameter	Beltrami South Variation Area	
			Proposed Orange Route	Beltrami South Variation
Total Lands	--	Acres within ROW	136	183
State Forests	--	Acres within ROW	136	183
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	136	181
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	136	181
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	0	0
	Trust Fund	Acres within ROW	0	0
	Federal - State Lease	Acres within ROW	0	0
Private Lands ⁽²⁾	--	Acres within ROW	0	2

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

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

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

Figure 6-61 Public Land Ownership/Management within the ROI in the Beltrami South Variation Area⁽¹⁾



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

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

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

uses compared to the Beltrami South Variation (Figure 6-61).

Impacts to land use from the proposed Project in the Beltrami South Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Orange Route and Beltrami South Variation would both result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the route that would parallel an existing corridor is also important. The Proposed Orange Route avoids a greater amount of state forest and state fee lands than the Beltrami South Variation, thereby avoiding long-term changes to land use.

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

6.3.3.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Beltrami South Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based

economy resources in the Beltrami South Variation Area are summarized in Table 6-92.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-92 shows the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Orange Route and Beltrami South Variations in the ROI.

No prime farmland or farmland of statewide importance has been identified for the Proposed Orange Route or the Beltrami South Variation in the Beltrami South Variation Area.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-92 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Orange Route and the Beltrami South Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Orange Route or the Beltrami South Variation in the Beltrami South Variation Area.

The Beltrami South Variation, which has a longer length, would pass through the most acres of

Table 6-92 Land-Based Economy Resources within the Anticipated ROW in the Beltrami South Variation Area

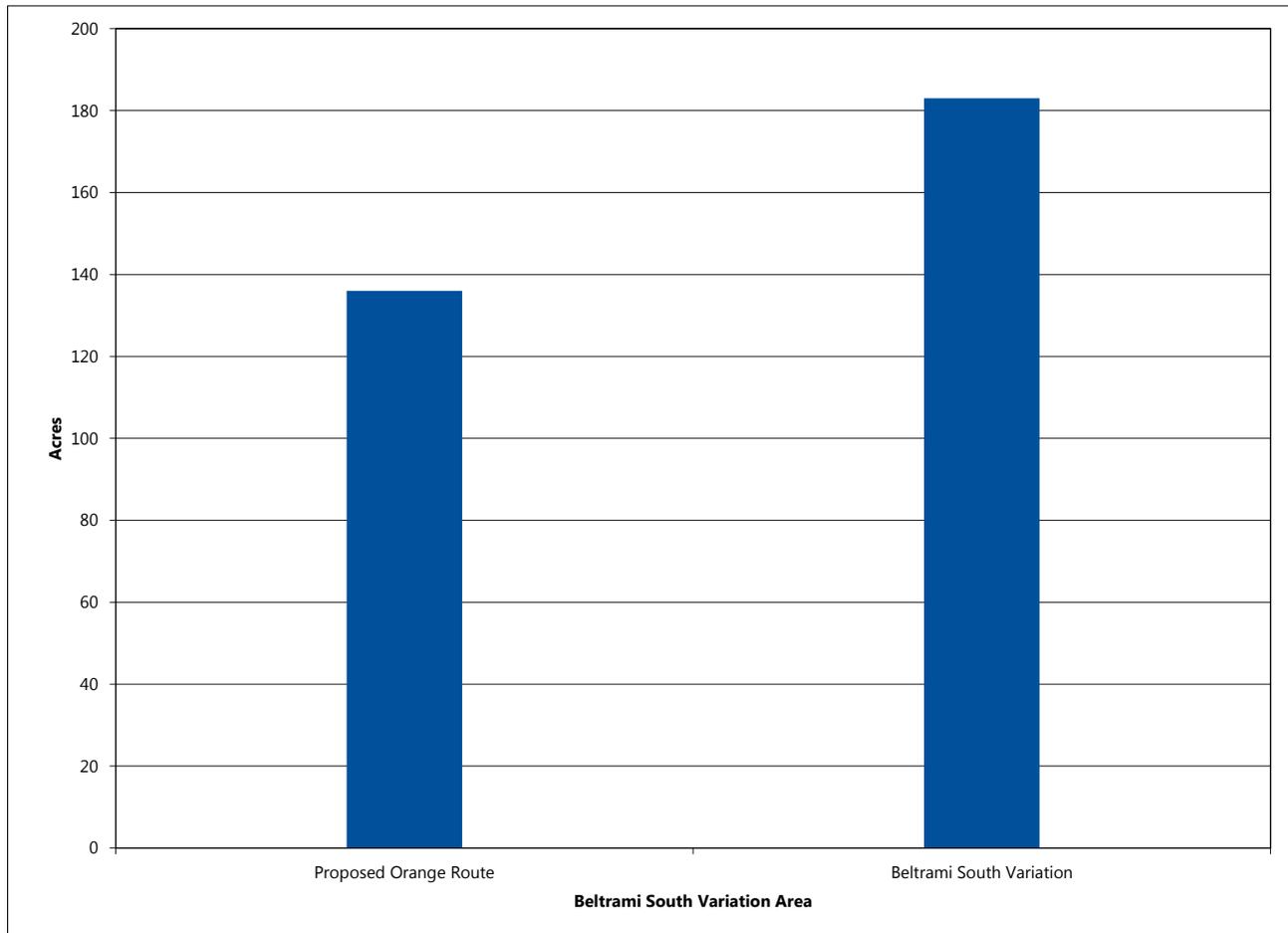
Resource	Type	Evaluation Parameter	Beltrami South Variation Area	
			Proposed Orange Route	Beltrami South Variation
Transmission Line	--	Length (mi)	5.6	7.5
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	100	0
Farmland	Not Farmland	Acres within ROW	136	183
	Prime Farmland if Drained	Acres within ROW	0	0
	Farmland of Statewide Importance	Acres within ROW	0	0
	All Areas Are Prime Farmland	Acres within ROW	0	0
State Forest	--	Acres within ROW	136	183
State Mineral Leases (active and/or terminated/expired)	--	Acres within ROW	58	287

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

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

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

Figure 6-62 Acres of State Forest Land within the Anticipated ROW in the Beltrami South Variation Area



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

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

state forest lands—the Beltrami Island State Forest (Figure 6-62, Map 5-33). The Beltrami South Proposed Route, which has a shorter length, would be expected to result in fewer impacts on timber activities in the Beltrami Island State Forest.

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

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

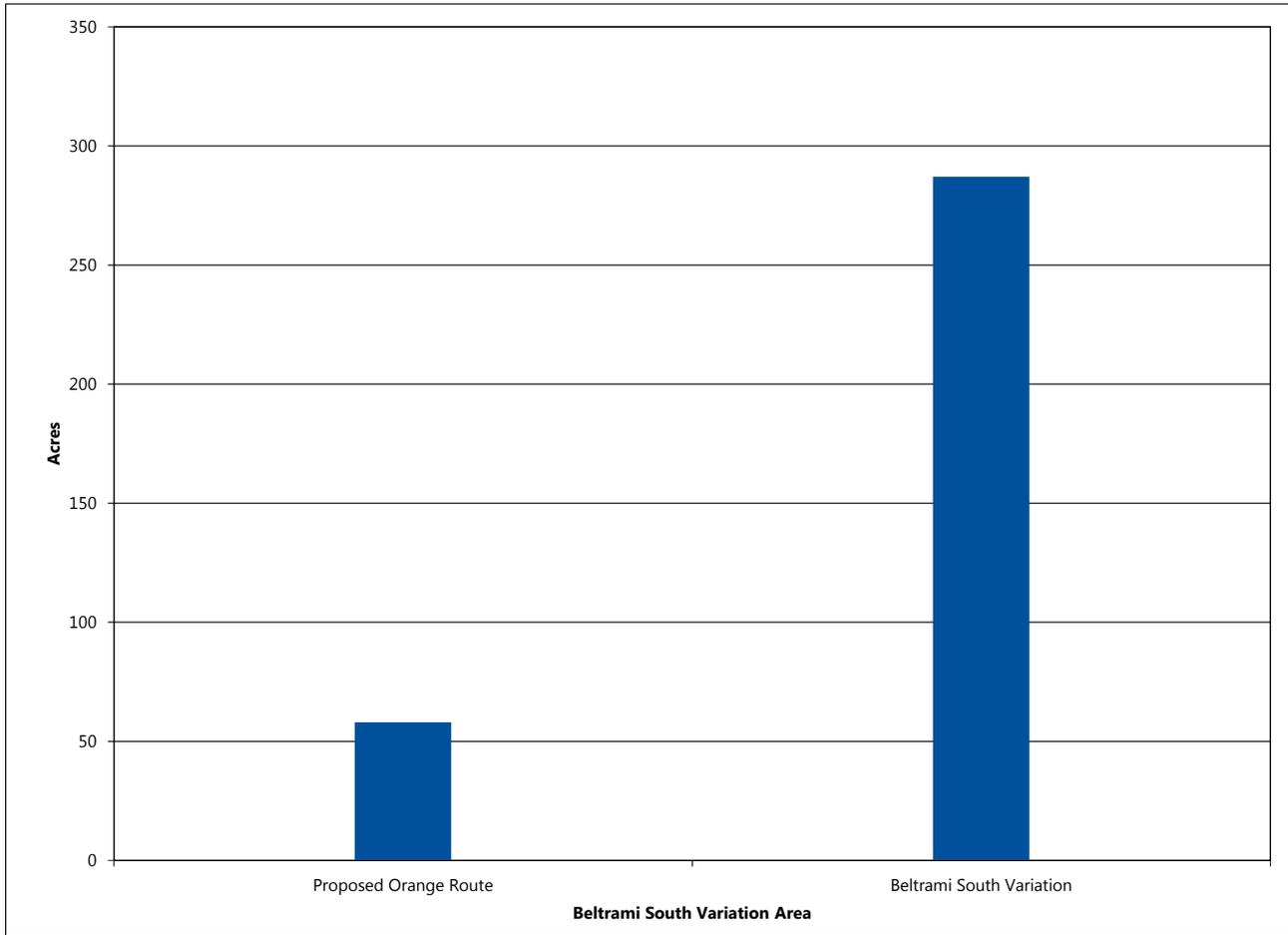
proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-92, Figure 6-63, and Map 6-31 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the Beltrami South Variation Area. There are no **active mineral leases**, known aggregate resources or records of current mineral mining in the ROI of either the Proposed Orange Route or Beltrami South Variation.

Both the Proposed Orange Route and the Beltrami South Variation would traverse mining lands with terminated/expired state mineral leases (Table 6-92, Figure 6-63, and Map 6-31). However, the Proposed Orange Route would pass through fewer acres and would do so adjacent to an existing transmission line corridor (Map 6-31). Because the Beltrami

Figure 6-63 Acres of State Mineral Leases within the Anticipated ROW in the Beltrami South Variation Area



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

South Variation would pass through more acres of mining lands with state leases and would require a new corridor, it would have a greater potential to interfere with future mining activities in this area.

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

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

6.3.3.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential

indirect effects to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites.

No previously recorded archaeological sites or historic architectural resources are present within the Beltrami South Variation Area (Map 6-32). Additionally, no specific Native American resources have been previously recorded within the ROW direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Orange Route and Beltrami South Variation in the Beltrami South Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

The Proposed Route and Variation have not been surveyed for cultural resources. As a result, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of

cultural resource investigations conducted in compliance with federal and/or state regulations for cultural resources. These cultural resources investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the direct and indirect APEs for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse effects on historic architectural properties as a result of construction and operation of the proposed Project.

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

6.3.3.4 Natural Environment

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

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Beltrami South Variation Area are summarized in Table 6-93 and shown on Map 6-33. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The need to place transmission structures in wetlands and quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Orange Route and Beltrami South Variation. Neither the Proposed Orange Route nor the Beltrami South Variation ROWs contain PWIs, non-PWI waters, trout streams, impaired waters, or floodplains.

Based on the NWI, the Proposed Orange Route and the Beltrami South Variation would both require conversion of forested shrub and wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-64, the Beltrami South Variation contains more combined forested and shrub wetlands compared to the Proposed Orange Route and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

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

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

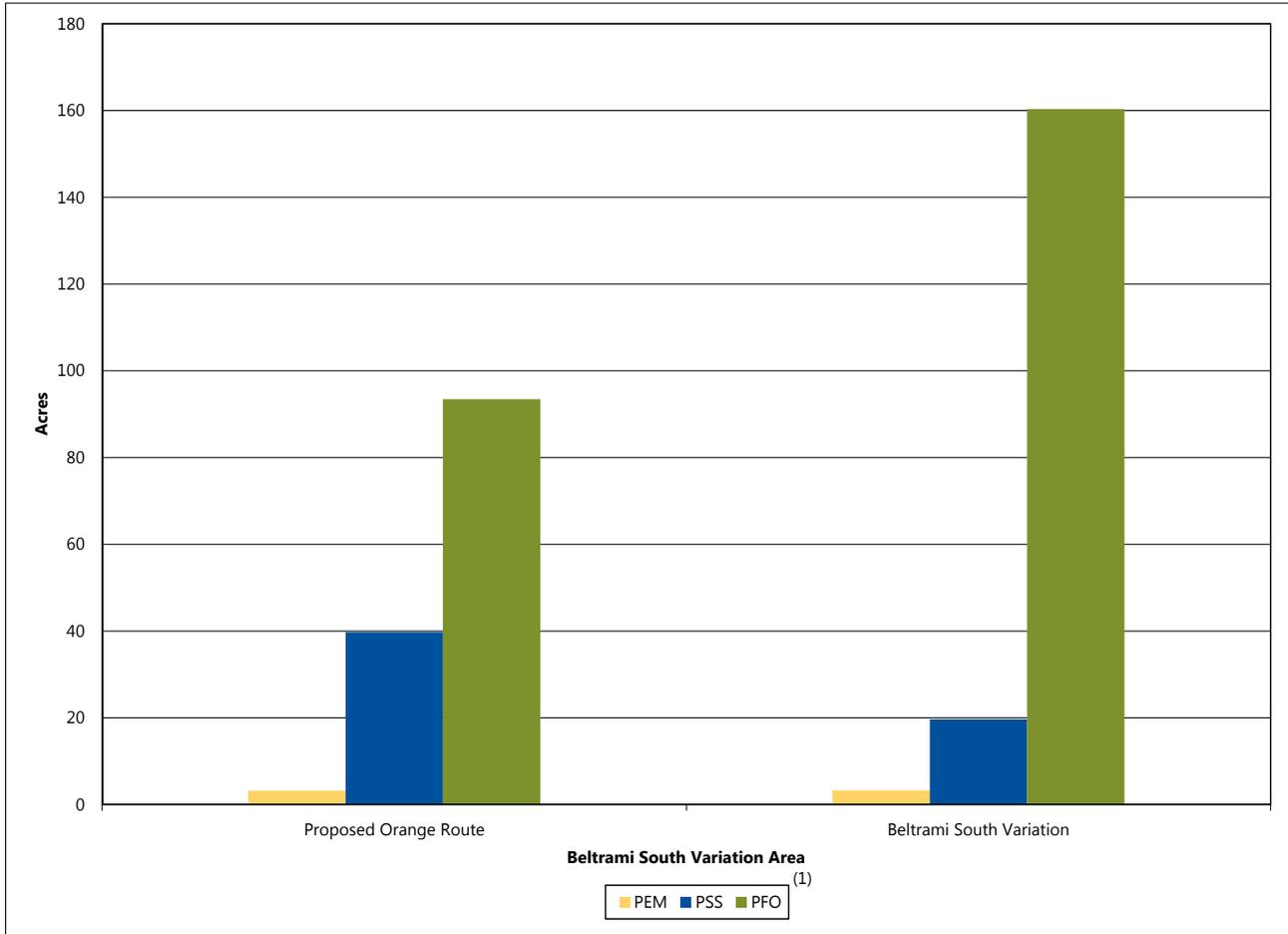
Table 6-93 Water Resources within the Anticipated ROW in the Beltrami South Variation Area

Resource	Evaluation Parameter	Beltrami South Variation Area	
		Proposed Orange Route	Beltrami South Variation
Transmission Line	Length (mi)	5.6	7.5
NWI Wetlands	Acres within ROW	136	183

Sources: USFWS 1997, reference (157); Minnesota Power 2014, reference (144)

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

Figure 6-64 Acres of Wetland by Type within the Anticipated ROW in the Beltrami South Variation Area



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

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

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

Table 6-94 Vegetation Resources within the Anticipated ROW in the Beltrami South Variation Area

Resource	Evaluation Parameter	Beltrami South Variation Area	
		Proposed Orange Route	Beltrami South Variation
Transmission Line	Length (mi)	5.6	7.5
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	100	0
State Forest	Acres within ROW	136	183
Total Forested GAP Land Cover	Acres within ROW	135	183
GAP Land Cover - Dominant Types ⁽³⁾			
North American Boreal Flooded and Swamp Forest	Acres within ROW	114	139
North American Boreal Forest	Acres within ROW	16	35

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

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

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

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Beltrami South Variation Area are summarized in Table 6-94 and shown on Maps 5-12 and 6-33. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

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

As indicated in Table 6-94 and Figure 6-65, the Beltrami South Variation would pass through more forested land, including state forest, relative to the Proposed Orange Route, therefore resulting in more permanent removal of forested vegetation. In addition, the Proposed Orange Route would parallel existing transmission line corridor for its entire length, while the Beltrami South Variation would require creation of new corridor for its entire length (Table 6-94). Because of this, the Beltrami South Variation would result in more fragmentation of intact forest in areas where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

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

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Beltrami South Variation Area are summarized in Table 6-95 and shown on Map 6-33. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Orange Route and Beltrami South Variation include loss and

fragmentation of natural and managed wildlife habitat and proximity of the Proposed Orange Route and Beltrami South Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor and/or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.3.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Orange Route and Beltrami South Variation.

Both the Proposed Orange Route and the Beltrami South Variation would pass through the Big Bog Important Bird Area (Table 6-95; Map 6-33). However, the Beltrami South Variation would traverse a greater portion of the Big Bog Important Bird Area and require the creation of new transmission line corridor for its entire length, while the Proposed Orange Route would parallel an existing transmission line corridor for its entire length (Table 6-95). Creation of a new corridor in the Big Bog Important Bird Area would likely result in both short-term and long-term direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result injury or death caused by avian collisions and electrocutions, discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region (Map 6-33), and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13).

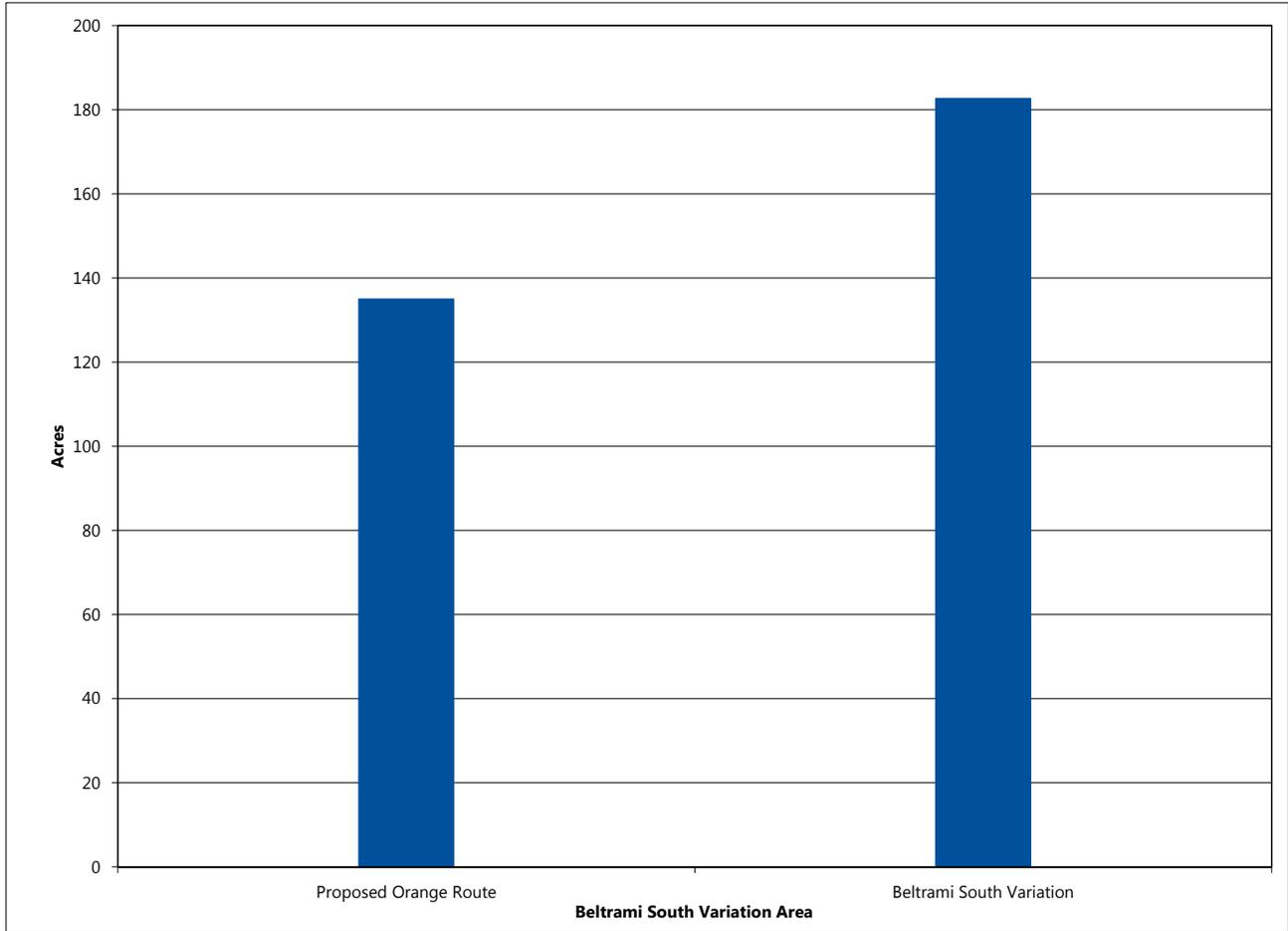
Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

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

6.3.3.5 Rare and Unique Natural Resources

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

Figure 6-65 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Beltrami South Variation Area



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

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

Table 6-95 Wildlife Resources within the Vicinity of the Beltrami South Variation Area

Resource	Evaluation Parameter	Beltrami South Variation Area	
		Proposed Orange Route	Beltrami South Variation
Transmission Line	Length (mi)	5.6	7.5
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	100	0
Important Bird Areas	Acres within ROW	136	183

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

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

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

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

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Beltrami South Variation Area are summarized in Table 6-96; additional data on rare species, such as the

Table 6-96 Rare Species Documented within One Mile of the Anticipated ROW in the Beltrami South Variation Area

Scientific Name ⁽¹⁾	Common Name	Federal Status	State Status	Type	Beltrami South Variation Area	
					Proposed Orange Route	Beltrami South Variation
<i>Botrychium pallidum</i>	Pale Moonwort	None	Special Concern	Vascular Plant		X
<i>Botrychium simplex</i>	Least Moonwort	None	Special Concern	Vascular Plant	X	X
<i>Cypripedium aridentinum</i>	Ram's head lady's slipper	None	Special Concern	Vascular Plant		X

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

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

presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

In general, proximity of state endangered, threatened, or special concern species is similar between the Proposed Orange Route and Beltrami South Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation, including critical habitat designated for gray wolf.

As indicated in Table 6-96, the ram's head lady's slipper and two rare moonwort species have been documented within one mile of the Beltrami South Variation; one of the *Botrychium* (moonwort) species was also documented within one mile of the Proposed Orange Route. Although the Beltrami South Variation would require the creation of new corridor, while the Proposed Orange Route would parallel an existing transmission line corridor, species in this genus prefer disturbed habitats, including ROWs. Because of this impacts on these rare species would likely be similar with either the Proposed Orange Route or Beltrami South Variation. **It is possible that the Beltrami South Variation may have more impacts on the ram's head lady's slipper.** The full extent of potential impacts from either the Proposed Orange Route or Beltrami South Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Both the Proposed Orange Route and the Beltrami South Variation would cross critical habitat

designated for gray wolf. The Proposed Orange Route would cross this habitat for approximately one mile and would parallel an existing transmission line corridor, while the Beltrami South Variation would cross this habitat for approximately 3 miles and would require the establishment of a new transmission line corridor. The Proposed Orange Route would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross less of this resource and would do so in an area where critical habitat designated for gray wolf has already been fragmented.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

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

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Beltrami South Central Variation Area are summarized in Table 6-97 and shown on Map 6-34;

Table 6-97 Rare Communities and Resources within the Vicinity of the Beltrami South Variation Area

Resource	Evaluation Parameter	Beltrami South Variation Area	
		Proposed Orange Route	Beltrami South Variation
Transmission Line	Length (mi)	5.6	7.5
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	100	0
MBS Sites of Biodiversity Significance ⁽³⁾	Acres within ROW	120	161

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

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

additional, more detailed data on rare communities and resources is provided in Appendix E.

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

As indicated in Table 6-97 and on Map 6-34, the Proposed Orange Route would pass through fewer acres of MBS Sites of Biodiversity Significance relative to the Beltrami South Variation. In addition, the Proposed Orange Route would parallel existing transmission line corridor for its entire length, while the Beltrami South Variation would require creation of new corridor for its entire length (Table 6-97; Map 6-34). Because of this, the Beltrami South Variation would result in more fragmentation of intact forest in areas where forest vegetation is present.

The rare communities and resources listed in Table 6-97 and detailed above show that the

proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

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

6.3.3.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property.

Table 6-98 Corridor Sharing in the Beltrami South Variation Area

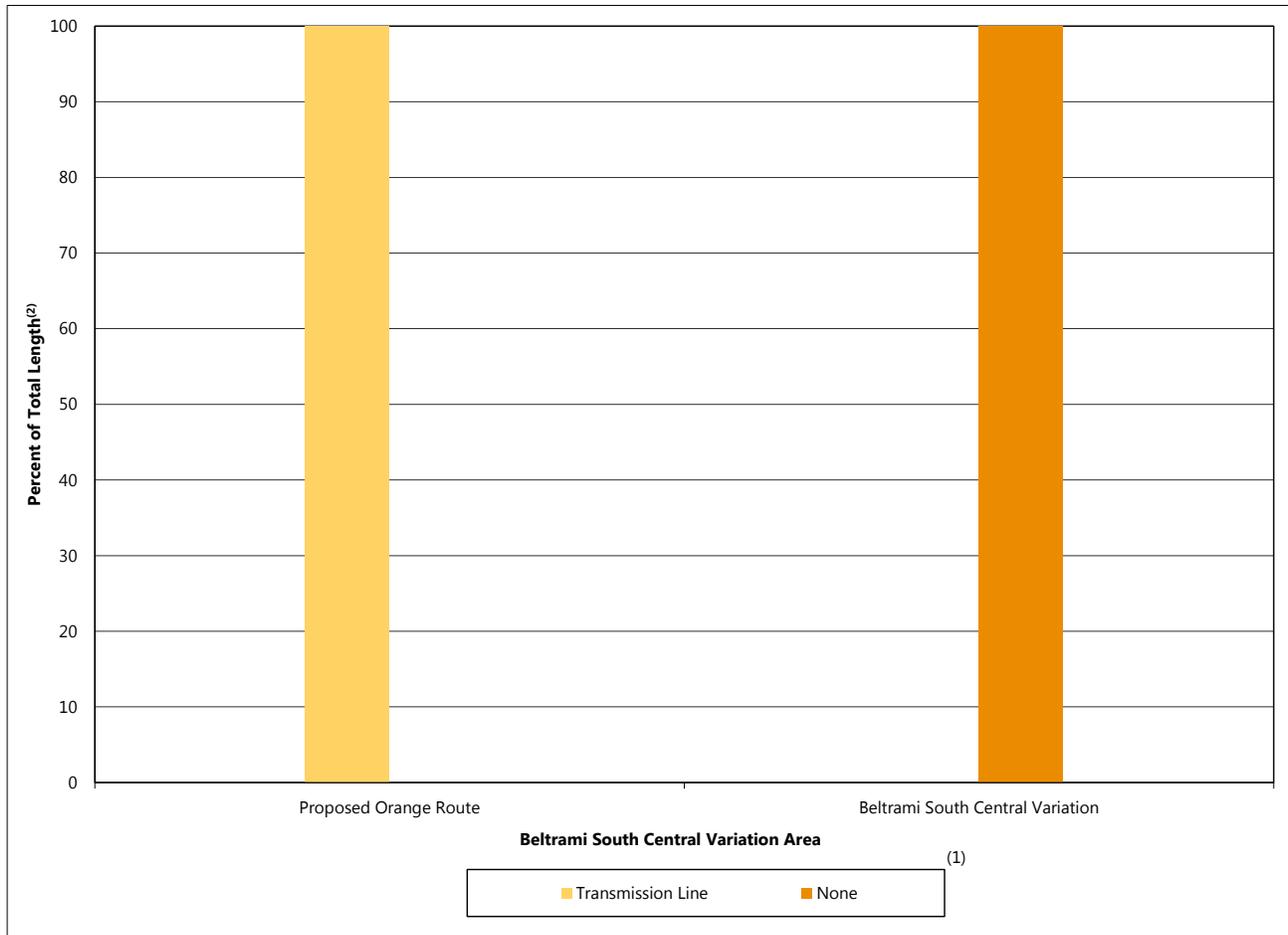
Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	Beltrami South Variation Area	
		Proposed Orange Route	Beltrami South Variation
Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS)	Percent of Total Length ⁽²⁾	100	0
None	Percent of Total Length ⁽²⁾	0	100

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

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

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

Figure 6-66 Corridor Sharing in the Beltrami South Variation Area



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

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

- (1) Transmission line (other linear features may be present within the transmission corridor; i.e., road, trail, field line, PLSS).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-35 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Beltrami South Variation Area.

Table 6-98 identifies the percentage of total transmission line length that the Proposed Orange Route and Beltrami South Variation parallel an existing corridor or linear feature in the Beltrami South Variation Area.

The Proposed Orange Route would parallel existing transmission line corridor for the entire length (Figure 6-66). The Beltrami South Variation would not follow any existing corridors.

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

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

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-99 summarizes the costs associated with constructing the Proposed Orange Route and Beltrami South Variation in the Beltrami South Central Variation Area. As indicated in Table 6-99, the Beltrami South

Variation would cost almost three times more to construct than the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$9,000 to \$12,000 annually for these alternatives in the Beltrami South Variation Area.

6.3.4 North Black River Variation Area

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

6.3.4.1 Human Settlement

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

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the North Black River Variation Area are summarized in Table 6-100 and shown on Maps 6-36, 6-37, 6-38, and 6-40.

As indicated in Table 6-100 for the North Black River Variation Area, the Proposed Blue Route and North Black River Variation would cross or be located

Table 6-99 Construction Costs in the Beltrami South Variation Area

Variation Area	Variation Names in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
Beltrami South	Proposed Orange Route	\$5,805,518	\$1,038,554	5.6
	Beltrami South Variation	\$9,925,396	\$1,318,114	7.5

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

Table 6-100 Aesthetic Resources within the ROI in the North Black River Variation Area

Resource	Evaluation Parameter ⁽¹⁾	North Black River Variation Area	
		Proposed Blue Route	North Black River Variation
Transmission Line	Length (mi)	8.4	9.2
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	0	100
Residences	Count within 0–500 ft	0	3
	Count within 0–1,000 ft	0	4
	Count within 0–1,500 ft	1	5
State Forests	Count within 0–1,500 ft	1	1
Snowmobile Trails	Count within 0–1,500 ft	2	2

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

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

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

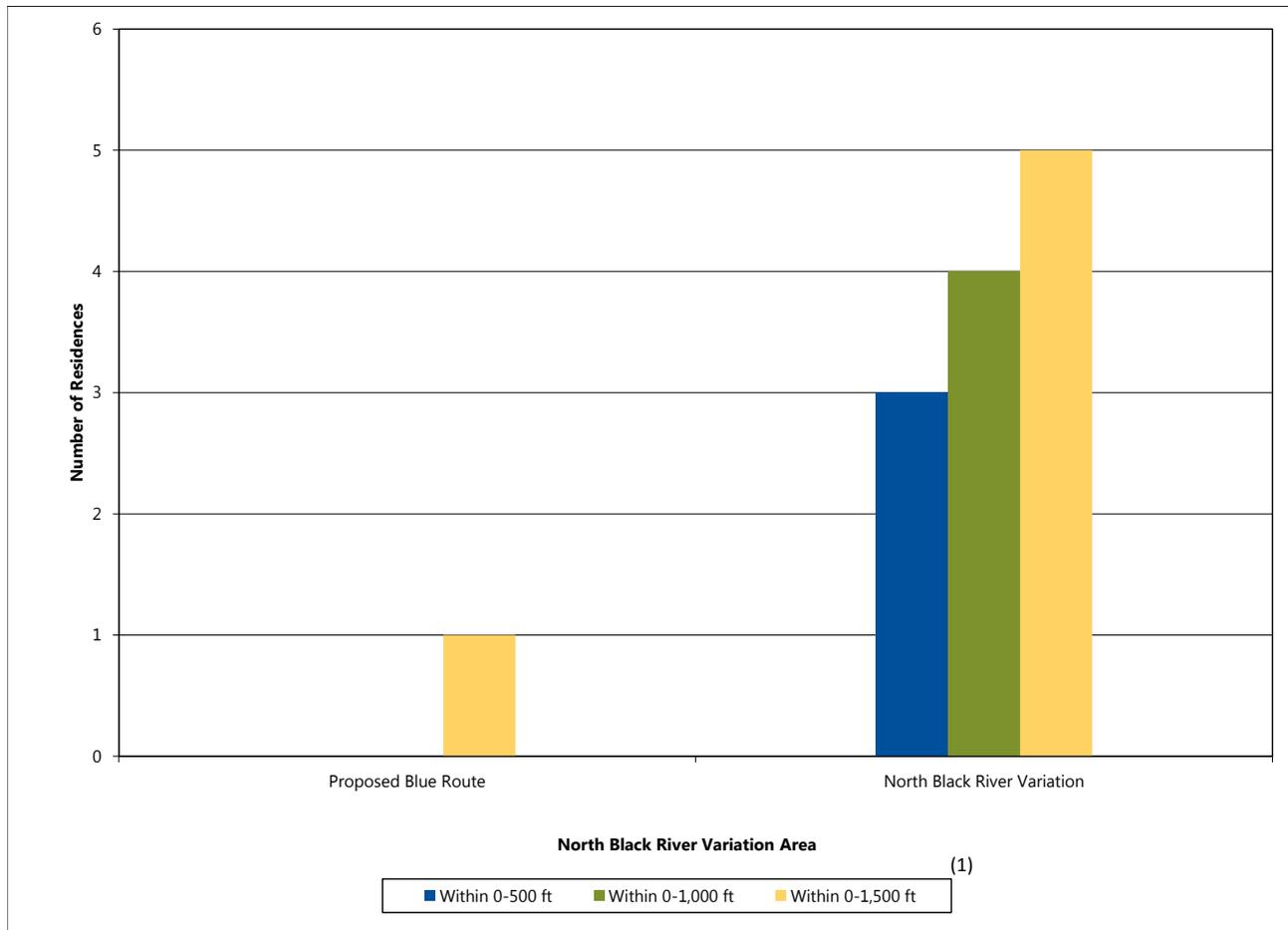
within 1,500 feet of aesthetic resources with high visual sensitivity, including two snowmobile trails and one state forest (Map 6-38 and Map 6-40). None of the alternatives would be located within one mile of any historic architectural sites, which would also have high visual sensitivity. In addition, the Proposed Blue Route and North Black River Variation would be located within 1,500 feet of one or more residences, which also have high visual sensitivity (Figure 6-67). The North Black River Variation would affect more residences within 1,500 feet of it (five) than the Proposed Blue Route (one; Table 6-100).

The North Black River Variation is slightly longer (9.2 miles) than the Proposed Blue Route (8.4 miles). However, the North Black River Variation parallels an existing large 230 kV transmission line for its entire length, whereas the Proposed Blue Route does not parallel an existing transmission line. By paralleling an existing large transmission line, the North Black River Variation would produce substantially less

contrast than the Proposed Blue Route. Although the North Black River Variation would be slightly longer and affect several more residences (5) than the Proposed Blue Route (1), the North Black River Variation would produce substantially less contrast due to paralleling an existing large transmission line for its entire length. For these reasons, the North Black River Variation would result in less aesthetic impact than the Proposed Blue Route in the North Black River Variation Area.

Because the North Black River Variation is relatively short in length, parallels an existing transmission line of similar size and design for its full length, and affects few residences and other sensitive visual resources (one state forest and two snowmobile trails), aesthetic impacts of the North Black River Variation are expected to be minimal. Although the Proposed Blue Route does not parallel an existing large transmission line, it is short in length (8.4 miles) and affects few residences (one) and other

Figure 6-67 Residences within the ROI in the North Black River Variation Area



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

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

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

sensitive visual resources (one state forest and two snowmobile trails).

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

Land Use Compatibility

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

Land Uses

Table 6-101 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue Route and North Black River Variation in the North Black River Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the variation area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Blue Route and Variation are shown on Map 6-36.

The Proposed Blue Route and North Black River Variation ROI are both primarily composed of

Table 6-101 Land Uses within the ROI in the North Black River Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	North Black River Variation Area	
			Proposed Blue Route	North Black River Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	3,210	3,495
	Developed or Disturbed	Acres within 0–1,500 ft	20	125
	Agricultural	Acres within 0–1,500 ft	0	69
	Forested and/or Swamp	Acres within 0–1,500 ft	3,190	3,296
	Other	Acres within 0–1,500 ft	0	5

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

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

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

Table 6-102 Land Ownership/Management within the Anticipated ROW in the North Black River Variation Area

Resource	Type	Evaluation Parameter	North Black River Variation Area	
			Proposed Blue Route	North Black River Variation
Total Lands	--	Acres within ROW	204	223
State Forests	--	Acres within ROW	188	156
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	184	158
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	158	133
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	26	25
	Trust Fund	Acres within ROW	0	0
	Federal - State Lease	Acres within ROW	0	0
Private Lands ⁽²⁾	--	Acres within ROW	20	65

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

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

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

forested and/or swamp land (Table 6-101). The Variation ROI is composed of a greater amount of forested and/or swamp land developed or disturbed, and agricultural land cover compared to the Proposed Blue Route.

Land Ownership and Management

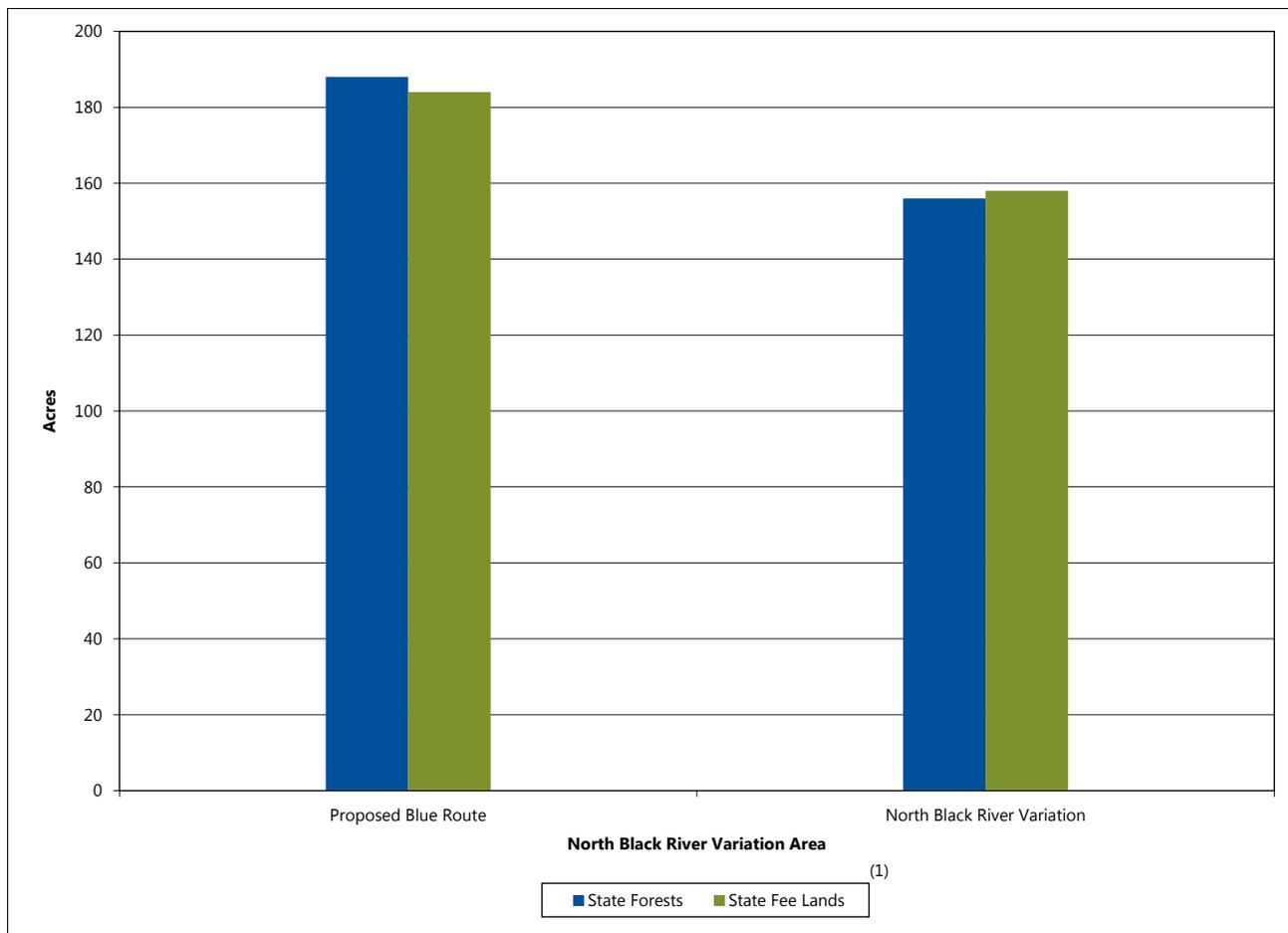
Table 6-102 shows that the Proposed Blue Route would include a slightly greater amount of state forest and state fee land compared to the North Black River Variation. No impacts to county lands, state conservation easements or USFWS Interest Lands would occur under the Proposed Blue Project or the North Black River Variation.

The North Black River Variation would parallel an existing corridor for its entire length, while the Proposed Blue Route would not parallel an existing corridor (see Section 6.3.4.6). Therefore, the North Black River Variation would be expected to have

less incompatibility with surrounding land uses compared to the Proposed Blue Route (Figure 6-68).

Impacts to land use from the Proposed Blue Route in the North Black River Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route and North Black River Variation would both result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the route that would parallel an existing corridor is also important. The North Black River Variation avoids a greater amount of state forest and state fee lands than the Proposed Blue Route thereby avoiding long-term changes to land use and the North Black River Variation would also parallel an

Figure 6-68 Public Land Ownership/Management within the ROI in the North Black River Variation Area



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

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

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

existing corridor compared to the Proposed Blue Route which does not parallel an existing corridor.

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

6.3.4.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the North Black River Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the North Black River Variation Area are summarized in Table 6-103.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-103 shows the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route and North Black River Variations in the ROI.

The North Black River Variation, which has the longer length, would pass through more acres of farmland, including prime farmland if drained (Figure 6-69). The Proposed Blue Route and North Black River Variation would each impact less than 30 acres of farmland of statewide importance. Because the North Black River Variation would parallel an existing transmission line for its entire length, it would be expected to have fewer impacts on farmland.

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

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

Table 6-103 Land-Based Economy Resources within the Anticipated ROW in the North Black River Variation Area

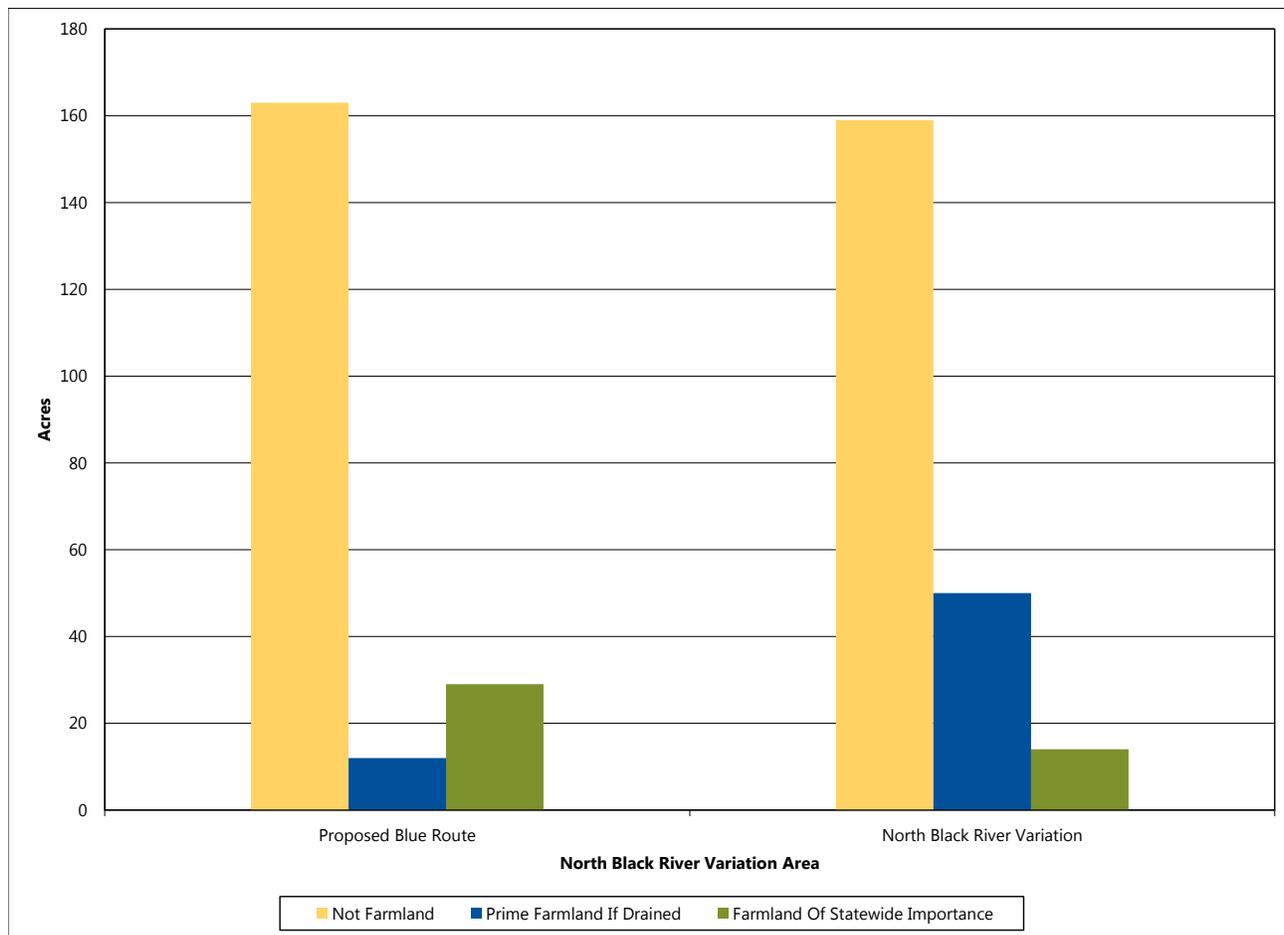
Resource	Type	Evaluation Parameter	North Black River Variation Area	
			Proposed Blue Route	North Black River Variation
Transmission Line	--	Length (mi)	8.4	9.2
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	0	100
Farmland	Not Farmland	Acres within ROW	163	159
	Prime Farmland if Drained	Acres within ROW	12	50
	Farmland of Statewide Importance	Acres within ROW	29	14
	All Areas are Prime Farmland	Acres within ROW	0	0
State Forest	--	Acres within ROW	188	156
State Mineral Leases (active and/or terminated/expired)	--	Acres within ROW	405	362

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

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

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

Figure 6-69 Acres of Farmland by Type within the Anticipated ROW in the North Black River Variation Area



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

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

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-103 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Blue Route and the North Black River Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue Route or the North Black River Variation in the North Black River Variation Area.

The Proposed Blue Route would pass through more acres of state forest lands - the Pine Island State Forest (Figure 6-70, Map 6-38). The North Black River Variation would have the least impact on the Pine Island State Forest as it would cross fewer acres of forest lands.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and

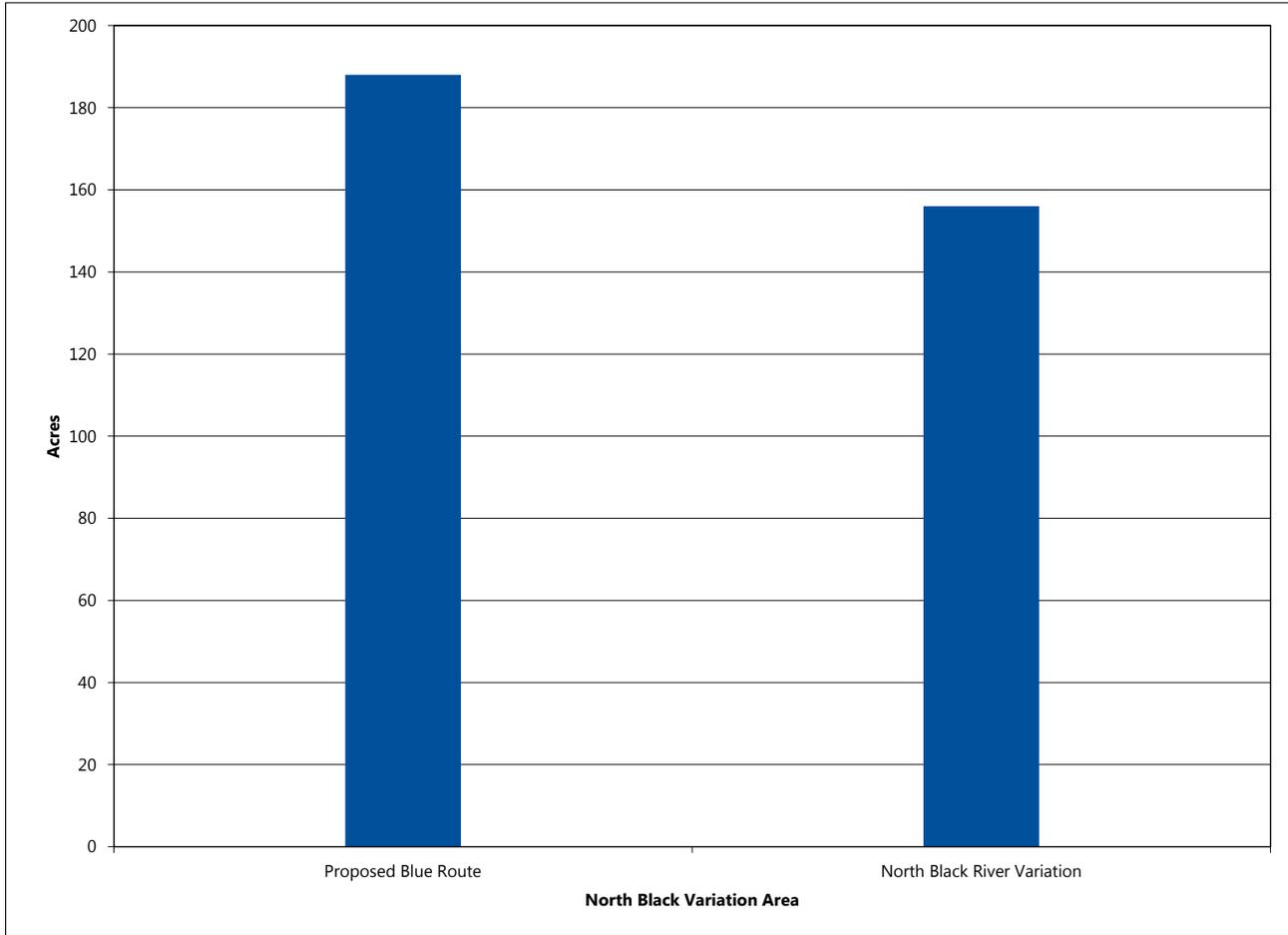
emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

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

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-103, Figure 6-71, and Map 6-36 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the

Figure 6-70 Acres of State Forest Land within the Anticipated ROW in the North Black River Variation Area



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

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

North Black River Variation Area. There are no **active mineral leases** or known aggregate resources in the ROI of either the Proposed Blue Route or the North Black River Variation.

Both the Proposed Blue Route and the North Black River Variation would traverse several acres of mining lands with terminated/expired state mineral leases (Table 6-103, Figure 6-71, and Map 6-36), with the Proposed Blue Route passing through more acres than the North Black River Variation. In addition, in comments provided by the MnDNR during scoping, MnDNR identified an area of recent and historic metallic occurrence, leasing, and exploration in northwestern Koochiching County (Map 6-36), as indicated by the high density of mineral exploration boreholes immediately south of where the Proposed Blue Route splits from the existing 230 kV transmission line. The MnDNR provided comments during the scoping process suggesting that the North Black River Variation would be less likely to impede future exploration for metallic mineral resources.

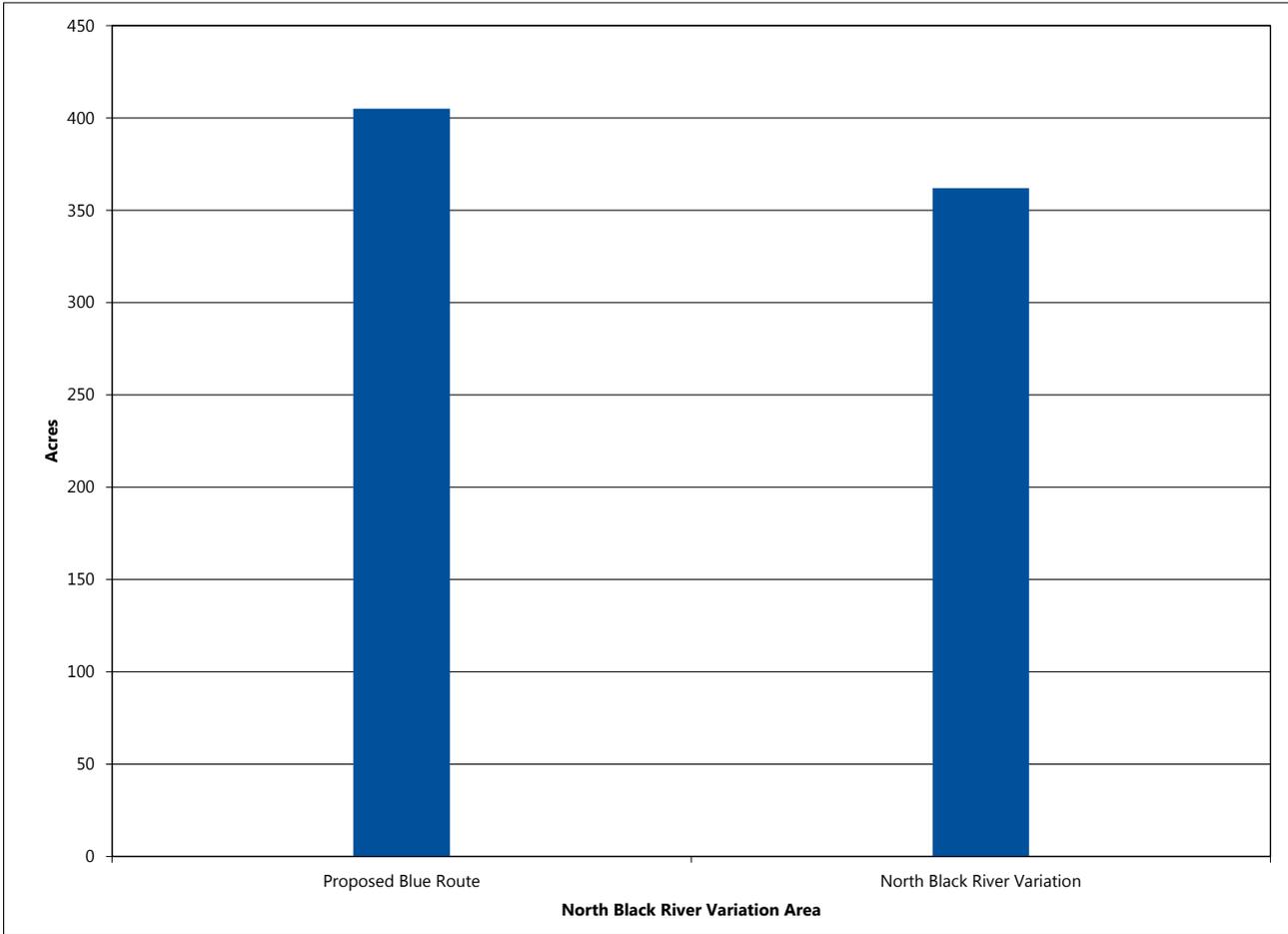
As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. **However, since the North Black River Variation would parallel an existing transmission line, it could reduce the geophysical mineral resource detection risk for this area.**

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

6.3.4.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the

Figure 6-71 Acres of State Mineral Leases within the Anticipated ROW in the North Black River Variation Area



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

proposed transmission line; however, potential indirect effects to historic architectural resources are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural properties.

No previously recorded archaeological sites or historic architectural resources are present within the North Black River Variation Area (Map 6-37). Additionally, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route and North Black River Variation in the North Black River Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Potential direct or indirect, long-term, adverse impacts to archaeological and historic resources

are not expected to be significant. However, since the Proposed Route and Variation have not been surveyed for cultural resources, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resource investigations conducted in compliance with federal and/or state regulations for cultural resources. These cultural resource investigations would be implemented as part of the DOE's Draft PA (Appendix V) that would establish a process to identify cultural resources within the direct and indirect APEs for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse effects on historic architectural properties as a result of implementation of the proposed Project.

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

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

6.3.4.4 Natural Environment

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

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the North Black River Variation Area are summarized in Table 6-104 and shown on Map 6-38. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The need to place transmission structures in wetlands, type of water crossings, and quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Blue Route and North Black River Variation. Neither the Proposed Blue Route nor the North Black River Variation ROWs contain PWIs, trout streams, impaired waters, or floodplains.

The Proposed Blue Route and the North Black River Variation would each require four non-PWI water crossings. The Proposed Blue Route would cross an unnamed waterbody, a watercourse, and ditches, while the North Black River Variation would just cross ditches and watercourses (Figure 6-72).

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

Based on the NWI, the Proposed Blue Route and the North Black River Variation would both require

conversion of forested shrub and wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-73, the Proposed Blue Route contains more combined forested and shrub wetlands compared to the North Black River Variation and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

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

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

Table 6-104 Water Resources within the Anticipated ROW in the North Black River Variation Area

Resource	Evaluation Parameter	North Black River Variation Area	
		Proposed Blue Route	North Black River Variation
Transmission Line	Length (mi)	8.4	9.2
Non-PWI Waters ⁽¹⁾	Number of Crossings	4	4
NWI Wetlands	Acres within ROW	193	198

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

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

Vegetation

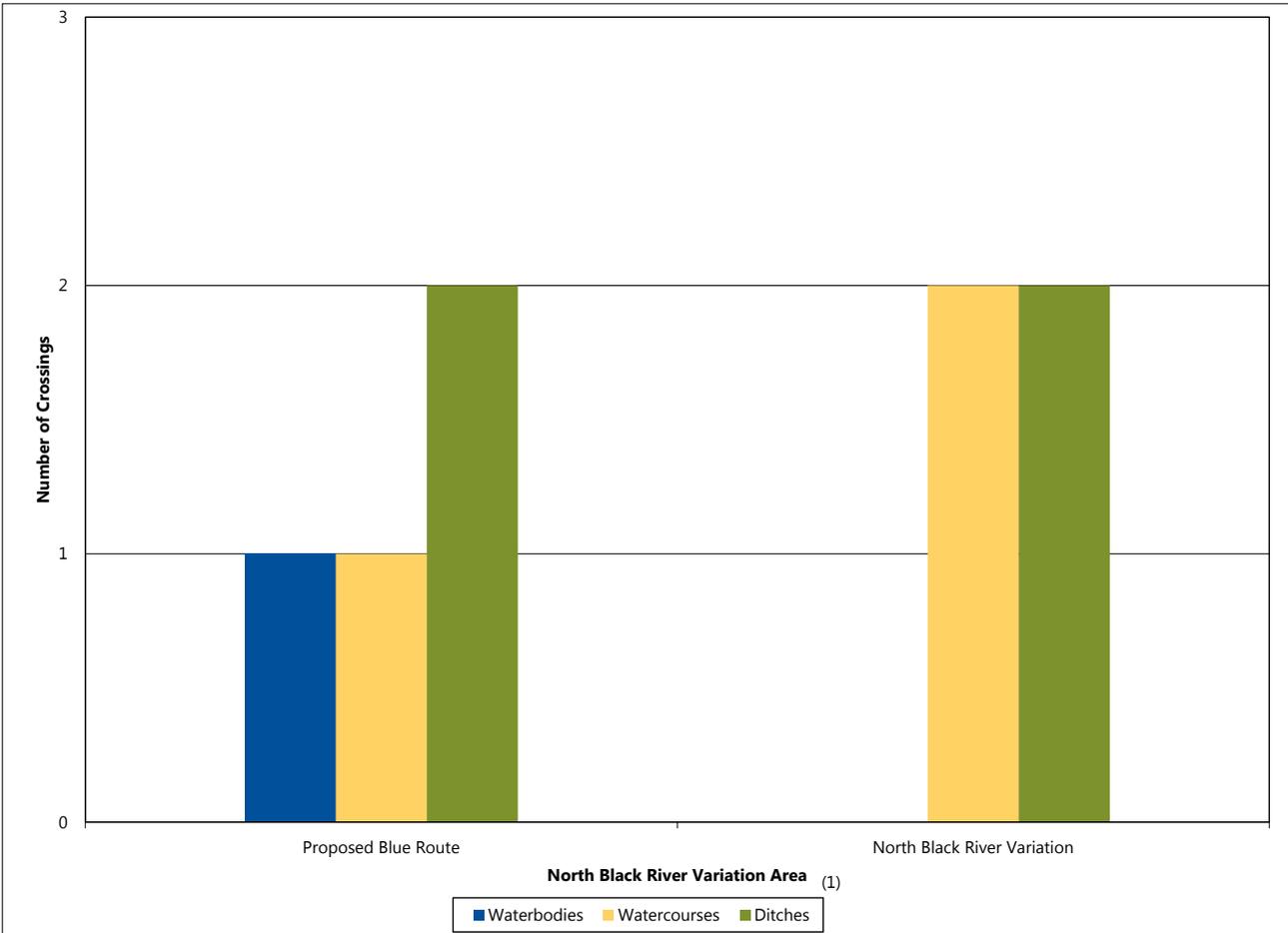
In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the North Black River Variation Area are summarized in Table 6-105 and shown on Maps 5-12 and 6-38. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

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

As indicated Table 6-105, the Proposed Blue Route and North Black River Variation would pass through similar amounts of forested land, including state forest. However, the North Black River Variation would parallel existing transmission line corridor for its entire length, while the Proposed Blue Route would require creation of new corridor for its entire length (Table 6-105). Because of this, the Proposed Blue Route would result in more fragmentation of intact forest in areas where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

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

Figure 6-72 Non-PWI Water Crossings by Type in the North Black River Variation Area

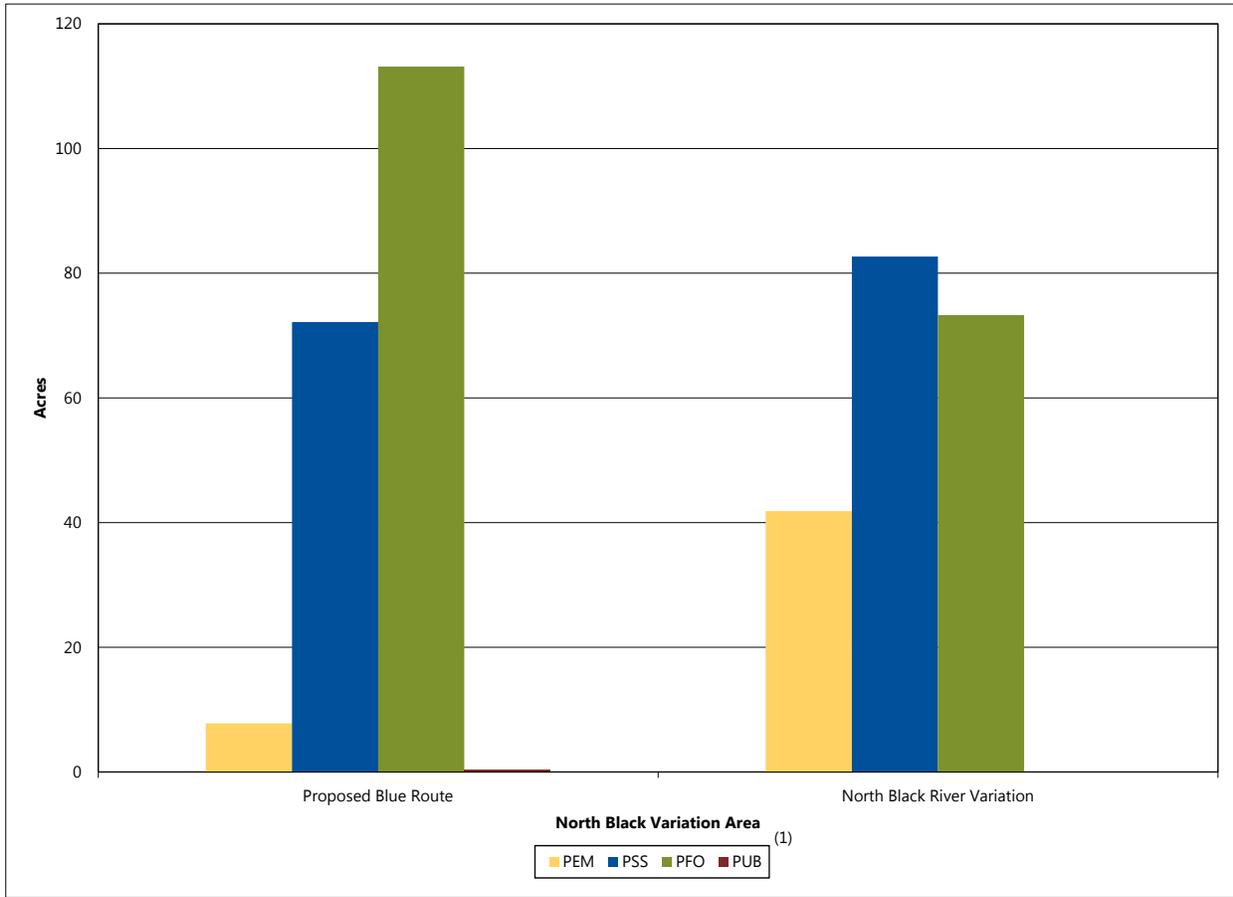


Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

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

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

Figure 6-73 Acres of Wetland by Type within the Anticipated ROW in the North Black River Variation Area



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

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

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

Table 6-105 Vegetation Resources within the Anticipated ROW in the North Black River Variation Area

Resource	Evaluation Parameter	North Black River Variation Area	
		Proposed Blue Route	North Black River Variation
Transmission Line	Length (mi)	8.4	9.2
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	100
State Forest	Acres within ROW	188	156
Total Forested GAP Land Cover	Acres within ROW	204	197
GAP Land Cover - Dominant Types ⁽³⁾			
North American Boreal Flooded and Swamp Forest	Acres within ROW	144	114
North American Boreal Forest	Acres within ROW	47	49
Eastern North American Flooded and Swamp Forest	Acres within ROW	12	29

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

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

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

Table 6-106 Wildlife Resources within the Vicinity of the North Black River Variation Area

Resource	Evaluation Parameter	North Black River Variation Area	
		Proposed Blue Route	North Black River Variation
Transmission Line	Length (mi)	8.4	9.2
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	100
Important Bird Areas	Acres within ROW	191	214

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

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

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

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the North Black River Variation Area are summarized in Table 6-106 and shown on Map 6-38. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Blue Route and North Black River Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue Route and North Black River Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.4.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue Route and North Black River Variation.

Both the Proposed Blue Route and the North Black River Variation would pass through the Big Bog Important Bird Area (Table 6-106; Map 6-38). While the North Black River Variation traverses through a slightly greater portion of the Big Bog Important Bird Area, it would parallel an existing transmission line corridor for its entire length (Table 6-106; Map 6-38). In contrast, the Proposed Blue Route would require the creation of new transmission line corridor for its entire length (Table 6-106; Map 6-38). Creation of a new corridor in the Big Bog Important Bird Area would likely result in both short-term and long-term direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds’

habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13).

The North Black River Variation is adjacent to a Grassland Bird Conservation Area core area (Map 6-38); however, there are two existing transmission lines and a road between the North Black River Variation and the Grassland Bird Conservation Area core area. Although the North Black River Variation could result in impacts to birds associated with the Grassland Bird Conservation Area such as loss of habitat, it is likely that additional impacts would be limited given the infrastructure already present in this location.

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

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

6.3.4.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features,

such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation. No state- or federally listed species have been documented within one mile of the Proposed Blue Route or North Black River Variation. However, the full extent of impacts from either the Proposed Blue Route or North Black River Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

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

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the North Black River Variation Area are summarized in Table 6-107 and shown on Map 6-39; additional, more detailed data on rare communities and resources is provided in Appendix E.

Loss or conversion of native vegetation is the primary impact on rare communities and resources that would differ between the Proposed Blue Route and North Black River Variation. As discussed in Section 5.3.5, permanent removal of vegetation would occur at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated in Table 6-107 and shown on Map 6-39, the Proposed Blue Route would pass through more acres of MBS Sites of Biodiversity Significance relative to the North Black River Variation. In addition, although the North Black River Variation is longer, it would parallel existing transmission line corridor for its entire length, while the Proposed Blue Route would require creation of new corridor for its entire length (Table 6-107; Map 6-39). Because of this, the Proposed Blue Route would result in more fragmentation of intact forest in areas where forest vegetation is present.

Table 6-107 Rare Communities and Resources within the Vicinity of the North Black River Variation Area

Resource	Evaluation Parameter	North Black River Variation Area	
		Proposed Blue Route	North Black River Variation
Transmission Line	Length (mi)	8.4	9.2
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	100
MBS Sites of Biodiversity Significance ⁽³⁾	Acres within ROW	165	109

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

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

The rare communities and resources listed in Table 6-107 and detailed above show that the proposed Project may result in direct, long-term, regional localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities.

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

6.3.4.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-40 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the North Black River Variation Area.

Table 6-108 identifies the percentage of total transmission line length that the Proposed Blue Route and North Black River Variation parallel an existing corridor or linear feature in the North Black River Variation Area.

The North Black River Variation would parallel existing transmission line corridors for the entire length (Table 6-108). The Proposed Blue Route would not follow any existing corridors.

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

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

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-109 summarizes the costs associated with constructing the Proposed Blue Route and North Black River Variation in the North Black River Variation Area. As indicated in Table 6-109, the Proposed Blue Route would cost more to construct than the North Black River Variation.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$13,000 to \$15,000 annually for these alternatives in the North Black River Variation Area.

6.3.5 C2 Segment Option Variation Area

The C2 Segment Option Variation Area encompasses two route alternatives: the Proposed Blue Route and the C2 Segment Option Variation. This section provides a comparison of the potential

Table 6-108 Corridor Sharing in the North Black River Variation Area

Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	North Black River Variation Area	
		Proposed Blue Route	North Black River Variation
Transmission Line (other linear features may be present within the transmission corridor; i.e., road, trail, field line, PLSS)	Percent of Total Length ⁽²⁾	0	100
None	Percent of Total Length ⁽²⁾	100	0

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

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

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

impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the C2 Segment Option Variation Area, depending on the route or variation considered. **The C2 Variation has the greatest potential to minimize impacts to the Nature Conservancy’s Black River portfolio site compared to the Proposed Blue Route.**

6.3.5.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the C2 Segment Option Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive

viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the C2 Variation Area are summarized in Table 6-110 and shown on Maps 6-41, 6-42, 6-43, and 6-45.

As indicated in Table 6-110 for the C2 Segment Option Variation Area, the Proposed Blue Route and C2 Segment Option Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including snowmobile trails, a water trail, a state trail, and several state forests. The Proposed Blue Route would cross two snowmobile trails, one water trail, one state trail, and two state forests (Maps 6-43 and 6-45). The C2 Segment Option Variation would cross one snowmobile trail, one water trail, one state trail, and three state forests (Maps 6-43 and 6-45). In total, the two alternatives would affect the same number

Table 6-109 Construction Costs in the North Black River Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
North Black River	Proposed Blue Route	\$9,893,560	\$1,179,209	8.4
	North Black River Variation	\$10,552,560	\$1,147,017	9.2

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

Table 6-110 Aesthetic Resources within the ROI in the C2 Segment Option Variation Area

Resource	Evaluation Parameter ⁽¹⁾	C2 Segment Option Variation Area	
		Proposed Blue Route	C2 Segment Option Variation
Transmission Line	Length (mi)	32.8	46.0
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	0	81
Residences	Count within 0–500 ft	0	4
	Count within 0–1,000 ft	0	14
	Count within 0–1,500 ft	0	29
State Trails	Count within 0–1,500 ft	1	1
State Forests	Count within 0–1,500 ft	2	3
Snowmobile Trails	Count within 0–1,500 ft	2	1
State Water Trails	Count within 0–1,500 ft	1	1

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); MnDNR 2003, reference (182); MnDNR 2003, reference (148); MnDNR 2010 reference (150); MnDNR 2010, reference (183)

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

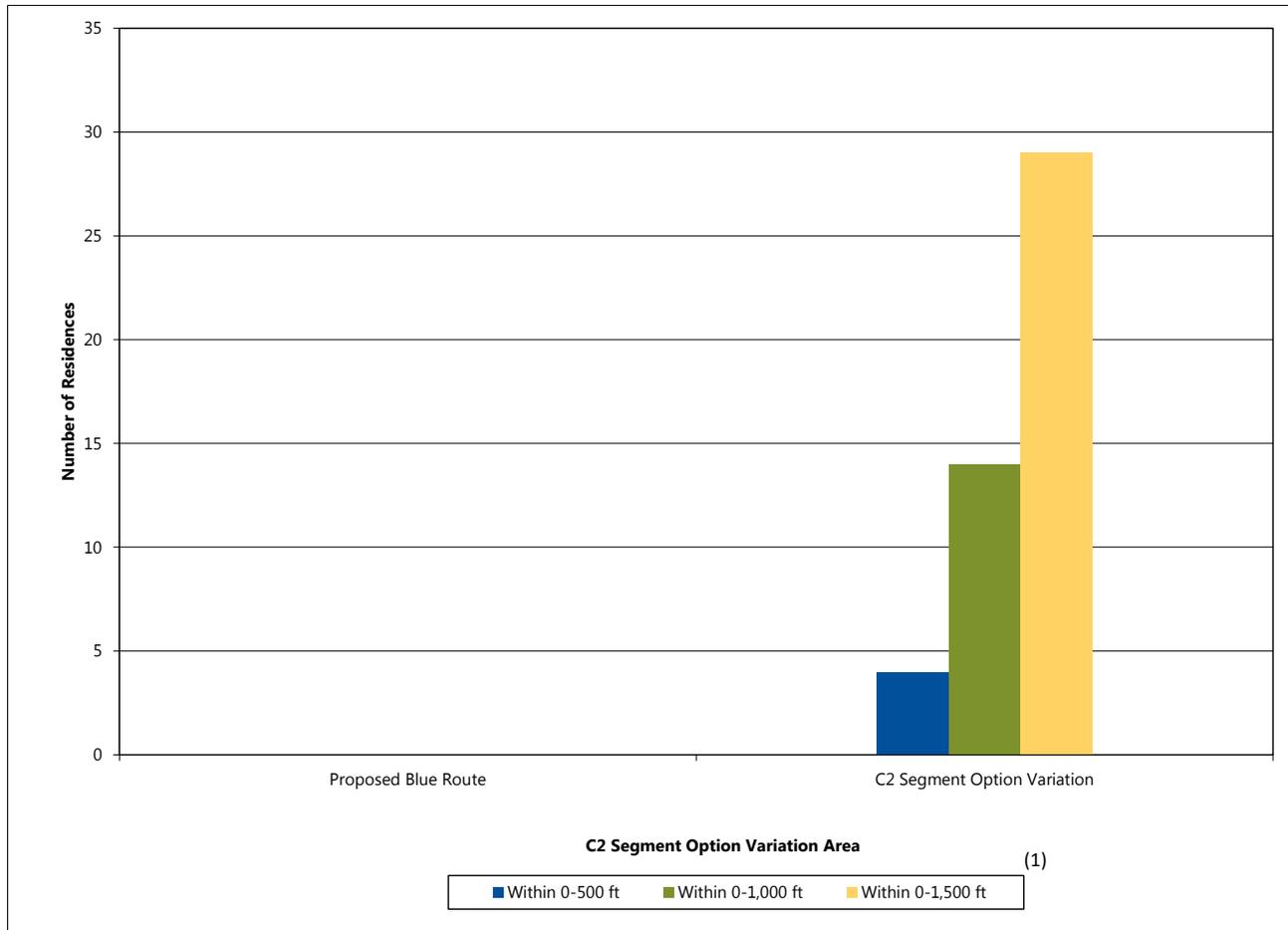
- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix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

of aesthetic resources. Neither alternative would be located within one mile of any historic architectural sites, which would also have high visual sensitivity. The C2 Segment Option Variation would affect substantially more residences within 1,500 feet of the anticipated alignment (29) than the Proposed Blue Route (0; Table 6-110; Figure 6-74), including 14 of the residences that would be within 1,000 feet of the anticipated alignment and four residences that would be within 500 feet.

The C2 Segment Option Variation is longer (46.0 miles) than the Proposed Blue Route (32.8 miles; Table 6-110). However, the C2 Segment Option Variation parallels an existing 230 kV transmission line for most of its length (81 percent), whereas the Proposed Blue Route does not parallel an existing transmission line. By paralleling the existing 230 kV transmission line, the C2 Segment Option Variation would produce substantially less contrast than the Proposed Blue Route.

Although the C2 Segment Option Variation would be longer and produce substantially less contrast than the Proposed Blue Route, it would affect substantially more residences within 1,500 feet of the anticipated alignment (29). However, by paralleling the existing 230 kV transmission line already visible from many of the residences, it is likely that the addition of a second high voltage transmission line adjacent to the existing line would result in only an incremental increase in contrast for viewers of the new transmission line in conjunction with the existing transmission line. The incremental increase in contrast would be slightly greater where the new transmission line is located between the existing transmission line and residences and slightly less where the new transmission line is located on the opposite side of the existing transmission line from residences. For these reasons, it is likely that despite being longer and affecting substantially more residences, the C2 Segment Option Variation would result in less new aesthetic impact than the

Figure 6-74 Residences within the ROI in the C2 Segment Option Variation Area



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

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

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

Proposed Blue Route in the C2 Segment Option Variation Area.

Although the Proposed Blue Route is long and does not parallel an existing large transmission line, it affects no residences and few other sensitive visual resources (one state trail, two state forest, two snowmobile trails, and one state water trail).

Although the C2 Segment Option Variation is also long and parallels an existing large transmission line of similar size and design for a large portion of its length (81 percent), it is located within 1,500 feet of 29 residences and several other sensitive visual resources (one state trail, two state forest, two snowmobile trails, and one state water trail). For these reasons, aesthetic impacts of the C2 Segment Option Variation are potentially significant.

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

Land Use Compatibility

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

Land Uses

Table 6-111 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignment of the Proposed Blue Route and C2 Segment Option Variation. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in

the C2 Segment Option Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Blue Route and C2 Segment Option Variation are shown on Map 6-41.

The Proposed Blue Route and C2 Segment Option Variation ROI are both primarily composed of forested and/or swamp land (Table 6-111). The C2 Segment Option Variation ROI contains a greater amount of forested/swamp land, developed or disturbed, and agricultural land compared to the Proposed Blue Route.

Land Ownership and Management

Table 6-112 shows that the Proposed Blue Route ROW would contain more state forest land and state fee land than the C2 Segment Option Variation. No impacts to state conservation easements or USFWS Interest Lands would occur under the Proposed Blue Route or C2 Segment Option Variation. The C2 Segment Option Variation would impact 14 acres of county land, while the Proposed Blue Route would not impact this land ownership category.

The C2 Segment Option Variation would parallel an existing corridor for 89 percent of its length, while the Proposed Blue Route would not parallel an existing corridor, but would parallel a field line for a small percentage of its length (see Section 6.3.5.6). Therefore, the C2 Segment Option Variation would be expected to have less incompatibility with surrounding land uses compared to the Proposed Blue Route (Figure 6-75).

Impacts to land use from the proposed Project in the C2 Segment Option Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route and C2 Segment Option Variation would both result in a long-term change in

Table 6-111 Land Uses within the ROI in the C2 Segment Option Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	C2 Segment Option Variation Area	
			Proposed Blue Route	C2 Segment Option Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	12,103	16,872
	Developed or Disturbed	Acres within 0–1,500 ft	94	504
	Agricultural	Acres within 0–1,500 ft	0	167
	Forested and/or Swamp	Acres within 0–1,500 ft	11,922	16,121
	Other	Acres within 0–1,500 ft	87	80

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

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

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

Table 6-112 Land Ownership and Management within the Anticipated ROW in the C2 Segment Option Variation Area

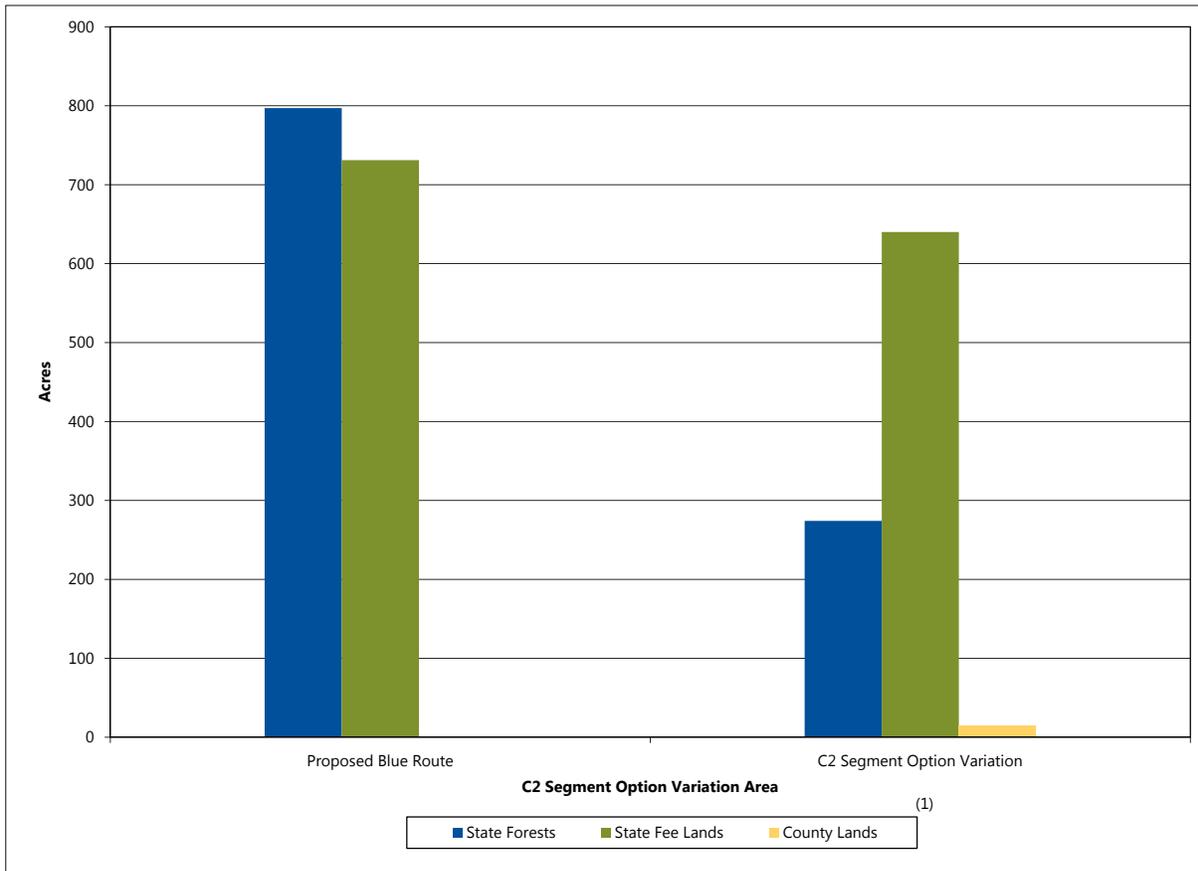
Resource	Type	Evaluation Parameter	C2 Segment Option Variation Area	
			Proposed Blue Route	C2 Segment Option Variation
Total Lands	--	Acres within ROW	797	1,116
State Forests	--	Acres within ROW	797	274
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	731	640
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	68	43
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	99	230
	Trust Fund	Acres within ROW	565	367
	Federal - State Lease	Acres within ROW	0	0
County Lands	--	Acres within ROW	0	14
Private Lands ⁽²⁾	--	Acres within ROW	66	462

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

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

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

Figure 6-75 Public Land Ownership/Management within the ROI in the Segment C2 Segment Option Variation Area



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

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

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

land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the Proposed Blue Route or C2 Segment Option Variation that would parallel an existing corridor is also important. The C2 Segment Option Variation avoids a greater amount of state forest and state fee lands than the Proposed Blue Route thereby avoiding long-term changes to land use and also parallel more of an existing corridor compared to the Proposed Blue Route.

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

6.3.5.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the C2 Segment Option Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the C2 Segment Option Variation Area are summarized in Table 6-113.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-113 and Figure 6-76 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route and C2 Segment Option Variation in the ROI.

The C2 Segment Option Variation would pass through more acres of farmland, including prime farmland, prime farmland if drained, and farmland of statewide importance (Figure 6-76). The Proposed Blue Route has a shorter length and would be expected to have the fewest impacts on farmland; however, the C2 Segment Option Variation would parallel an existing corridor for much of its length.

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

Table 6-113 Land-Based Economy Resources within the Anticipated ROW in the C2 Segment Option Variation Area

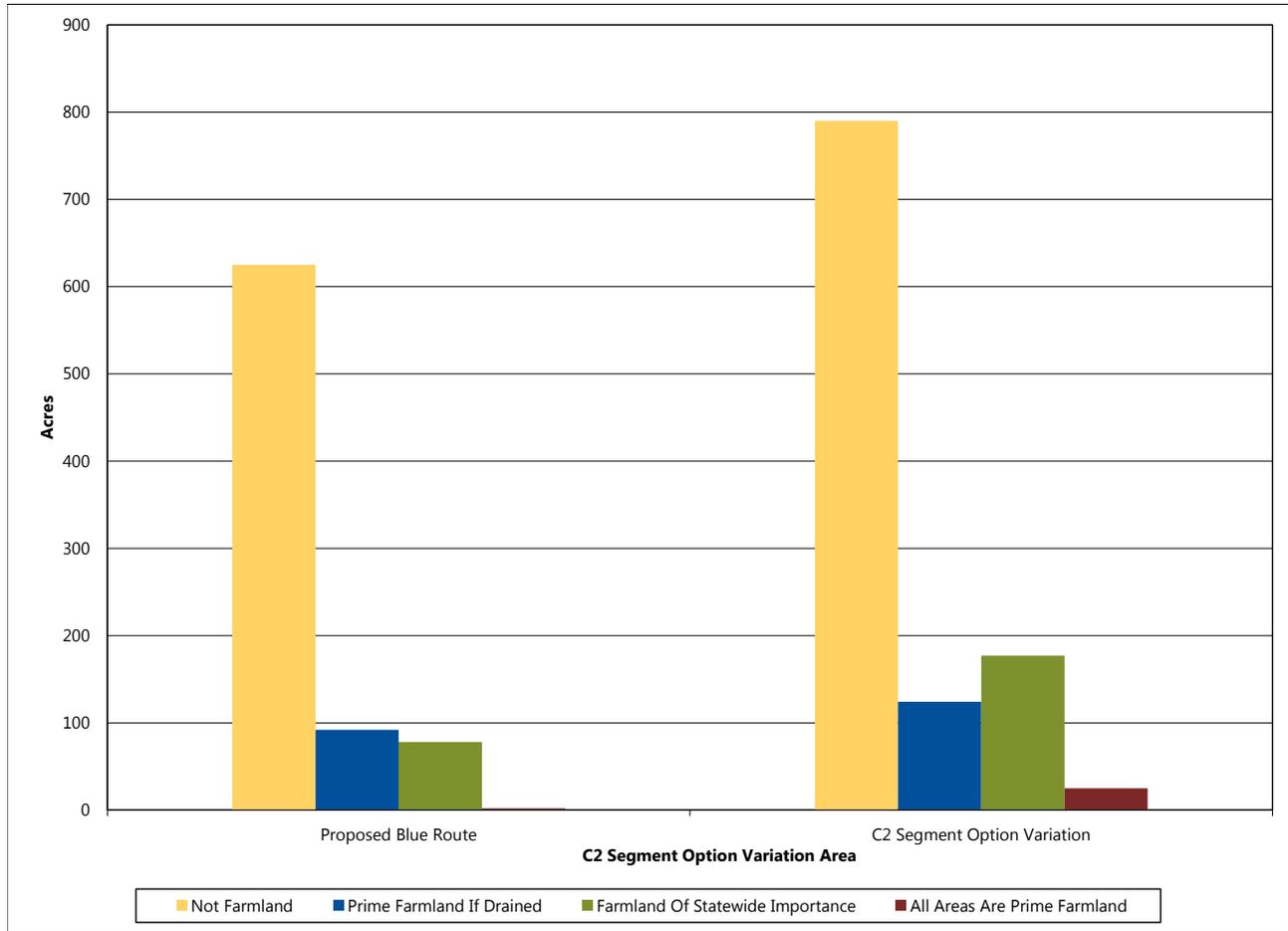
Resource	Type	Evaluation Parameter	C2 Segment Option Variation Area	
			Proposed Blue Route	C2 Segment Option Variation
Transmission Line	--	Length (mi)	32.8	46.0
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	0	81
Farmland	Not Farmland	Acres within ROW	625	790
	Prime Farmland if Drained	Acres within ROW	92	124
	Farmland of Statewide Importance	Acres within ROW	78	177
	All Areas are Prime Farmland	Acres within ROW	2	25
State Forest	--	Acres within ROW	797	274
State Mineral Leases (active and/or terminated/expired)	--	Acres within ROW	16	67

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

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

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

Figure 6-76 Acres of Farmland by Type within the Anticipated ROW in the C2 Segment Option Variation Area



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

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

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

Forestry

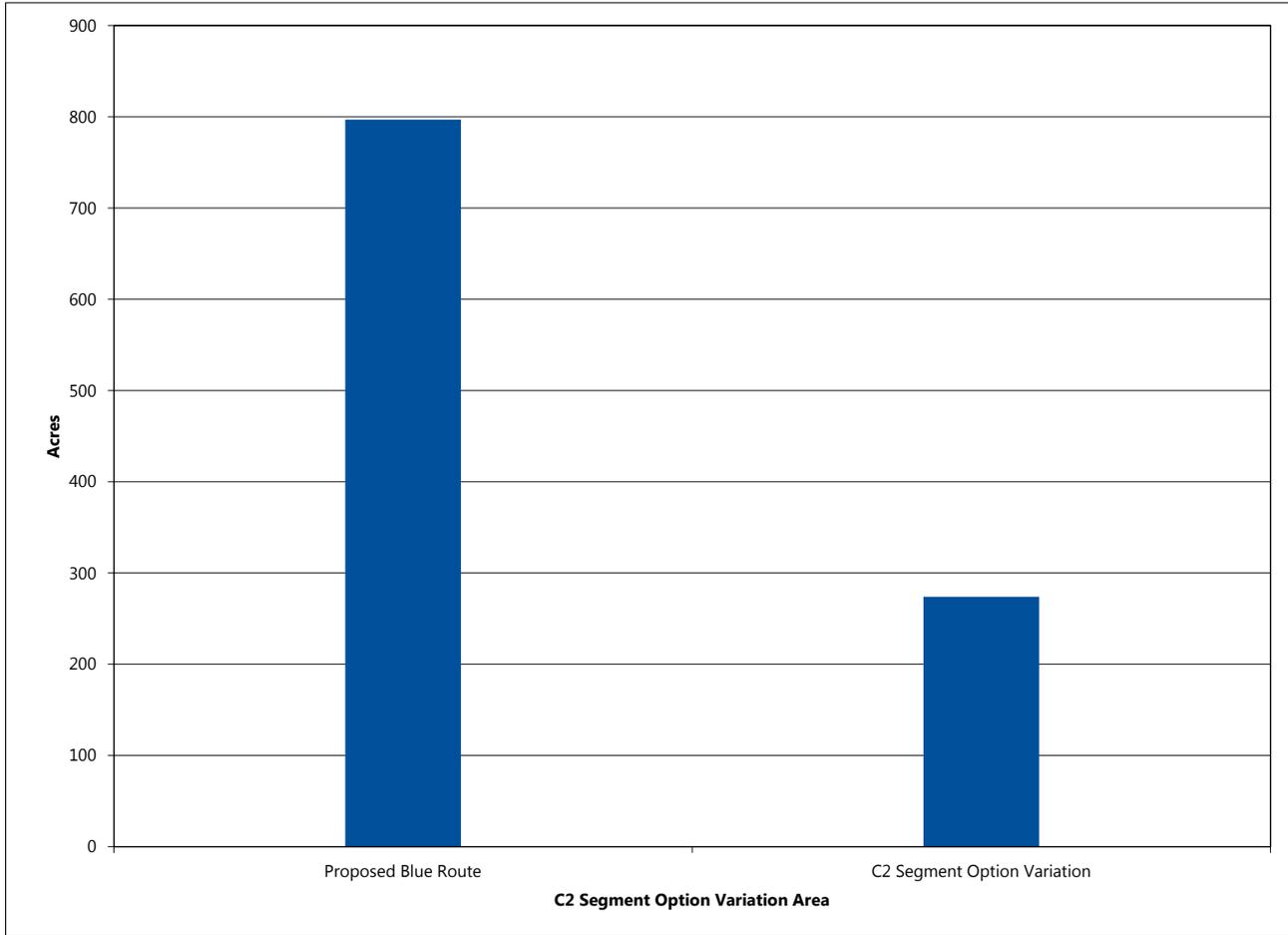
As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-113 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Blue Route and the C2 Segment Option Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue Route or the C2 Segment Option Variation in the C2 Segment Option Variation Area.

As indicated in Table 6-113 and Figure 6-77, the Proposed Blue Route would pass through more acres of state forest lands. The State Forests

located in this variation area include the Smokey Bear, Koochiching, and Pine Island State Forests (Map 6-43). The C2 Segment Option Variation would be expected to have less of an impact on timber activities in State Forests because a large portion of the C2 Segment Option Variation is outside of the Pine Island and Koochiching State Forest boundaries.

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

Figure 6-77 Acres of State Forest Land within the Anticipated ROW in the C2 Segment Option Variation Area



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

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

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

Mining and Mineral Resources

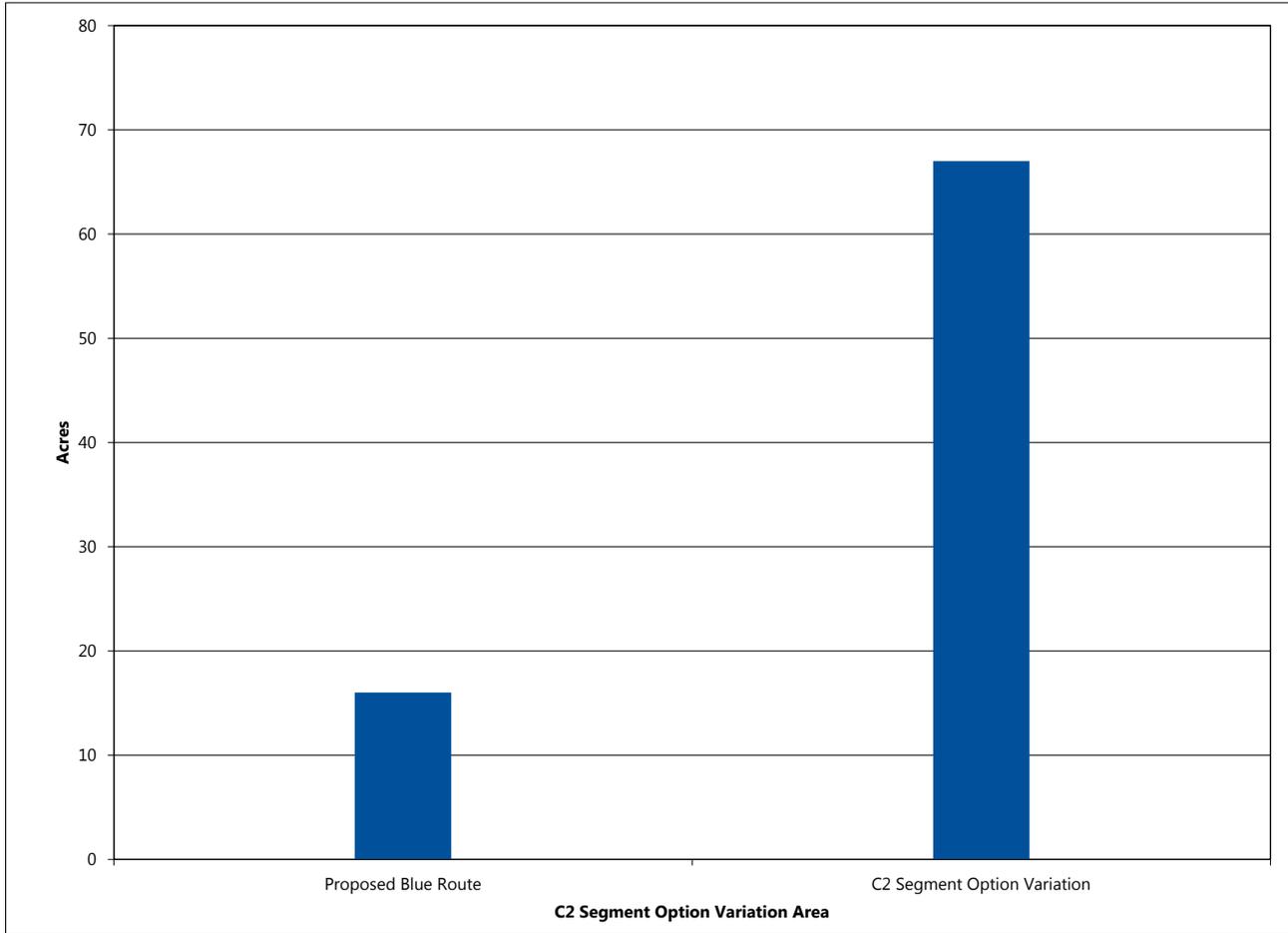
As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-113, Figure 6-78, and Map 6-41 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the C2 Segment Option Variation Area. There are **no active mineral leases**, known aggregate resources, or current mining lands in the ROI of either the Proposed Blue Route or the C2 Segment Option Variation.

Both the Proposed Blue Route and the C2 Segment Option Variation would traverse mining lands with terminated/expired state mineral leases, with the C2 Segment Option Variation passing through more acres than the Proposed Blue Route (Table 6-113, Figure 6-78, and Map 6-41). Because the C2 Segment Option Variation would pass through more mining lands with state mineral leases, it is more likely to potentially interfere with future mining activities in this area. However, the C2 Segment Option Variation would parallel an existing transmission line corridor for much of its length, so sources of potential interference with future mining activities are already present along this route.

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

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

Figure 6-78 Acres of State Mineral Leases within the Anticipated ROW in the C2 Segment Option Variation Area



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

term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.3.5.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the proposed transmission line, however, potential indirect effects to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites. Table 6-114 provides a summary of the previously recorded archaeological and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Blue Route and C2 Segment Option Variation in the C2 Segment Option Variation Area.

There are no archaeological sites or historic architectural sites located within either the ROW of the Proposed Blue Route or C2 Segment Option Variation. **Additionally, no Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route and C2 Segment Variation in the C2 Segment Option Variation Area.** However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

There is currently no potential for direct, long-term, adverse effects on the archaeological or historic architectural sites within the C2 Segment Option Variation Area as none are identified within the ROW (direct APE), although cultural resource investigations have not yet occurred for the Proposed Route or Variation. Since there are

Table 6-114 Archaeological and Historic Resources within the C2 Segment Option Variation Area

Resource	Evaluation Parameter ⁽¹⁾	C2 Segment Option Variation Area	
		Proposed Blue Route	C2 Segment Option Variation
Historic Architectural Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	0
	Count within 0–5,280 ft	0	0
Archaeological Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	0

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

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

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

no historic architectural sites identified within the indirect APE from either the Proposed Blue Route or the C2 Segment Option Variation, indirect, long-term, adverse visual effects to architectural resources are not likely to occur. **As the Proposed Blue Route and C2 Segment Option Variation have not been surveyed for cultural resources, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources conducted in compliance with federal and/or state regulations for cultural resources.** These cultural resources investigations will be implemented as part of the PA proposed by DOE (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential adverse effects to cultural resources during construction and operation of the proposed Project.

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

6.3.5.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the C2 Segment Option Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the C2 Segment Option Variation Area are summarized in Table 6-115 and shown on Map 6-43. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of waterbody/watercourse crossings, the need to place transmission structures in floodplains and wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Blue Route and the C2 Segment Option Variation.

The Proposed Blue Route and the C2 Segment Option Variation would both cross the Black River and the Big Fork River, which are PWI watercourses. The Proposed Blue Route would also cross three PWI tributaries to the Black River, and the C2 Segment Option Variation would cross one PWI tributary to the Little Fork River. As shown in Table 6-115, the Proposed Blue Route would result in the most total PWI watercourse crossings. Neither the Proposed Blue Route nor the C2 Segment Option Variation would cross PWI waterbodies or wetlands.

The Proposed Blue Route and C2 Segment Option Variation would both require crossing non-PWI waters. The Proposed Blue Route would require more crossings than the C2 Segment Option Variation, and the majority of these crossings would be ditches (Figure 6-79).

The Proposed Blue Route and the C2 Segment Option Variation would each require one crossing of the Big Fork River, which is a MPCA-listed impaired water. The

C2 Segment Option Variation would also cross a reach of MPCA-listed impaired Black River once.

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

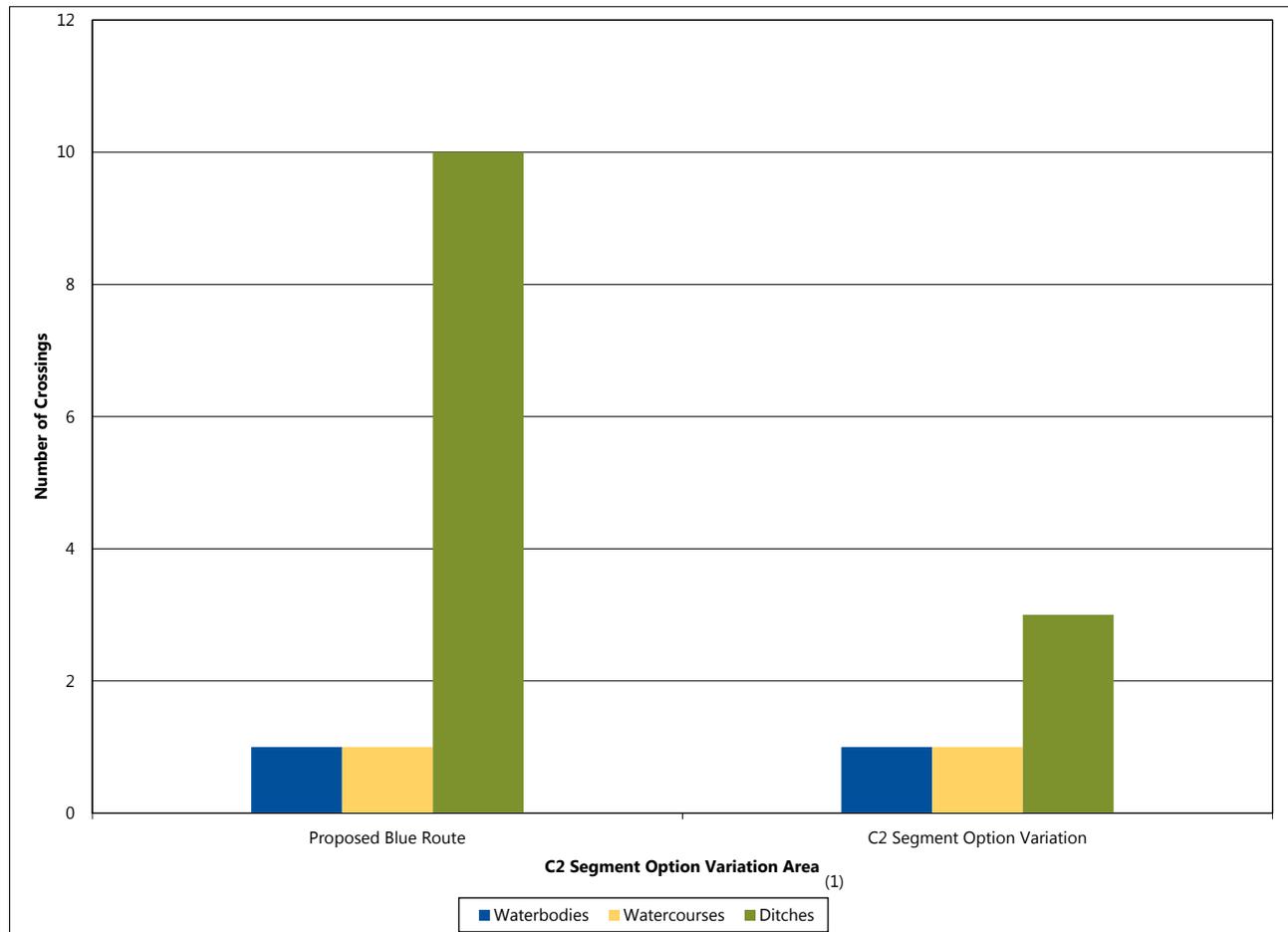
Both the Proposed Blue Route and the C2 Segment Option Variation would require construction and placement of transmission structures in Zone A floodplains of the Black River and the Big Fork River, respectively. Placement of transmission structures in these floodplains could not be avoided by spanning as floodplain crossing distances exceed the average spanning length of 1,250 feet.

Based on the NWI, the Proposed Blue Route and the C2 Segment Option Variation would both require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal

of woody vegetation in the ROW. As shown in Figure 6-80, the C2 Segment Option Variation contains more combined forested and shrub wetlands compared to the Proposed Blue Route and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts as summarized in Section 5.3.4.1. Both the Proposed Blue Route and the C2 Segment Option Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central

Figure 6-79 Non-PWI Water Crossings by Type in the C2 Segment Option Variation Area



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

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

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

Table 6-115 Water Resources within the Anticipated ROW in the C2 Segment Option Variation Area

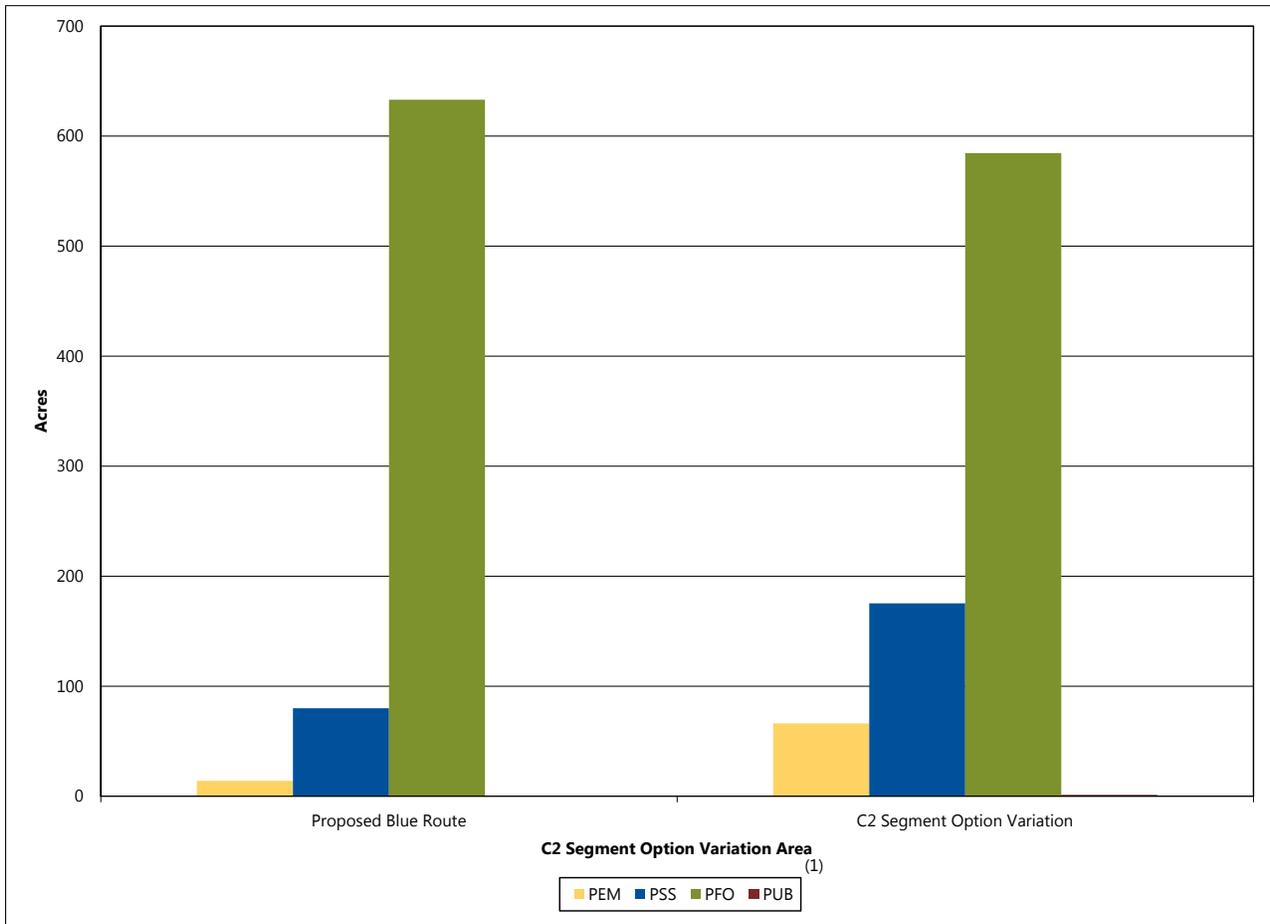
Resource	Evaluation Parameter	C2 Segment Option Variation Area	
		Proposed Blue Route	C2 Segment Option Variation
Transmission Line	Length (mi)	32.8	46.0
PWI Waters ⁽¹⁾	Number of Crossings	5	3
Non-PWI Waters ⁽²⁾	Number of Crossings	12	5
Impaired Waters	Number of Crossings	1	2
Floodplains ⁽³⁾	Acres within ROW	8	28
NWI Wetlands	Acres within ROW	728	829

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

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

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

Figure 6-80 Acres of Wetland by Type within the Anticipated ROW in the C2 Segment Option Variation Area



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

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

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

Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill, are expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed Blue Route and the C2 Segment Option Variation would both require temporary construction access through wetlands, which is also expected to be minimal due to the short-term, localized nature of the impact, and the Applicant’s intended use of minimization measures, such as matting.

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

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the C2 Segment Option Variation Area are summarized in Table 6-116 and shown on Maps 5-12 and 6-43. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ between the Proposed Blue Route and C2 Segment Option Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-116 and Figure 6-81, the C2 Segment Option Variation would pass through more forested land due to its longer length; however, the Proposed Blue Route would pass through more state forest land. Despite the longer length of the C2 Segment Option Variation, it would parallel existing transmission line corridor for much of its length while the Proposed Blue Route would require creation of new corridor for its entire length (Table 6-116; Map 6-43). Because of this, the Proposed Blue Route would result in more fragmentation of intact forest in areas where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

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

Table 6-116 Vegetation Resources within the Anticipated ROW in the C2 Segment Option Variation Area

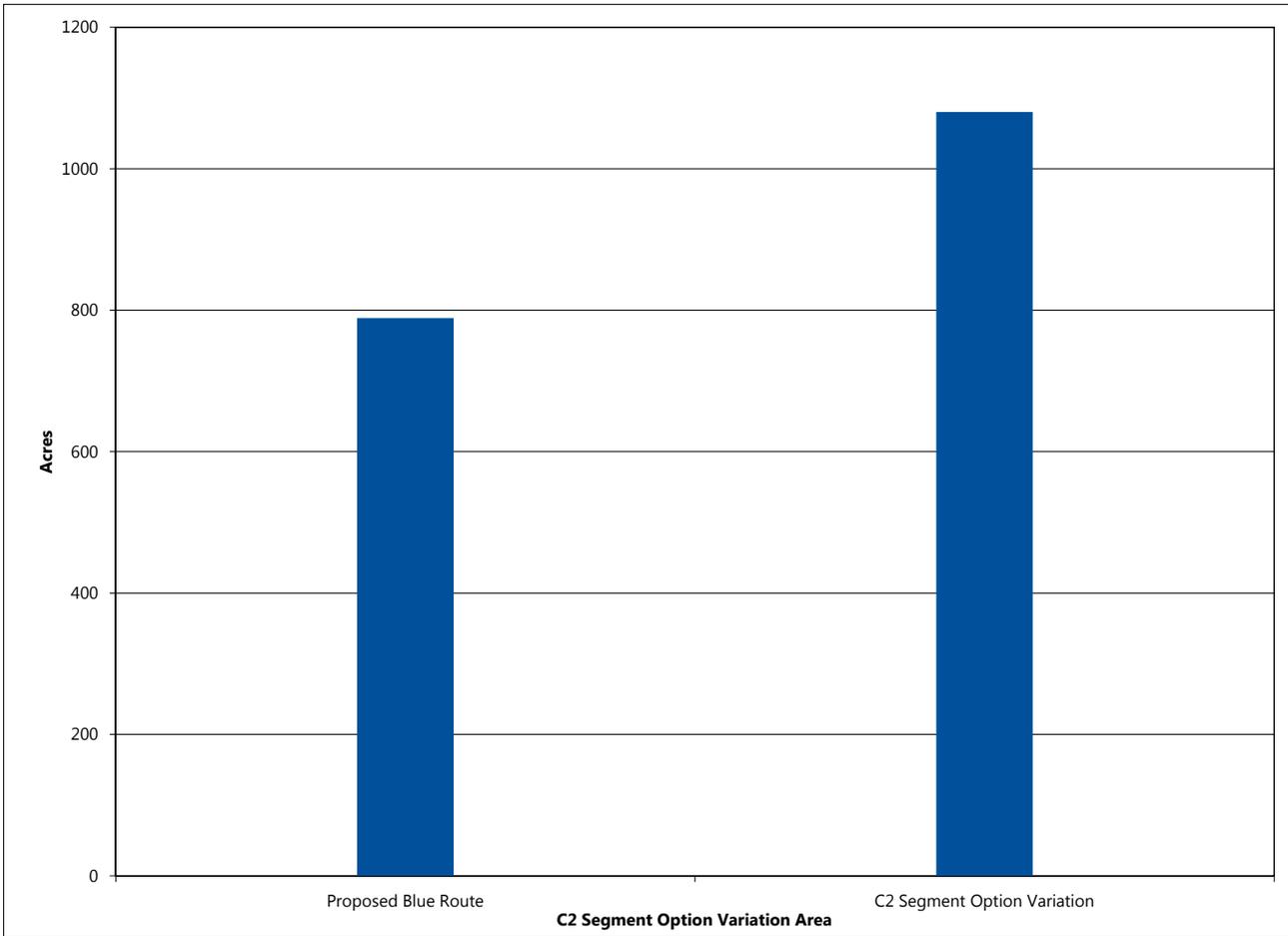
Resource	Evaluation Parameter	C2 Segment Option Variation Area	
		Proposed Blue Route	C2 Segment Option Variation
Transmission Line	Length (mi)	32.8	46.0
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	81
State Forest	Acres within ROW	797	274
Total Forested GAP Land Cover	Acres within ROW	789	1,080
GAP Land Cover - Dominant Types⁽³⁾			
North American Boreal Flooded and Swamp Forest	Acres within ROW	484	728
North American Boreal Forest	Acres within ROW	248	162
Eastern North American Flooded and Swamp Forest	Acres within ROW	56	185

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

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

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

Figure 6-81 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the C2 Segment Option Variation Area



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

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

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the C2 Segment Option Variation Area are summarized in Table 6-117 and shown on Map 6-43. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Blue Route and C2 Segment Option Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Blue Route and C2 Segment Option Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.5.4 (Vegetation)

summarizes potential impacts on forested vegetation from the Proposed Blue Route and C2 Segment Option Variation.

Both the Proposed Blue Route and the C2 Segment Option Variation would pass through the Big Bog Important Bird Area (Table 6-117; Map 6-43). While the C2 Segment Option Variation would traverse the Big Bog Important Bird Area adjacent to an existing corridor, the Proposed Blue Route would traverse a greater portion of the Big Bog Important Bird Area and would require the creation of new transmission line corridor for its entire length (Table 6-117; Map 6-43). Creation of new corridor in the Big Bog Important Bird Area would likely result in more short-term indirect and long-term direct, adverse impacts on birds and other wildlife associated with the area. The short-term indirect, impacts would be associated with construction and alteration of the birds’ habitat, while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian

Table 6-117 Wildlife Resources within the Vicinity of the C2 Segment Option Variation Area

Resource	Evaluation Parameter	C2 Segment Option Variation Area	
		Proposed Blue Route	C2 Segment Option Variation
Transmission Line	Length (mi)	32.8	46.0
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	81
Important Bird Areas	Acres within ROW	469	406

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

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

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

collisions and electrocutions discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (2.13).

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

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

6.3.5.5 Rare and Unique Natural Resources

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

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the C2 Segment Option Variation Area are summarized in Table 6-118; additional data on rare species, such as the presence of MnDNR tracked species,

is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

In general, proximity of state endangered, threatened, or special concern species is similar between the Proposed Blue Route and C2 Segment Option Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation, including critical habitat designated for gray wolf.

As indicated in Table 6-118, the state-threatened ram’s head lady’s slipper was documented within one mile of the C2 Segment Option Variation. The remaining three rare species identified in Table 6-118 are all aquatic; because all lakes and streams would be spanned in the C2 Segment Option Variation Area and throughout the entire proposed Project, impacts to aquatic species, such as fish and mussels are not anticipated. Although the ram’s head lady’s slipper has not been documented within one mile of the Proposed Blue Route, there is suitable habitat (coniferous swamps and bogs and upland pine forests) for this species in the vicinity of both the Proposed Blue Route and the C2 Segment Option Variation. The C2 Segment Option Variation would parallel existing transmission line for over 80 percent of its length, while the Proposed Blue Route would require the creation of new corridor for its entire length (Table 6-119). Because of this the Proposed Blue Route could impact more rare species that are susceptible to fragmentation of intact forest habitat. However, the full extent of potential impacts from either the Proposed Blue Route or C2 Segment Option Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit.

The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Both the Proposed Blue Route and the C2 Segment Option Variation would cross critical habitat designated for gray wolf for approximately 32 miles. The Proposed Blue Route would cross this habitat along a new transmission line corridor, while the C2 Segment Option Variation would cross this habitat parallel to an existing transmission line corridor. The C2 Segment Option Variation would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross this resource in an area where critical habitat designated for gray wolf has already been fragmented.

Any indirect impacts to rare species from the proposed Project would be expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

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

Table 6-118 Rare Species Documented within One Mile of the Anticipated ROW in the C2 Segment Option Variation Area

Scientific Name ⁽¹⁾	Common Name	Federal Status	State Status	Type	C2 Segment Option Variation Area	
					Proposed Blue Route	C2 Segment Option Variation
<i>Cypripedium arietinum</i>	Ram's-head Lady's-slipper	None	Threatened	Vascular Plant		X
<i>Acipenser fulvescens</i>	Lake Sturgeon	None	Special Concern	Fish		X
<i>Lasmigona compressa</i>	Creek Heelsplitter	None	Special Concern	Mussel	X	
<i>Ligumia recta</i>	Black Sandshell	None	Special Concern	Mussel	X	X

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

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

Table 6-119 Rare Communities and Resources within the Vicinity of the C2 Segment Option Variation Area

Resource	Evaluation Parameter ⁽¹⁾	C2 Segment Option Variation Area	
		Proposed Blue Route	C2 Segment Option Variation
Transmission Line	Length (mi)	32.8	46.0
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	0	81
Scientific and Natural Areas	Acres within 0–1,500 ft	0	155
MBS Sites of Biodiversity Significance	Acres within ROW	642	510
Ecologically Important Lowland Conifers	Acres within ROW	7	6

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (187); MBS 2015, reference (167); MnDNR 2014, reference (185)

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the C2 Segment Option Variation Area are summarized in Table 6-119 and shown on Map 6-44; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Blue Route and C2 Segment Option Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-44 and in Table 6-119, the North Black River Peatland SNA is adjacent to the C2 Segment Option Variation, with approximately 155 acres of the SNA located within 1,500 feet of the anticipated alignment for the C2 Segment Option Variation. The Proposed Blue Route is over one half mile from the nearest SNA (South Black River Peatland; Map 6-44). However, while the Proposed Blue Route would require creation of new corridor for its entire length, the C2 Segment Option Variation would follow to an existing transmission line corridor for most of its length, including the portion that runs adjacent to the SNA (Map 6-44).

Relative to the C2 Segment Option Variation, the Proposed Blue Route would pass through more acres of MBS Sites of Biodiversity Significance and would do so along a new transmission line corridor (Table 6-119; Map 6-44). Because of this, the Proposed Blue Route would likely result in more impacts on MBS Sites of Biodiversity Significance and the rare communities and species associated with them.

Both the Proposed Blue Route and the C2 Segment Option Variation would pass through similar amounts of the same MnDNR Ecologically Important Lowland Conifer stand; however the C2 Segment Option Variation would do so at the edge of the stand and along an existing transmission line corridor, while the Proposed Blue Route would cross through the center of the stand along a new transmission line corridor (Table 6-119; Map 6-44). Because of this, the Proposed Blue Route would likely result in more impacts to this MnDNR Ecologically Important Lowland Conifer stand.

The rare communities and resources listed in Table 6-119 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

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

6.3.5.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-45 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the C2 Segment Option Variation Area.

Table 6-120 identifies the percentage of total transmission line length that the Proposed Blue Route and C2 Segment Option Variation parallel an existing corridor or linear feature in the C2 Segment Option Variation Area.

The C2 Segment Option Variation would parallel an existing transmission line corridor for over two thirds of the length (Figure 6-82). The Proposed Blue Route would follow other types of existing corridors for less than one tenth of the length.

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

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

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-121 summarizes the costs associated with constructing the Proposed Blue Route and C2 Segment Option Variation in the C2 Segment Option Variation Area. As indicated in Table 6-121, the C2 Segment Option Variation would cost more to construct than the Proposed Blue Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$52,000 to \$74,000 annually for these alternatives in the C2 Segment Option Variation Area.

6.3.6 J2 Segment Option Variation Area

The J2 Segment Option Variation Area encompasses two route alternatives: the Proposed Orange Route and the J2 Segment Option Variation. This section provides a comparison of the potential

impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the J2 Segment Option Variation Area, depending on the route or variation considered.

6.3.6.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the J2 Segment Option Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the J2 Variation Area are summarized in Table 6-122 and shown on Maps 6-46, 6-47, 6-48, and 6-50.

As indicated in Table 6-122 for the J2 Segment Option Variation Area, the Proposed Orange Route and J2 Segment Option Variation would cross or

Table 6-120 Corridor Sharing in the C2 Segment Option Variation Area

Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	C2 Segment Option Variation Area	
		Proposed Blue Route	C2 Segment Option Variation
Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS)	Percent of Total Length ⁽²⁾	0	81
PLSS Only	Percent of Total Length ⁽²⁾	6	0
None	Percent of Total Length ⁽²⁾	94	19

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

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

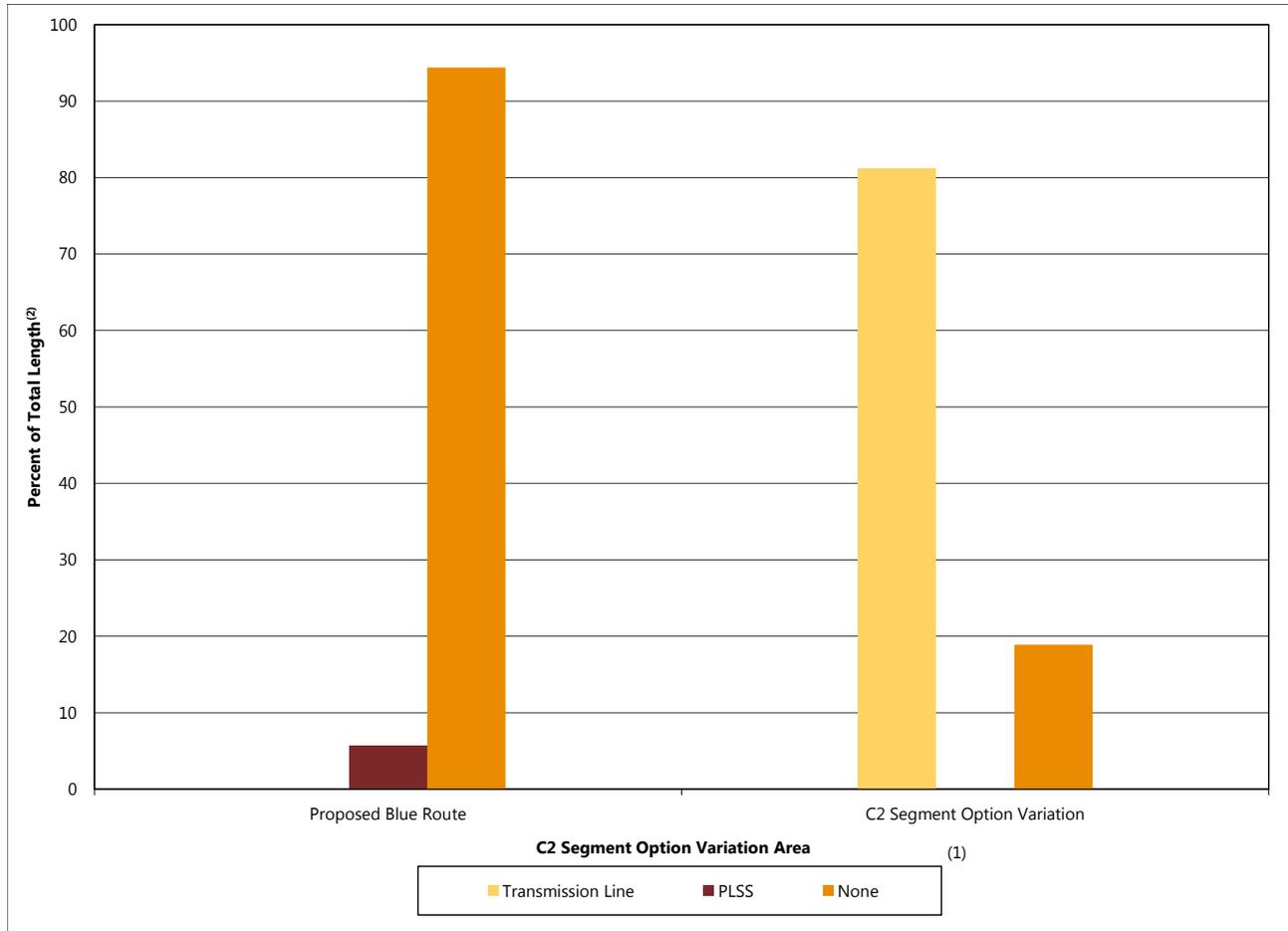
- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any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

Table 6-121 Construction Costs in the C2 Segment Option Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
C2 Segment Option	Proposed Blue Route	\$35,769,239	\$1,087,211	32.8
	C2 Segment Option Variation	\$54,466,435	\$1,184,053	46

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

Figure 6-82 Corridor Sharing in the C2 Variation Area



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

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

- (1) Transmission line (other linear features may be present within the transmission corridor; i.e., road, trail, field line, PLSS).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

be located within 1,500 feet of aesthetic resources with high visual sensitivity, including a state trail, snowmobile trails, state forests, and scenic byways (Maps 6-48 and 6-50). Also, the Proposed Orange Route and J2 Segment Option Variation would be located within one mile of several historic architectural sites (Map 6-47). In total, the Proposed Orange Route would affect fewer aesthetic resources (eight) than the J2 Segment Option Variation (16). In addition, the J2 Segment Option Variation would be located within 1,500 feet of six residences, five of which are located within 1,000 feet and one within 500 feet of the anticipated alignment; these could also have high visual sensitivity. The anticipated alignment of the Proposed Orange Route would not be within 1,500 feet of any residences (Figure 6-83).

The J2 Segment Option Variation is slightly longer (45.2 miles) than the Proposed Orange Route (42.2 miles) and neither alternative parallel an existing

large transmission line. Therefore contrast for both transmission lines would be similar.

The J2 Segment Option Variation would cross four snowmobile trails, would be located within one mile of seven historic architectural sites, and would cross two scenic byways (the Avenue of the Pines [State Route 46] and Edge of the Wilderness [State Route 38]; Map 6-47). In comparison, the Proposed Orange Route would cross two snowmobile trails and would be located within one mile of two historic architectural sites, but would not cross any scenic byways (Map 6-47).

Viewpoint 05 in Appendix N shows the existing view looking east from the Edge of the Wilderness Scenic Byway south of Effie where the J2 Segment Option Variation would cross the highway. This viewpoint also shows a simulation of what the transmission line and new corridor would look

Table 6-122 Aesthetic Resources within the ROI in the J2 Segment Option Variation area

Resource	Evaluation Parameter ⁽¹⁾	J2 Segment Option Variation Area	
		Proposed Orange Route	J2 Segment Option Variation
Transmission Line	Length (mi)	42.2	45.2
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	0	0
Residences	Count within 0–500 ft	0	1
	Count within 0–1,000 ft	0	5
	Count within 0–1,500 ft	0	6
Historic Architectural Sites	Count within 0–1,500 ft	0	2
	Count within 0–5,280 ft	2	7
State Trails	Count within 0–1,500 ft	1	1
State Forests	Count within 0–1,500 ft	3	2
State Scenic Byways	Count within 0–1,500 ft	0	2
Snowmobile Trails	Count within 0–1,500 ft	2	4

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2003, reference (182); MnDNR 2003, reference (148) MnDOT 2013, reference (149); MnDNR 2010 reference (150)

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

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

like at this same location. Although a substantial amount of vegetation would be cleared and tall lattice structures would be visible, the transmission line crosses perpendicular to the road and would be visible only briefly to passing motorists and others traveling on the road. Even so, the new transmission line would interrupt views of the otherwise natural character of the forest landscape in this area of the scenic highway and diminish the aesthetic quality for viewers with high viewer sensitivity.

Although the J2 Segment Option Variation crosses fewer state forests (two) than the Proposed Orange Route (three; Table 6-122), overall the J2 Segment Option Variation would affect a greater number of aesthetic resources and residences (six residences, seven historic architectural sites, one state trail, two state forests, two state scenic byways, and four snowmobile trails). While the contrast would be similar for both alternatives, the J2 Segment Option Variation would potentially affect views for more residences and aesthetic resources with high visual sensitivity (two residences, one state trail, three state forests, and two snowmobile trails). Therefore, the Proposed Orange Route would potentially result in less aesthetic impact than the J2 Segment Option Variation.

Although the Proposed Orange Route is long and does not parallel an existing large transmission line,

it affects no residences and few other sensitive visual resources (two historic architectural sites, one state trail, three state forest, no state scenic byways, and two snowmobile trails). For these reasons, potential aesthetic impacts of the Proposed Orange Route are not expected to be significant.

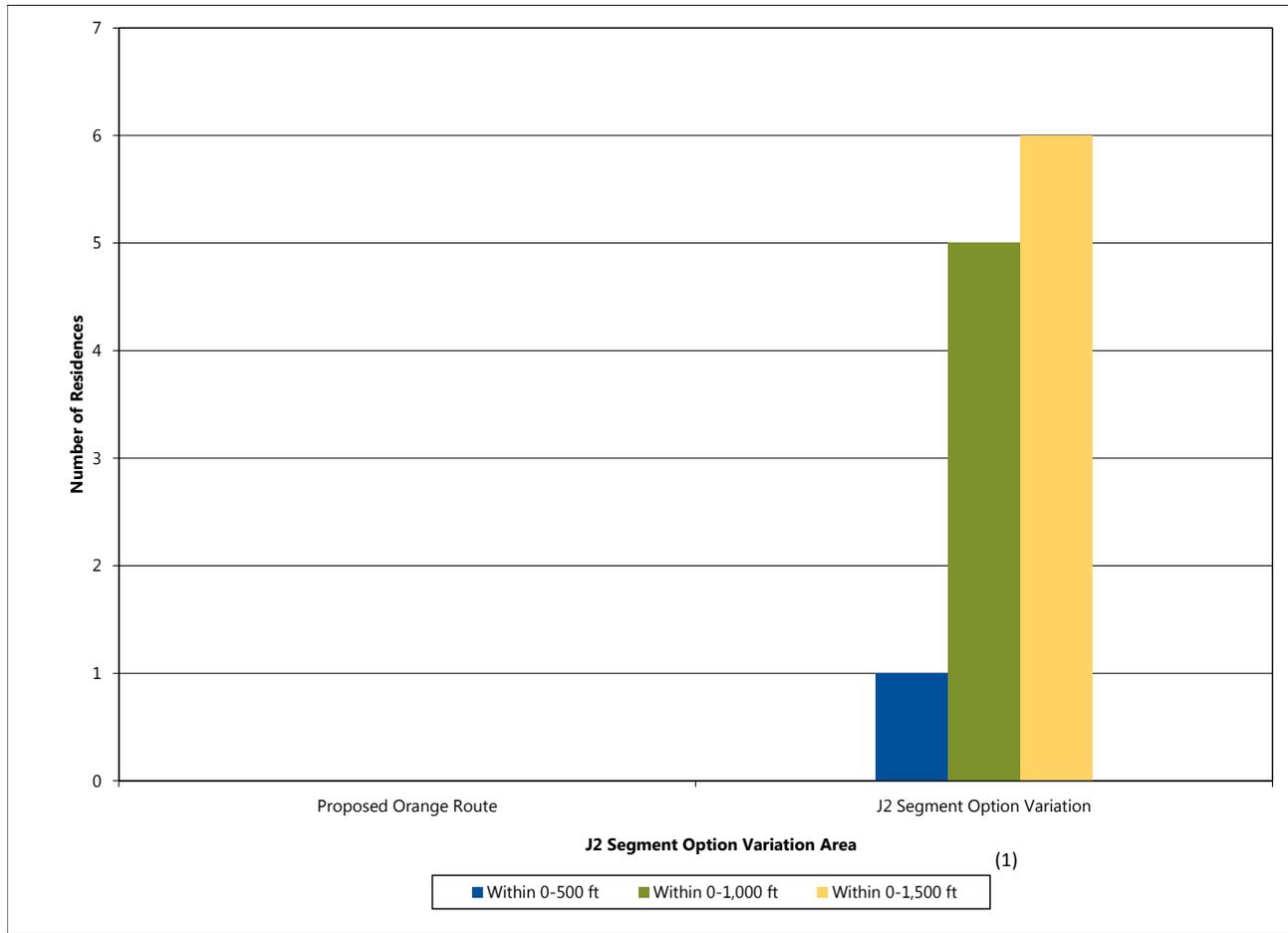
In contrast, because the J2 Segment Option Variation is long, does not parallel an existing large transmission line, and affects several residences (six) and other sensitive visual resources (seven historic architectural sites, one state trail, two state forests, two state scenic byways, and four snowmobile trails), aesthetic impacts of the J2 Segment Option Variation are potentially significant.

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

Land Use Compatibility

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

Figure 6-83 Residences within the ROI in the J2 Segment Option Variation Area



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

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

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

Land Uses

Table 6-123 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Orange Route and J2 Segment Option Variation in the J2 Segment Option Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the J2 Segment Option Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Orange Route and J2 Segment Option Variation are shown on Map 6-46.

The Proposed Orange Route and J2 Segment Option Variation ROI are both primarily composed of forested and/or swamp land (Table 6-123).

Land Ownership and Management

As identified in Table 6-124, the Proposed Orange Route would contain more state forest land and state fee land than the J2 Segment Option Variation.

No impacts to county land or state conservation easements would occur under the Proposed Orange Route or J2 Segment Option Variation; however, the J2 Segment Option Variation would impact 28 acres of USFWS Interest Lands with a crossing length of 10,587 feet, while the Proposed Orange Route would not impact this land ownership type (Map 6-46).

Neither the Proposed Orange Route nor the J2 Segment Option Variation would parallel an existing corridor; however a small portion of each route would parallel a field line (see Section 6.3.6.6) (Figure 6-84).

Impacts to land use from the proposed Project in the J2 Segment Option Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Orange Route and J2 Segment Option Variation would both result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest

and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the alternative that would parallel an existing corridor is also important. The J2 Segment Option Variation avoids a greater amount of state forest and state fee lands than the Proposed Orange Route thereby avoiding long-term changes to land use and neither the Proposed Route nor the J2 Segment Option Variation parallel an existing corridor.

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

or mitigate impacts on these resources from the proposed Project.

6.3.6.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the J2 Segment Option Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the J2 Segment Option Variation Area are summarized in Table 6-125.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-125 and Figure 6-85

Table 6-123 Land Uses within the ROI in the J2 Segment Option Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	J2 Segment Option Variation Area	
			Proposed Orange Route	J2 Segment Option Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	15,512	16,589
	Developed or Disturbed	Acres within 0–1,500 ft	145	355
	Agricultural	Acres within 0–1,500 ft	153	164
	Forested and/or Swamp	Acres within 0–1,500 ft	15,110	15,860
	Other	Acres within 0–1,500 ft	104	210

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

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

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

Table 6-124 Land Ownership/Management within the Anticipated ROW in the J2 Segment Option Variation Area

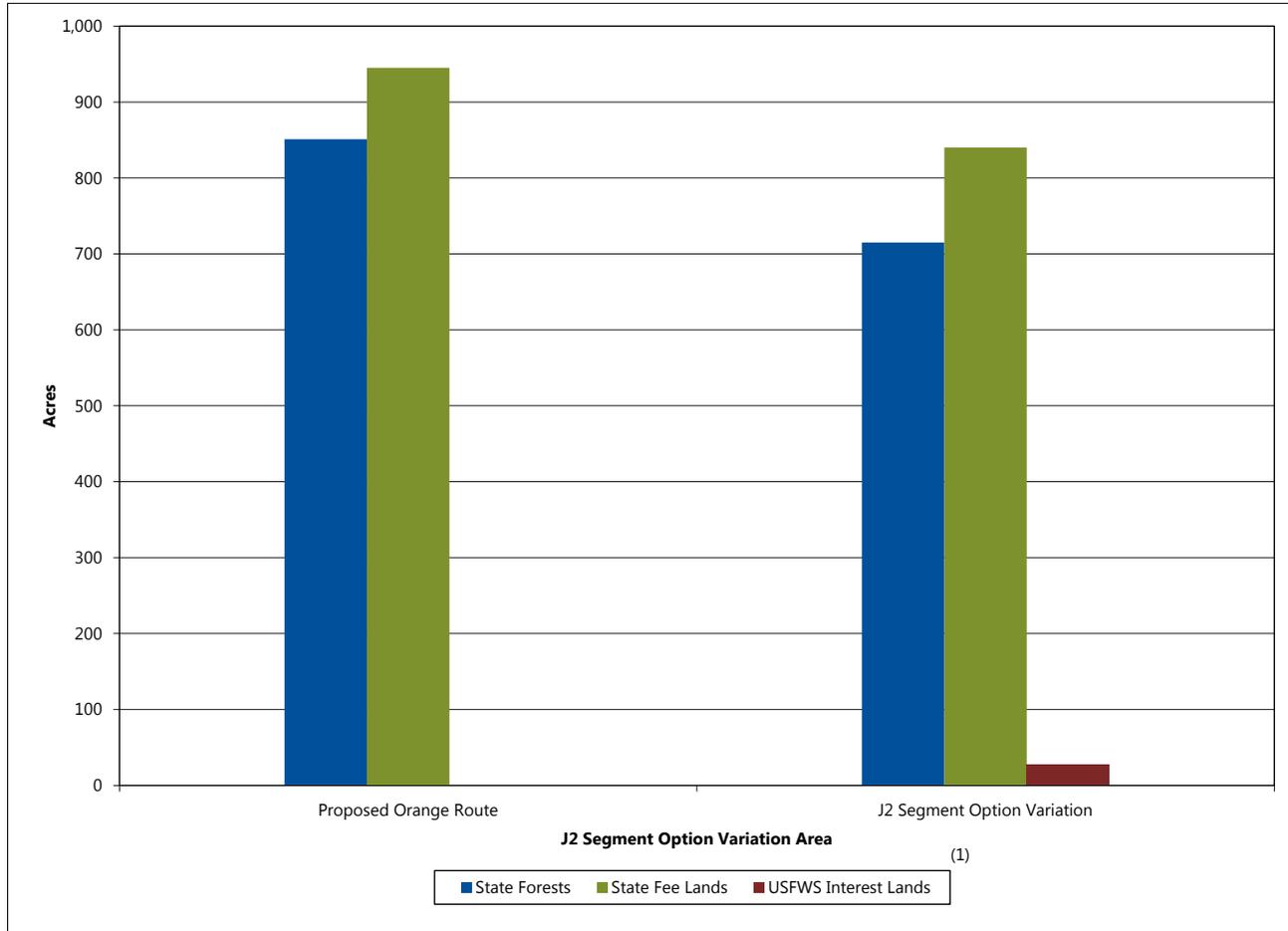
Resource	Type	Evaluation Parameter	J2 Segment Option Variation Area	
			Proposed Orange Route	J2 Segment Option Variation
Total Lands	--	Acres within ROW	79	229
State Forests	--	Acres within ROW	851	715
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	945	840
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	0	0
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	522	528
	Trust Fund	Acres within ROW	423	311
	Federal - State Lease	Acres within ROW	0	0
USFWS Interest Lands	--	Acres within ROW	0	28
Private Lands⁽²⁾	--	Acres within ROW	1,024	1,096

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

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

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

Figure 6-84 Public Land Ownership/Management within the ROI in the J2 Segment Option Variation Area



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

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

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

show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Orange Route and J2 Segment Option Variation in the ROI.

The J2 Segment Option Variation, which has the longer transmission line route, would pass through more acres of farmland, including farmland of statewide importance and prime farmland (Figure 6-85). The Proposed Orange Route and J2 Segment Option Variation would each impact 300 or more acres of “prime farmland if drained”. The Proposed Orange Route, which has the shorter length, would be expected to have the fewest impacts to farmland.

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

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

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

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line.

Table 6-125 Land-Based Economy Resources within the Anticipated ROW in the J2 Segment Option Variation Area

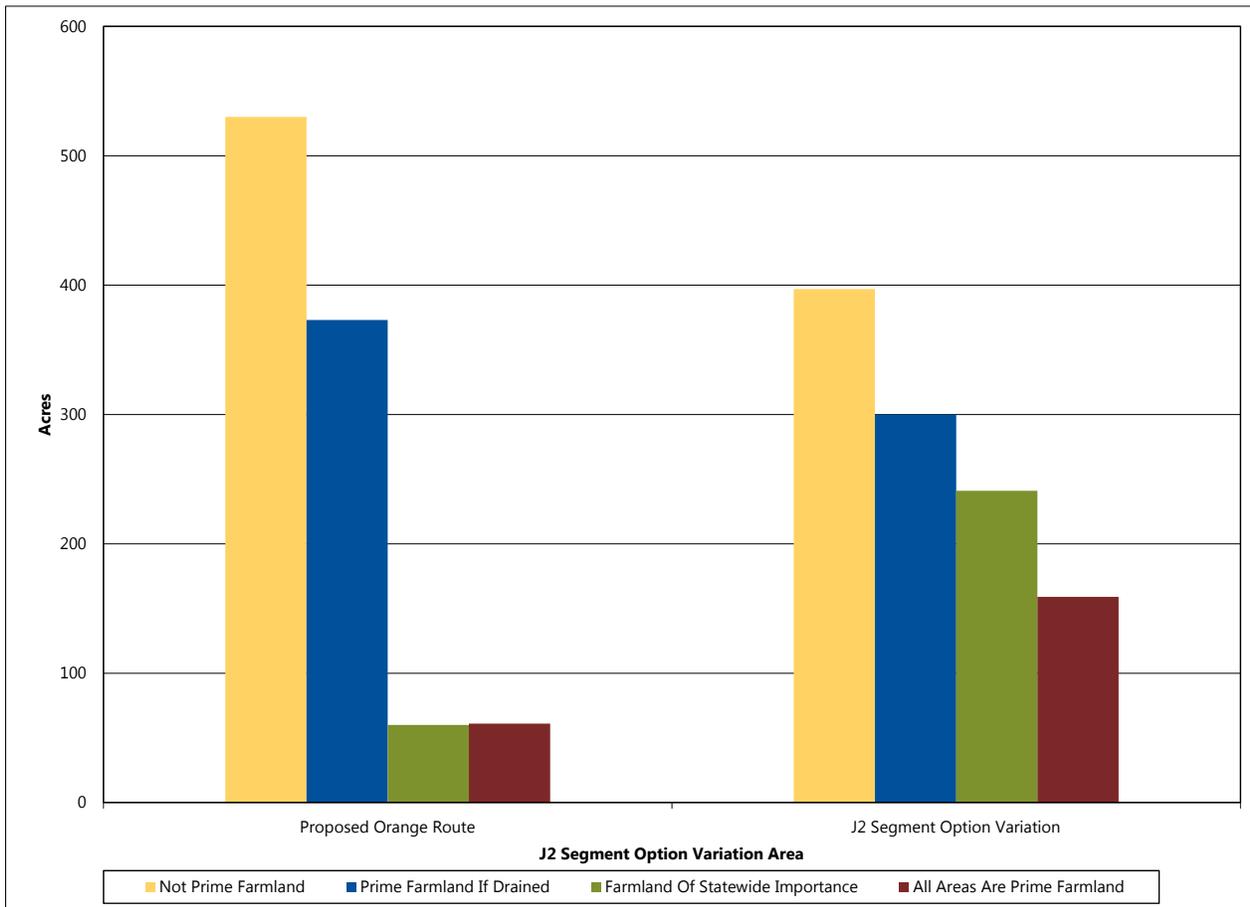
Resource	Type	Evaluation Parameter	J2 Segment Option Variation Area	
			Proposed Orange Route	J2 Segment Option Variation
Transmission Line	--	Length (mi)	42.2	45.2
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	0	0
Farmland	Not Farmland	Acres within ROW	530	397
	Prime Farmland if Drained	Acres within ROW	373	300
	Farmland of Statewide Importance	Acres within ROW	60	241
	All Areas are Prime Farmland	Acres within ROW	61	159
State Forest	--	Acres within ROW	851	715
State Mineral Leases (active and/or terminated/expired)	--	Acres within ROW	82	73

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

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

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

Figure 6-85 Acres of Farmland by Type within the Anticipated ROW in the J2 Segment Option Variation Area



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

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

Table 6-125 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Orange Route and the J2 Segment Option Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue Route or the J2 Segment Option Variation in the J2 Segment Option Variation Area.

The Proposed Orange Route would pass through more acres of state forest lands - Pine Island State Forest (Figure 6-86, Map 6-48). The J2 Segment Option Variation would be expected to have fewer impacts on timber activities in the Pine Island State Forest as it would cross less forest lands.

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

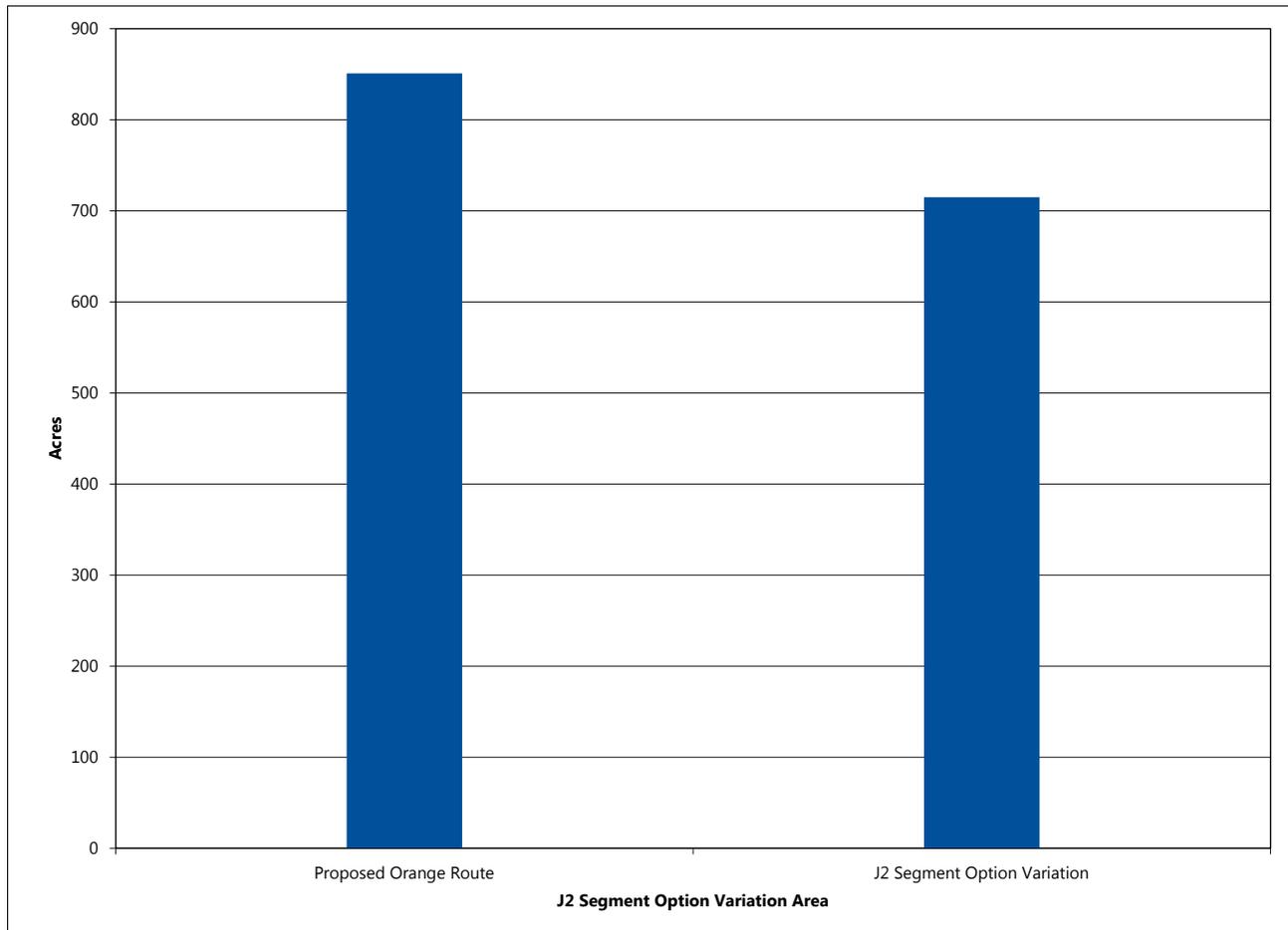
the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

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

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-125, Figure 6-87, and Map 6-46 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the J2 Segment Option Variation Area. **There are no active mineral leases in the ROI of either the Proposed Orange Route or the J2 Segment Option Variation.** Map 6-46 identifies the

Figure 6-86 Acres of State Forest Land within the Anticipated ROW in the J2 Segment Option Variation Area



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

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

state aggregate resources that may be impacted in the J2 Segment Option Variation Area.

Both the Proposed Orange Route and the J2 Segment Option Variation would traverse mining lands with terminated/expired state mineral leases, with the Proposed Orange Route passing through slightly more acres than the J2 Segment Option Variation (Table 6-125, Figure 6-87, and Map 6-46). Both the Proposed Orange Route and the J2 Segment Option Variation could potentially interfere with future mining activities in this area.

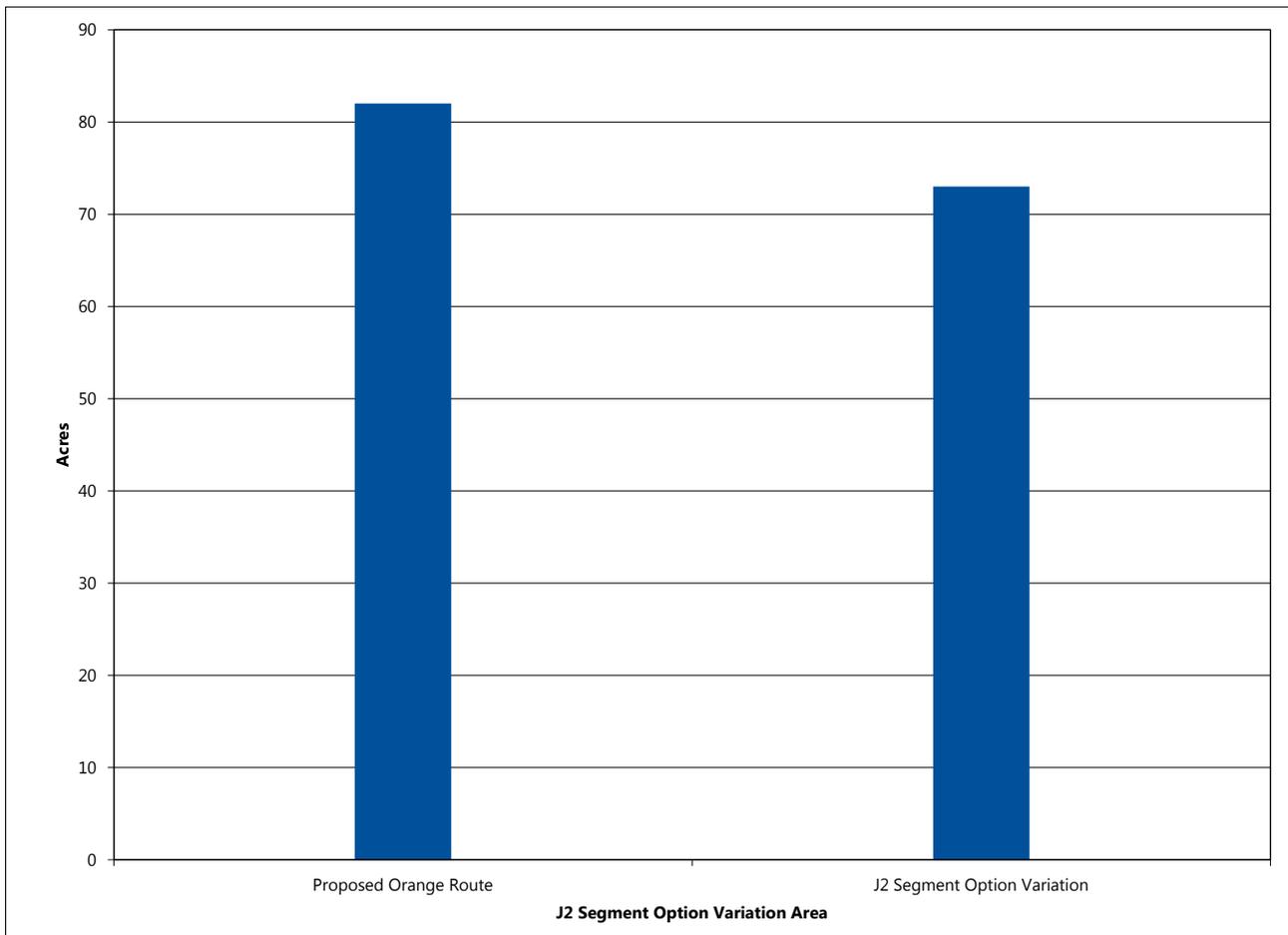
According to the Minnesota Department of Transportation Aggregate Source Information System data, aggregate resources are present within the vicinity of both the Proposed Orange Route and the J2 Segment Option Variation (Map 6-46; MnDOT 2015, reference (188)). Based on review of the aggregate resource data in conjunction with 2013 aerial photographs (described in Section 5.3.2.3), there are two aggregate resources within the ROI of **both** the Proposed Orange

Route and the J2 Segment Option Variation. Both the Proposed Orange Route and the J2 Segment Option Variation could interfere with current or future aggregate mining activities. The full extent of impacts on aggregate resources in the J2 Segment Option Variation Area, and whether micro siting of the anticipated alignment within an approved route width can avoid these impacts, cannot be determined without field surveys.

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

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

Figure 6-87 Acres of State Mineral Leases within the Anticipated ROW in the J2 Segment Option Variation Area



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

6.3.6.3 Archaeology and Historic Architectural Resources

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

Table 6-126 provides a summary of the previously recorded archaeological sites and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Orange Route and J2 Segment Option Variation in the J2 Segment Option Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within 1,500 feet of the anticipated alignment (direct APE for cultural resources) or within the ROW (indirect APE for historic architectural resources or Native American resources) for the Proposed Orange Route and J2 Segment Option Variation in the J2 Segment Option Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the J2 Segment Option Variation Area, there are no archaeological or historic architectural sites within the ROW of the Proposed Orange Route or J2 Segment Option Variation (Map 6-47). The J2 Segment Option Variation has a higher number of historic architectural sites than does the Proposed Orange Route. Within the J2 Segment Option

Variation, six of the seven historic architectural sites have been recommended as not NRHP eligible (IC-UOG-074, IC-UOG-075, IC-EFC-006, IC-EFC-007, IC-EFC-016, and IC-EFC-017); the one remaining site, KC-UOG-031, has not been evaluated for NRHP eligibility. The KC-UOG-031 site is also located within the indirect APE of the Proposed Orange Route, as is the KC-UOG-035 site, neither of which have been evaluated for NRHP eligibility.

There is currently no known potential for direct, long-term, adverse effects on the archaeological and historic architectural resources sites identified within the J2 Segment Option Variation Area, although cultural resource investigations have not yet occurred for the Proposed Route or Variation. **Indirect, long-term, adverse impacts on the two previously recorded historic architectural resources within the indirect APE for the proposed Orange Route and one of the seven previously recorded architectural resources within the indirect APE for the J2 Segment Option Variation** are likely to occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since both the Proposed Orange Route and J2 Segment Option Variation contain historic architectural sites that have not been evaluated for NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse effect under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

The Proposed Route and Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or

Table 6-126 Archaeological and Historic Resources within the J2 Segment Option Variation Area

Resource	Evaluation Parameter ⁽¹⁾	J2 Segment Option Variation Area	
		Proposed Orange Route	J2 Segment Option Variation
Historic Architectural Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	2
	Count within 0–5,280 ft	2	7
Archaeological Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	0

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

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

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

inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for cultural resources. These cultural resources investigations will be implemented as part of DOE’s Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential adverse effects to cultural resources during construction and operation of the proposed Project.

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

6.3.6.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the J2 Segment Option Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to ROI for water resources in the J2 Segment Option Variation Area are summarized in Table 6-127 and shown on Map 6-48. Additional, water resources data beyond

those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmissions structures in floodplains and wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Orange Route and the J2 Segment Option Variation. Neither the Proposed Orange Route nor the J2 Segment Option Variation would cross any trout streams or impaired waters.

The Proposed Orange Route and the J2 Segment Option Variation would each cross PWI watercourses, including unnamed tributaries to Deer Creek and unnamed perennial streams. As shown in Table 6-127, the Proposed Orange Route would cross more PWI watercourses than the J2 Segment Option Variation. Neither the Proposed Orange Route nor the J2 Segment Option Variation would cross PWI waterbodies or wetlands.

The Proposed Orange Route and the J2 Segment Option Variation would both require crossing non-PWI waters. The J2 Segment Option Variation would require more non-PWI water crossings than the Proposed Orange Route and would cross both waterbodies and watercourses (Figure 6-88).

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

The J2 Segment Option Variation would not traverse a floodplain; however the Proposed Orange Route would cross Zone A floodplains of three different unnamed tributaries to Deer Creek. Though the

Table 6-127 Water Resources within the Anticipated ROW in the J2 Segment Option Variation Area

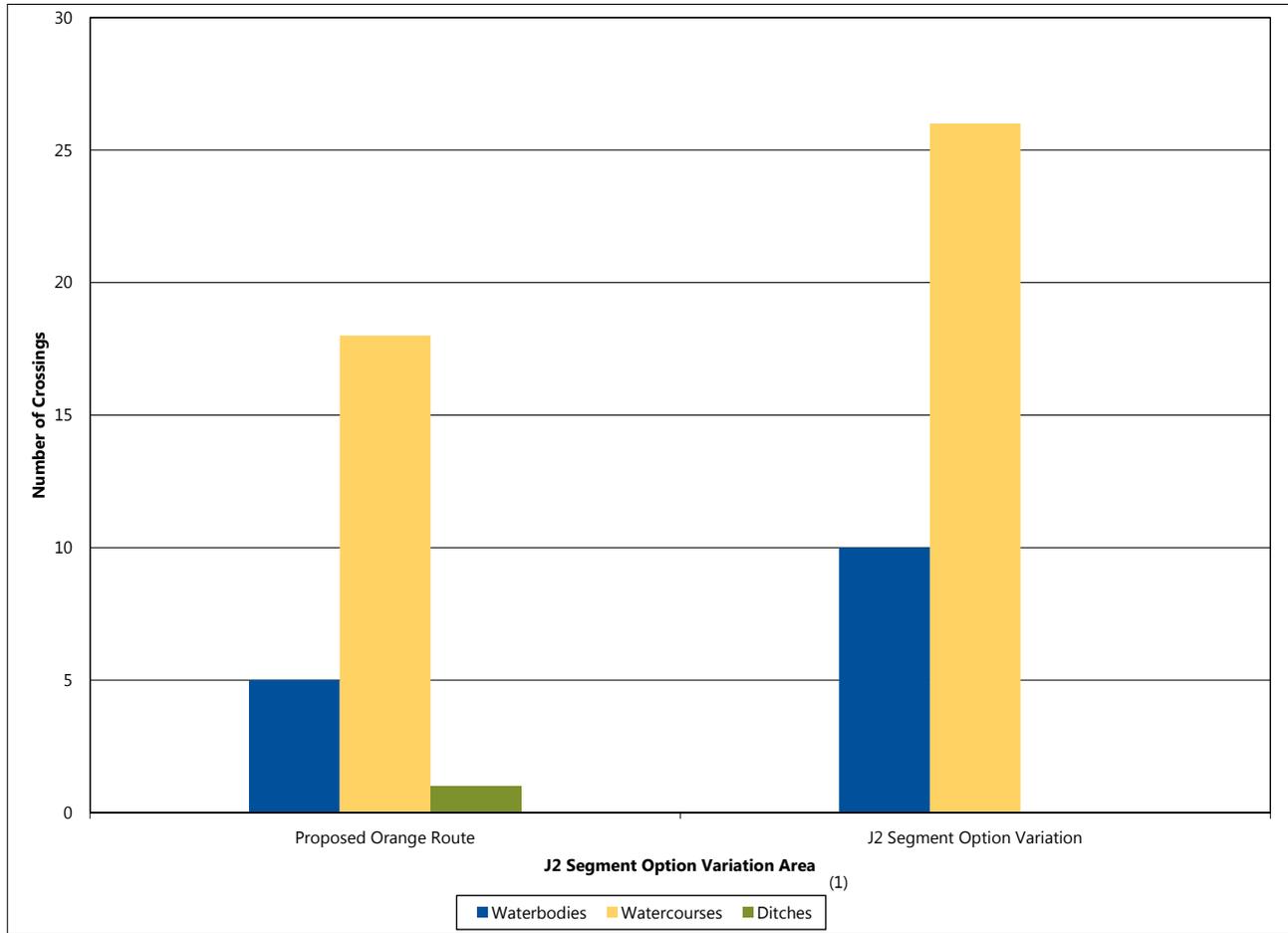
Resource	Evaluation Parameter	J2 Segment Option Variation Area	
		Proposed Orange Route	J2 Segment Option Variation
Transmission Line	Length (mi)	42.2	45.2
PWI Waters ⁽¹⁾	Number of Crossings	6	3
Non-PWI Waters ⁽²⁾	Number of Crossings	24	36
Floodplains ⁽³⁾	Acres within ROW	3	0
NWI Wetlands	Acres within ROW	509	353

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

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

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

Figure 6-88 Non-PWI Water Crossings by Type in the J2 Segment Option Variation Area



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

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

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

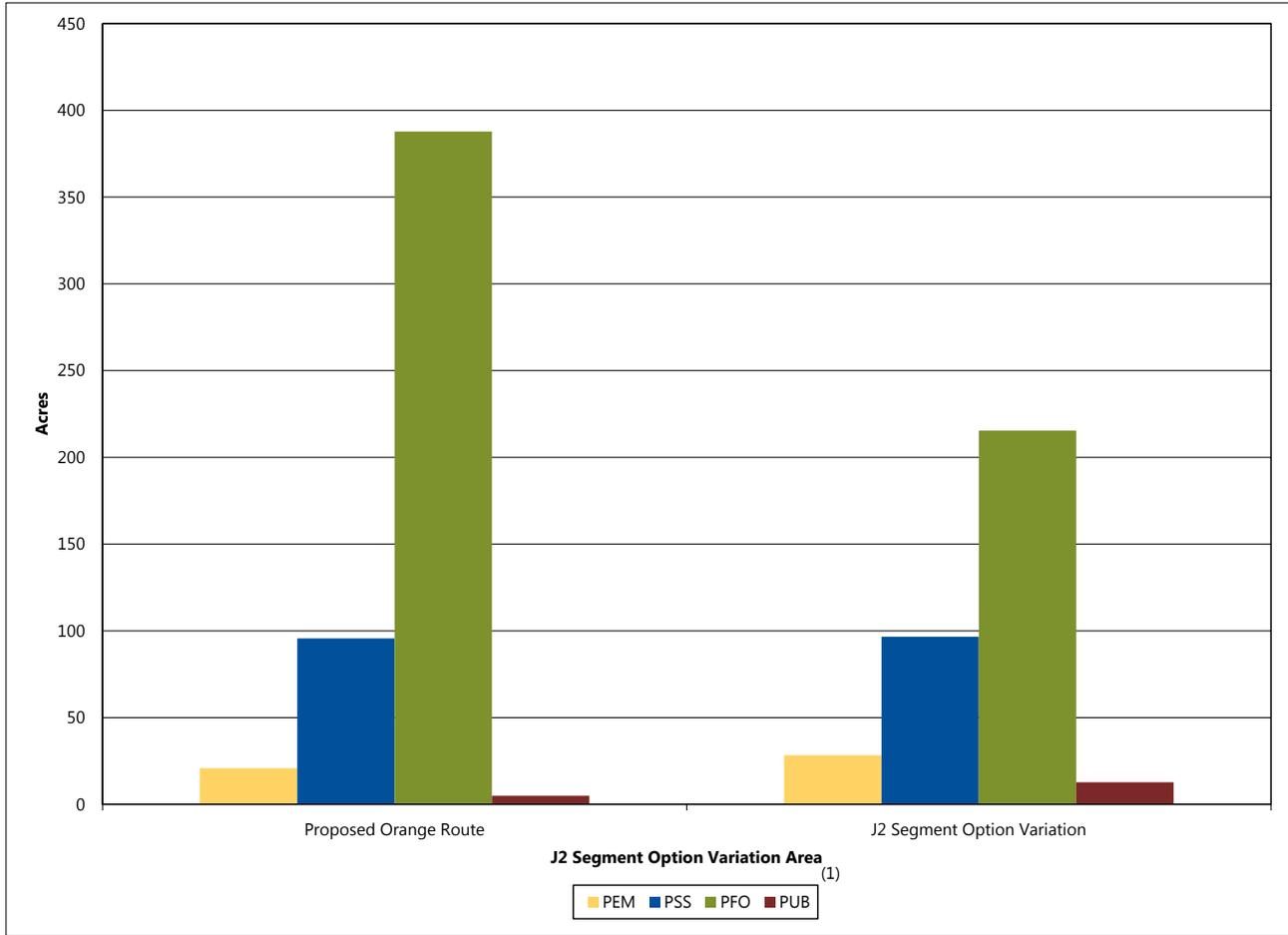
Proposed Orange Route would cross floodplains, the crossings would be less than the average spanning length of 1,250 feet. Therefore, it would be expected that the floodplain crossings would be spanned and transmission structures would not be placed within floodplains.

Based on the NWI, the Proposed Orange Route and the J2 Segment Option Variation would both require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-89, the Proposed Orange Route contains more combined forested and shrub wetland compared to the J2 Segment Option Variation and would result in the greatest amount of wetland type conversion. Impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to have be minimal because of the amount of surrounding

shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed Orange Route and the J2 Segment Option Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill are expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed Orange Route and the J2 Segment Option Variation would both require temporary construction access through wetlands, which is also are expected to be minimal due to the short-term, localized nature of the impact, and the

Figure 6-89 Acres of Wetland by Type within the Anticipated ROW in the J2 Segment Option Variation Area



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).

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

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

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the J2 Segment Option Variation Area are summarized in Table 6-128 and shown on Maps 5-12 and 6-48. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

In general, loss or fragmentation of forest would be similar with either the Proposed Orange Route or J2 Segment Option Variation. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-128, the Proposed Orange Route and J2 Segment Option Variation would pass through a similar amount of forested land, with the Proposed Orange Route passing through more state forest land, therefore resulting in more permanent removal of forested vegetation in state forests. Both the Proposed Orange Route and J2 Segment Option Variation would require new corridor for their entire lengths. Because of this both the Proposed Orange Route and J2 Segment Option Variation would result in similar fragmentation of intact forest in

Table 6-128 Vegetation Resources within the Anticipated ROW in the J2 Segment Option Variation Area

Resource	Evaluation Parameter	J2 Segment Option Variation Area	
		Proposed Orange Route	J2 Segment Option Variation
Transmission Line	Length (mi)	42.2	45.2
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0
State Forest	Acres within ROW	851	715
Total Forested GAP Land Cover	Acres within ROW	1,007	1,063
GAP Land Cover - Dominant Types ⁽³⁾			
North American Boreal Flooded and Swamp Forest	Acres within ROW	319	124
North American Boreal Forest	Acres within ROW	477	650
Eastern North American Flooded and Swamp Forest	Acres within ROW	176	191
Eastern North American Cool Temperate Forest	Acres within ROW	36	99

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

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

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

areas where forest vegetation is present, with the Proposed Orange Route fragmenting more state forest land. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

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

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the J2 Segment Option Variation Area are summarized in Table 6-129 and shown on Map 6-48. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Orange Route and J2 Segment Option Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed Orange

Route and J2 Segment Option Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.6.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Orange Route and J2 Segment Option Variation.

The Proposed Orange Route would pass through the Big Bog Important Bird Area, while the J2 Segment Option Variation would traverse a smaller portion of the Chippewa Plains Important Bird Area (Table 6-129; Map 6-48). Both the Proposed Orange Route and the J2 Segment Option Variation would require creation of corridor for their entire lengths (Table 6-129). Creation of a new corridor in the Big Bog Important Bird Area would likely result in both short-term and long-term direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds’ habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be

Table 6-129 Wildlife Resources within the Vicinity of the J2 Segment Option Variation Area

Resource	Evaluation Parameter	J2 Segment Option Variation Area	
		Proposed Orange Route	J2 Segment Option Variation
Transmission Line	Length (mi)	42.2	45.2
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0
Important Bird Areas	Acres within ROW	262	72

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

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

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

minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13).

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

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

6.3.6.5 Rare and Unique Natural Resources

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

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations.

Data related to rare species in the J2 Segment Option Variation Area are summarized in Table 6-130; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the

license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species differs between the Proposed Orange Route and J2 Segment Option Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation, including critical habitat designated for gray wolf.

As indicated in Table 6-130, the Proposed Orange Route has more documented rare species within one mile of its ROW, including the state-threatened sterile sedge and hair-like beakrush. With the exception of the creek heelsplitter mussel, the rare species documented within one mile of the Proposed Orange Route are associated with the calcareous fen located north of the Proposed Orange Route (discussed below). The full extent of potential impacts from either of the Proposed Orange Route or J2 Segment Option Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Two colonial waterbird nesting sites have been documented within one mile of the J2 Segment Option Variation; both are located within 1,500 feet of the anticipated alignments, two of which are also in the ROW. There are no documented colonial waterbird nesting sites within one mile of the Proposed Orange Route. The J2 Segment Option Variation would likely result in more impacts to

Table 6-130 Rare Species Documented within One Mile of the Anticipated ROW in the J2 Segment Option Variation Area

Scientific Name ⁽¹⁾	Common Name	Federal Status	State Status	Type	J2 Segment Option Variation Area	
					Proposed Orange Route	J2 Segment Option Variation
<i>Carex sterilis</i>	Sterile Sedge	None	Threatened	Vascular Plant	X	
<i>Rhynchospora capillacea</i>	Hair-like Beak-rush	None	Threatened	Vascular Plant	X	
<i>Cladium mariscoides</i>	Twig-rush	None	Special Concern	Vascular Plant	X	
<i>Lasmigona compressa</i>	Creek Heelsplitter	None	Special Concern	Mussel	X	
<i>Torreyochloa pallida</i>	Torrey's Manna-grass	None	Special Concern	Vascular Plant		X
Colonial Waterbird Nesting Area	Colonial Waterbird Nesting Site	--	--	Animal Assemblage		X

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

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

colonial waterbirds, due to the proximity of its ROW to these sites.

Both the Proposed Orange Route and the J2 Segment Option Variation would cross critical habitat designated for gray wolf, with the Proposed Orange Route crossing this habitat for approximately 42 miles and the J2 Segment Option Variation crossing it for approximately 13 miles. Neither the Proposed Orange Route nor the J2 Segment Option Variation would parallel and existing transmission line corridor. The J2 Segment Option Variation would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross less of this resource than the Proposed Orange Route.

Any indirect impacts to rare species from the proposed Project are not expected to be significant because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

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

impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the J2 Segment Option Variation Area are summarized in Table 6-131 and shown on Map 6-49; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Orange Route and J2 Segment Option Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated in Table 6-131 and on Map 6-49, despite its shorter length, the Proposed Orange Route would pass through more acres of MBS Sites of Biodiversity Significance relative to the J2 Segment Option Variation. Because of this, the Proposed Orange Route would likely result in more impacts on MBS Sites of Biodiversity Significance and the rare communities and species associated with them.

Table 6-131 Rare Communities and Resources within the Vicinity of the J2 Segment Option Variation Area

Resource	Evaluation Parameter	J2 Segment Option Variation Area	
		Proposed Orange Route	J2 Segment Option Variation
Transmission Line	Length (mi)	42.2	45.2
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0
MBS Sites of Biodiversity Significance ⁽³⁾	Acres within ROW	489	185

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

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

One of the calcareous fens documented in Central Section is located just over one mile from the Proposed Orange Route (Map 6-49). This fen is associated with one of the Lost River Peatland SNA units, which is located just under a mile from the Proposed Orange Route (Map 6-49). The Proposed Orange Route would not cross the SNA WPA (described in Section 5.3.5 that is associated with this fen, nor is the WPA present within the ROW (Map 6-49). As mentioned above, several rare species documented within one mile of the Proposed Orange Route are associated with this fen.

The rare communities and resources listed in Table 6-131 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

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

6.3.6.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-50 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the J2 Segment Option Variation Area.

Table 6-132 identifies the percentage of total transmission line length that the Proposed Orange Route and J2 Segment Option Variation parallel an existing corridor or linear feature in the J2 Segment Option Variation Area.

The Proposed Orange Route would parallel existing corridors for approximately one tenth of the length (Table 6-132). The J2 Option Segment Variation would parallel existing corridors for slightly more of its length. Neither the proposed route nor variation would follow any existing transmission line or road/trail corridors.

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

Table 6-132 Corridor Sharing in the J2 Segment Option Variation Area

Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	J2 Segment Option Variation Area	
		Proposed Orange Route	J2 Segment Option Variation
Field Line (PLSS may be present within the field line corridor)	Percent of Total Length ⁽²⁾	2	2
PLSS Only	Percent of Total Length ⁽²⁾	11	13
None	Percent of Total Length ⁽²⁾	87	85

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

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

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

Table 6-133 Construction Costs in the J2 Segment Option Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
J2 Segment Option	Proposed Orange Route	\$48,706,641	\$1,154,186	42.2
	J2 Segment Option Variation	\$52,128,879	\$1,153,294	45.2

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

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

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-133 summarizes the costs associated with constructing the Proposed Orange Route and J2 Segment Option Variation in the J2 Segment Option Variation Area. As indicated in Table 6-133, the J2 Segment Option Variation would cost more to construct than the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$67,000 to \$72,000 annually for these alternatives in the J2 Segment Option Variation Area.

6.3.7 Northhome Variation Area

The Northhome Variation Area encompasses two route alternatives: that portion of the J2 Segment Option Variation that lies within the Northhome

Variation Area and the Northhome Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Northhome Variation Area, depending on the route or variation considered.

6.3.7.1 Human Settlement

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

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Northhome Variation Area are summarized in Table 6-134 and shown on Maps 6-46, 6-47, 6-48, and 6-50.

As indicated in Table 6-134 for the Northome Variation Area, the J2 Segment Option Variation and Northome Variation would cross or be located within 1,500 feet of one state forest. In addition, the Northome Variation would cross or be located within 1,500 feet of one national forest (Chippewa National Forest). Both the state and national forests are aesthetic resources with high visual sensitivity. Neither alternative would affect other aesthetic resources or residences with high visual sensitivity within 1,500 feet of the anticipated alignment.

The Northome Variation is slightly longer (4.0 miles) than the J2 Segment Option Variation (3.7 miles; Table 6-134) and neither variation parallels an existing large transmission line. Therefore contrast for the transmission lines for both variations would be similar, but potentially slightly more for the slightly longer Northome Variation.

The Northome Variation crosses one state forest and is located within 1,500 feet of a national forest (Chippewa National Forest). The J2 Segment Option Variation also crosses one state forest but is not within 1,500 feet of a national forest. For this reason, the Northome Variation may have a slightly greater effect on an additional aesthetic resource than the J2 Segment Option Variation.

Because the Northome Variation may produce slightly greater contrast and may affect an additional aesthetic resource (i.e., a national forest) with high visual sensitivity, the J2 Segment Option Variation is likely to result in slightly less aesthetic impact than the Northome Variation in the Northome Variation Area.

Although the J2 Segment Option Variation and Northome Variation do not parallel existing large

transmission lines of similar size and design, they are both short in length at 3.7 and 4.0 miles, respectively and affect no residences or historic architectural sites and very few other sensitive visual resources (one state forest and one national forest).

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

Land Use Compatibility

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

Land Uses

Table 6-135 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the J2 Segment Option Variation and Northome Variation in the Northome Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the J2 Segment Option Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the J2 Segment Option Variation and Northome Variation are shown on Map 6-46.

The J2 Segment Option Variation and Northome Variation ROI are both primarily composed of forested and/or swamp land. The Northome Variation ROW contains a slightly greater amount of forested/swamp land than the J2 Segment Option Variation (Table 6-135). A slightly greater amount of

Table 6-134 Aesthetic Resources within the ROI in the Northome Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Northome Variation Area	
		J2 Segment Option Variation	Northome Variation
Transmission Line	Length (mi)	3.7	4.0
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	0	0
State Forests	Count within 0–1,500 ft	1	1
USDA-USFS National Forest	Count within 0–1,500 ft	0	1

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008 reference (189)

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

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

developed and disturbed land and agricultural land is present in the J2 Segment Option Variation ROI compared to the Northhome Variation.

Land Ownership and Management

As shown in Table 6-136, the Northhome Variation ROW contains a greater amount of state fee land compared to the J2 Segment Option Variation. Less than a half-acre of land in both the J2 Segment Option Variation and Northhome Variation is state forest land. No impacts to county lands, state conservation easements would occur under the J2 Segment Option Variation or Northhome Variation Area. The J2 Segment Option Variation would

impact 28 acres of USFWS Interest Lands, while the Northhome Variation would affect none. The Chippewa National Forest would be located within the ROI of the Northhome Variation; however, no impacts to the national forest would be expected (Map 6-46).

Neither the J2 Segment Option Variation nor the Northhome Variation would parallel an existing ROW (see Section 6.3.7.6) (Figure 6-90).

Impacts to land use from the proposed Project in the Northhome Variation Area would be similar to those described in Section 6.2.1.1. The J2 Segment Option Variation and Northhome Variation would

Table 6-135 Land Uses within the ROI in the Northhome Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	Northhome Variation Area	
			J2 Segment Option Variation	Northhome Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	1,523	1,632
	Developed or Disturbed	Acres within 0–1,500 ft	24	16
	Agricultural	Acres within 0–1,500 ft	64	0
	Forested and/or Swamp	Acres within 0–1,500 ft	1,418	1,555
	Other	Acres within 0–1,500 ft	17	61

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

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

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

Table 6-136 Land Ownership/Management within the Anticipated ROW in the Northhome Variation Area

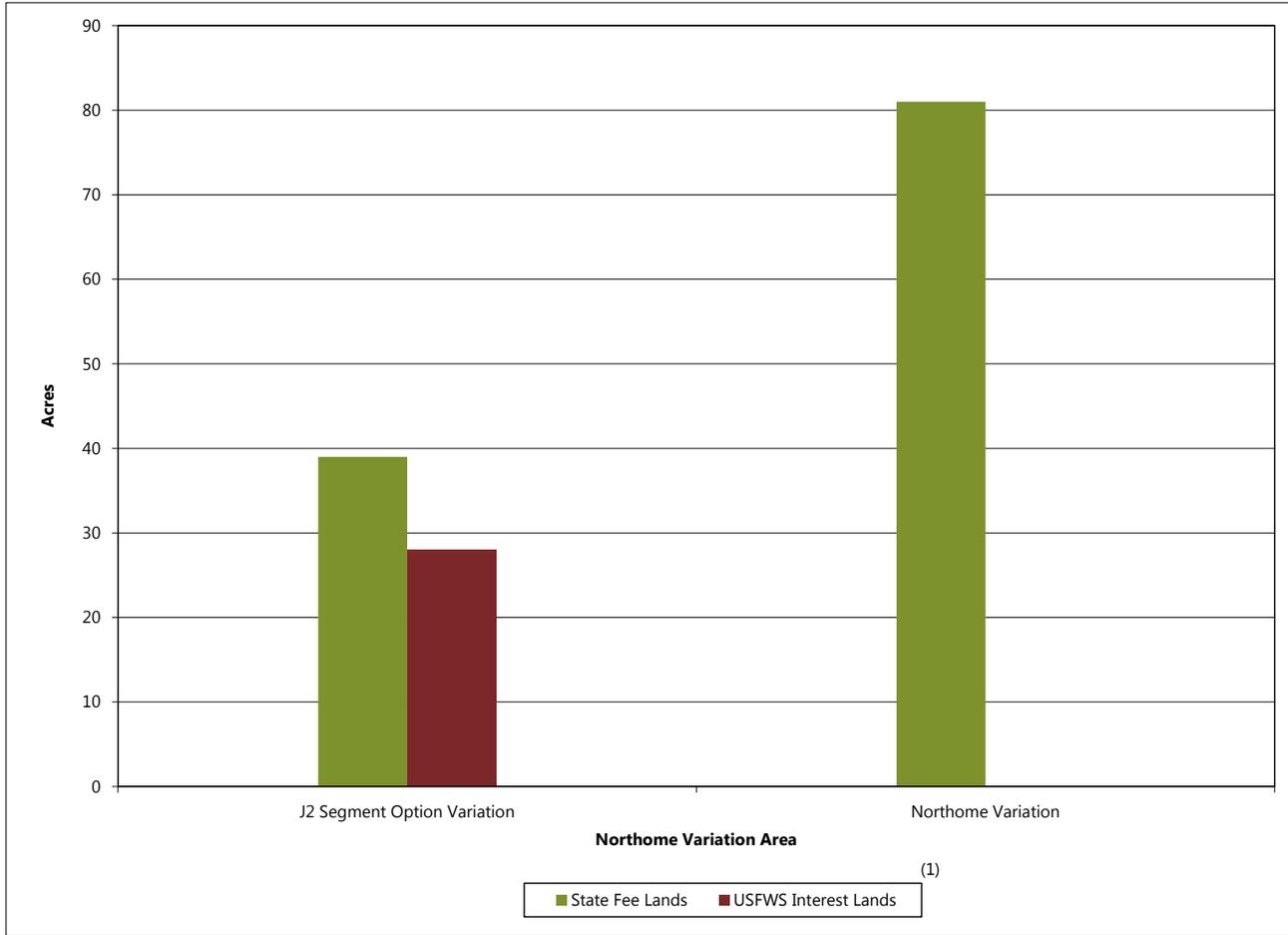
Resource	Type	Evaluation Parameter	Northhome Variation Area	
			J2 Segment Option Variation	Northhome Variation
Total Lands	--	Acres within ROW	91	99
State Forests	--	Acres within ROW	<0.5	<0.5
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	39	81
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	0	0
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	15	55
	Trust Fund	Acres within ROW	24	26
	Federal - State Lease	Acres within ROW	0	0
USFWS Interest Lands	--	Acres within ROW	28	0
Private Lands⁽²⁾	--	Acres within ROW	25	18

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

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

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

Figure 6-90 Public Land Ownership/Management within the ROI in the Northome Variation Area



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

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

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

both result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the route that would parallel an existing corridor is also important. The J2 Segment Option Variation avoids a greater amount of state forest and state fee lands than the Variation thereby avoiding long-term changes to land use but neither the J2 Segment Option Variation nor the Northome Variation parallel an existing corridor.

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

6.3.7.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Northome Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Northome Variation Area are summarized in Table 6-137.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-137 and Figure 6-91 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the J2 Segment Option Variation and Northome Variation in the ROI.

Table 6-137 Land-Based Economy Resources within the Anticipated ROW in the Northhome Variation Area

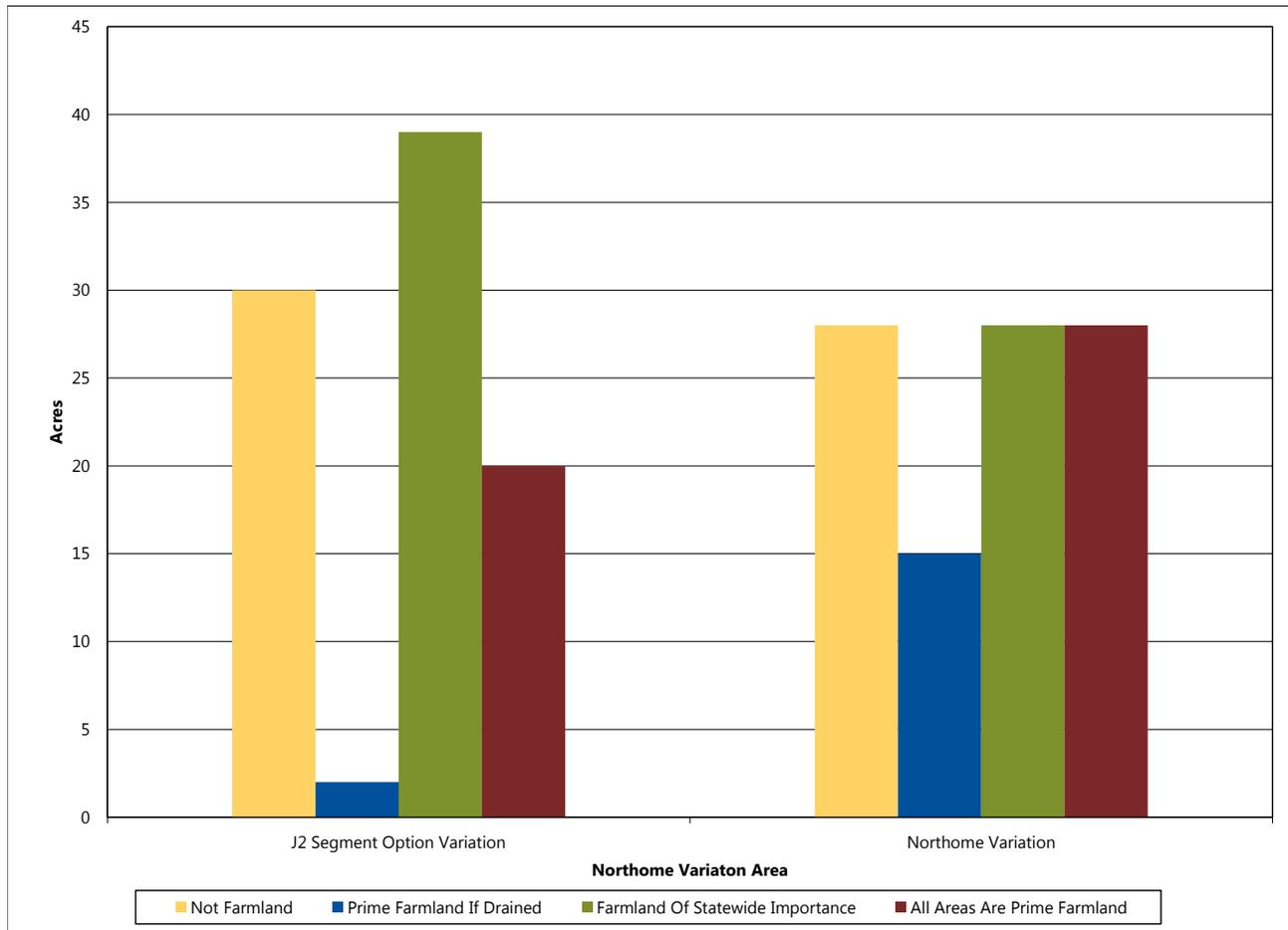
Resource	Type	Evaluation Parameter	Northhome Variation Area	
			J2 Segment Option Variation	Northhome Variation
Transmission Line	--	Length (mi)	3.7	4.0
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	0	0
Farmland	Not Farmland	Acres within ROW	30	28
	Prime Farmland if Drained	Acres within ROW	2	15
	Farmland of Statewide Importance	Acres within ROW	39	28
	All Areas are Prime Farmland	Acres within ROW	20	28
State Forest	--	Acres within ROW	<0.5	<0.5

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR 2003, reference (148)

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

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

Figure 6-91 Acres of Farmland by Type within the Anticipated ROW in the Northhome Variation Area



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

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

The Northome Variation, which has the longer length, would pass through more farmland, including more prime farmland and “prime farmland if drained” (Figure 6-91). However, the Northome Variation would impact fewer acres of farmland of statewide importance. The J2 Segment Option Variation, which has a shorter length, would be expected to have fewer impacts on farmland.

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

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

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-137 identifies the acreage of state forest land that would be impacted in the ROI by the J2 Segment Option Variation and the Northome Variation.

The J2 Segment Option Variation and the Northome Variation would impact less than 0.5 acres each of state forest lands. There are no USDA-USFS national forest lands within the ROI of the J2 Segment Option Variation or the Northome Variation in the Northome Variation Area.

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

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

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. There are no active or expired/terminated state mineral leases, records of current mineral mining, or known aggregate resources that would be impacted by the J2 Segment Option Variation or the Northome Variation.

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

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

6.3.7.3 Archaeology and Historic Architectural Resources

As described in Section 6.2.1.3, the APE for potential direct effects to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential indirect effects to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites. Table 6-138 provides a summary of the previously recorded archaeological **sites** and historic **architectural resources** within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the J2 Segment Option Variation and the Northome Variation in the Northome Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within 1,500 feet of

the anticipated alignment (direct APE for cultural resources) or within the ROW (indirect APE for historic architectural resources or Native American resources) for the J2 Segment Option Variation and the Northome Variation in the Northome Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Northome Variation Area, no archaeological sites or historic architectural resources were documented within the ROW of the J2 Segment Option Variation or Northome Variation (Table 6-138; Map 6-47). There are no historic architectural resources documented within the indirect APE of the J2 Segment Option Variation or the Northome Variation in the Northome Variation Area.

There is currently no known potential for direct, long-term, adverse, impacts to archaeological or historic architectural sites as none are documented within the direct APE in the Northome Variation Area, although cultural resource investigations have not yet occurred for the variations. There are no historic architectural sites identified within the indirect APE of the Northome Variation Area, therefore, indirect, long-term, adverse visual effects on architectural resources are not likely to occur.

The J2 Segment Option Variation and Northome Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resources investigations will be implemented as part of DOE’s Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the

proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential adverse effects to cultural resources during construction and operation of the proposed Project.

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

6.3.7.4 Natural Environment

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

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Northome Variation Area are summarized in Table 6-139 and shown on Map 6-48. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmission structures in wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed J2 Segment Option Route and the Northome Variation. Neither the Proposed J2 Segment Option Route nor the Northome Variation ROWs contain trout streams, impaired waters, or floodplains.

Table 6-138 Archaeological and Historic Resources within the Northome Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Northome Variation Area	
		J2 Segment Option Variation	Northome Variation
Historic Architectural Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	0
	Count within 0–5,280 ft	0	0
Archaeological Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	1

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

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

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

The Proposed J2 Segment Option Variation would not cross any PWI waters. The Northome Variation would cross Little Constance Lake, which is a PWI waterbody. The Proposed J2 Segment Option Variation and Northome Variation would also cross several non-PWI waters. The Proposed J2 Segment Option Route would cross six waterbodies, while the Northome Variation would cross one watercourse. Neither the Proposed J2 Segment Option Route nor the Northome Variation would cross ditches. It is anticipated that both the PWI and non-PWI water crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Based on the NWI, the Proposed J2 Segment Option Variation and the Northome Variation would both require conversion of forested shrub and wetland areas to a herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-92, the Proposed J2 Segment Option Route contains more forested and shrub wetlands compared to the Northome Variation and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. Both the Proposed J2 Segment Option Variation and the Northome Variation would require placement of permanent fill in wetlands for the construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the Central Section generally exceed the average spanning length allowable for structures,

but impacts to wetlands from permanent fill would be expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to large wetland complexes in the area, it would be expected that the Proposed J2 Segment Option Variation and the Northome Variation would both require temporary construction access through wetlands, which is also are expected to be minimal due to the short-term, localized nature of the impact, and the Applicant’s intended use of minimization measures, such as matting.

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

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Northome Variation Area are summarized in Table 6-140 and shown on Maps 5-12 and 6-48. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

In general, loss or fragmentation of forest would be similar with either the Proposed J2 Segment Option Variation or Northome Variation. As discussed in Section 5.3.4.2 the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

Table 6-139 Water Resources within the Anticipated ROW in the Northome Variation Area

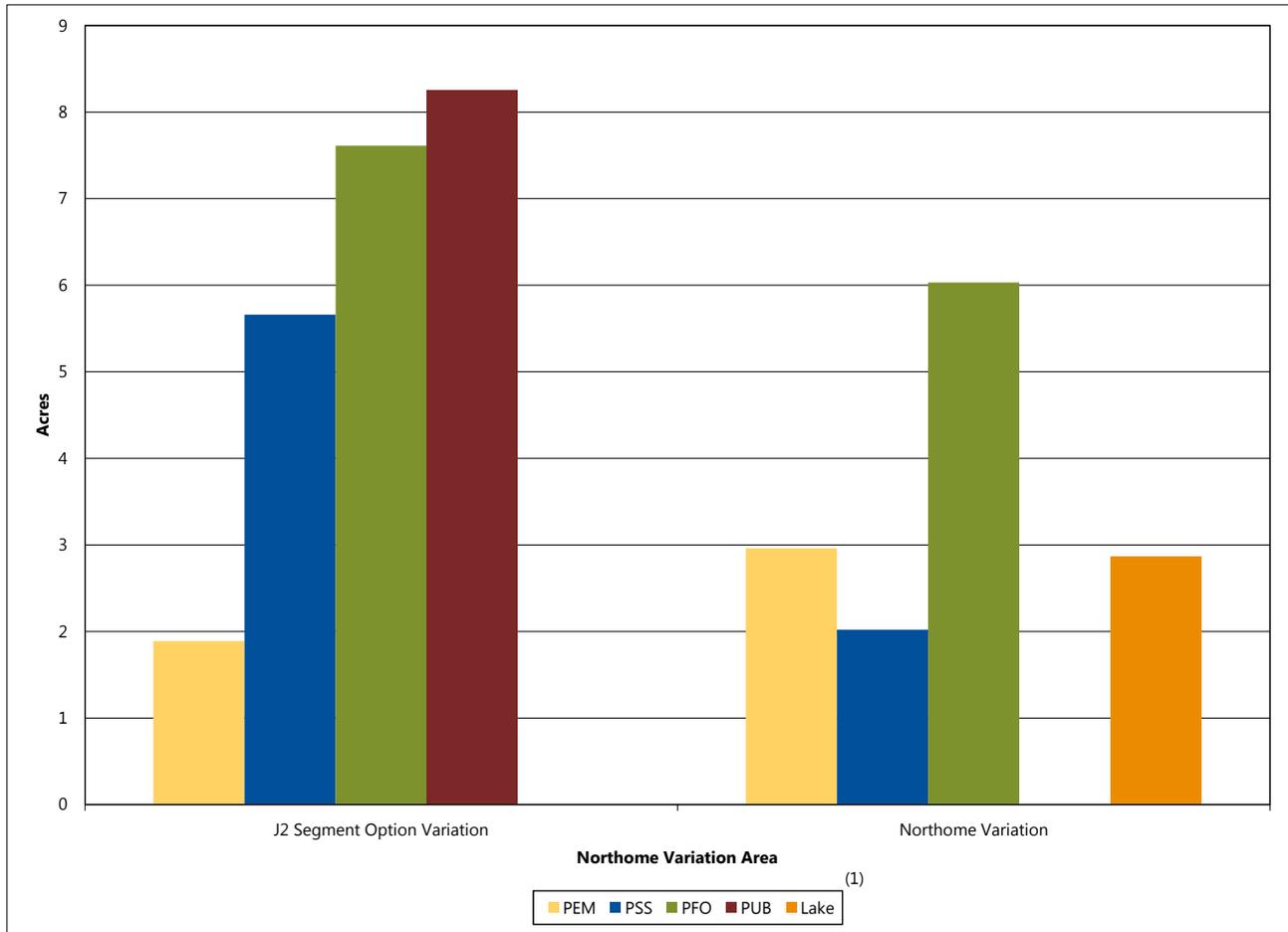
Resource	Evaluation Parameter	Northome Variation Area	
		J2 Segment Option Variation	Northome Variation
Transmission Line	Length (mi)	3.7	4.0
PWI Waters ⁽¹⁾	Number of Crossings	0	1
Non-PWI Waters ⁽²⁾	Number of Crossings	6	1
NWI Wetlands	Acres within ROW	23	14

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

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

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

Figure 6-92 Acres of Wetland by Type within the Anticipated ROW in the Northhome Variation Area



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

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

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

As indicated in Table 6-140, the Proposed J2 Segment Option Route and Northhome Variation would pass through a similar amount of forested land. While neither the Proposed J2 Segment Option Route nor the Northhome Variation would pass through state forest land, the Northhome Variation borders the Chippewa National Forest, with approximately 171 acres of the National Forest occurring within 1,500 feet of the anticipated alignment for the Northhome Variation. Both the Proposed J2 Segment Option Route and Northhome Variation would require new corridor for their entire lengths. Because of this both the Proposed J2 Segment Option Route and Northhome Variation would result in similar fragmentation of intact forest in areas where forest vegetation is present, with the Northhome Variation fragmenting more forest near the Chippewa National Forest. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

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

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Northhome Variation Area are summarized in Table 6-141 and shown on Map 6-48. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed J2 Segment Option Variation and Northhome Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the Proposed J2 Segment

Option Variation and Northome Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor and/or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.7.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed J2 Segment Option Variation and Northome Variation.

The Northome Variation would require crossing a MnDNR-designated unnamed shallow lake along a new transmission line corridor, while the Proposed J2 Segment Option Variation would avoid this resource. Crossing a shallow lake could result in impacts on wildlife that utilize this lake (Table 6-141; Map 6-48).

Both the Proposed J2 Segment Option Variation and the Northome Variation would require creation of

new transmission line corridor, with the Northome Variation requiring approximately 0.3 more miles of new corridor than the Northome Variation. The longer length of the Northome Variation would result in more habitat fragmentation and potentially more impacts on wildlife currently inhabiting the area. The Northome Variation also runs adjacent to the Chippewa National Forest and could impact more wildlife species associated with the national forest (Map 6-48).

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

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

Table 6-140 Vegetation Resources within the Anticipated ROW in the Northome Variation Area

Resource	Evaluation Parameter	Northome Variation Area	
		J2 Segment Option Variation	Northome Variation
Transmission Line	Length (mi)	3.7	4.0
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0
Total Forested GAP Land Cover	Acres within ROW	89	96
GAP Land Cover - Dominant Types ⁽³⁾			
North American Boreal Forest	Acres within ROW	71	81
Eastern North American Cool Temperate Forest	Acres within ROW	10	10

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

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

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

Table 6-141 Wildlife Resources within the Vicinity of the Northome Variation Area

Resource	Evaluation Parameter	Northome Variation Area	
		J2 Segment Option Variation	Northome Variation
Transmission Line	Length (mi)	3.7	4.0
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0
Shallow Lakes	Count within ROW	0	1

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

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

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

6.3.7.5 Rare and Unique Natural Resources

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

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation.

No state or federally listed species have been documented within one mile of the Proposed J2 Segment Option Variation or Northome Variation. However, the full extent of impacts from either the Proposed J2 Segment Option Variation or Northome Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

One colonial waterbird nesting site has been documented within one mile of the Proposed J2 Segment Option Variation and two colonial waterbird nesting sites have been documented within one mile of the Northome Variation (Appendix F). None of these sites are located within the ROW or within 1,500 feet of the anticipated alignment.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

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

Rare Communities

As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

While both the Proposed J2 Segment Option Variation and Northome Variation pass through native vegetation, at present, there are no documented rare communities within either ROW (the ROI for rare communities).

The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

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

6.3.7.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-50 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear feature in the Northome Variation Area.

The J2 Segment Option Variation and the Northome Variation would not parallel any existing corridors or linear features in the Northome Variation Area.

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

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

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-142 summarizes the costs associated with constructing the J2 Segment Option Variation and the Northome Variation in the Northome Variation Area. As indicated in Table 6-142, the Northome Variation would cost more to construct than the J2 Segment Option Variation.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$6,000 to \$6,500 annually for these alternatives in the Northome Variation Area.

6.3.8 Cutfoot Variation Area

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

6.3.8.1 Human Settlement

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

Aesthetics

As described in the Aesthetics discussion for the Pine Island Variation (see Section 6.3.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic

resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Cutfoot Variation Area are summarized in Table 6-143 and shown on Maps 6-46, 6-47, 6-48, and 6-50.

As indicated in Table 6-143 for the Cutfoot Variation Area, the Proposed Orange Route and the Cutfoot Variation would each cross or be located within 1,500 feet of three state forests. These state forests are aesthetic resources with high visual sensitivity. Neither the proposed route nor variation would affect other aesthetic resources such as historic architectural sites, state trails, etc., or residences with high visual sensitivity within 1,500 feet of the anticipated alignments for the Proposed Orange Route or Cutfoot Variation.

The Cutfoot Variation is slightly longer (4.8 miles) than the Proposed Orange Route (Table 6-143) and neither route parallel an existing large transmission line. Therefore contrast for both transmission lines would be similar, but potentially slightly greater for the slightly longer Cutfoot Variation.

Although the Proposed Orange Route and Cutfoot Variation would affect aesthetic resources with high visual sensitivity similarly (i.e., three state forests), the Cutfoot Variation may have a greater effect on aesthetic resources because it is slightly longer than the Proposed Orange Route. For these reasons, the Proposed Orange Route is likely to result in slightly less aesthetic impact than the Cutfoot Variation.

Although the Proposed Orange Route and the Cutfoot Variation do not parallel existing large transmission lines of similar size and design, they are both short in length and affect no residences and very few other sensitive visual resources (three state forests).

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

Table 6-142 Construction Costs in the Northome Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
Northome	J2 Segment Option Variation	\$4,192,942	\$1,121,108	3.7
	Northome Variation	\$6,385,615	\$1,596,404	4

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

Land Use Compatibility

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

Land Uses

Table 6-144 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Orange Route and Cutfoot Variation in the Cutfoot Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the Cutfoot Variation Area are shown in Map 5-12 and residences, churches, cemeteries, and airports near the Proposed Orange Route and Cutfoot Variation are shown on Map 6-46.

The Proposed Orange Route and Cutfoot Variation ROI are both primarily composed of forested and/or swamp land (Table 6-144). The Cutfoot Variation ROW contains a slightly greater amount of forested/swamp land than the Proposed Orange Route. A similar amount of developed and disturbed land is located in both the Proposed Orange Route and Cutfoot Variation ROI, while no agricultural land is present in either ROI.

Land Ownership and Management

Table 6-145 and Figure 6-93 show the Proposed Orange Route and Cutfoot Variation ROW contain a similar amount of state forest land and state fee land. No impacts to county lands, state conservation easements, or USFWS Interest Lands would occur under the Proposed Route or Cutfoot Variation.

Neither the Proposed Orange Route nor the Cutfoot Variation would parallel an existing ROW (see Section 6.3.8.6).

Impacts to land use from the proposed Project in the Cutfoot Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Orange Route and Cutfoot Variation would both result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the route that would parallel an existing corridor is also important. The Cutfoot Variation avoids slightly more state forest and state fee lands than the Proposed Orange Route, but would impact slightly more state forest land. Neither the Cutfoot Variation nor the Proposed Orange Route would parallel an existing corridor.

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

6.3.8.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Cutfoot Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Cutfoot Variation Area are summarized in Table 6-146.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-146 and Figure 6-94 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide

Table 6-143 Aesthetic Resources within the ROI in the Cutfoot Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Cutfoot Variation Area	
		Proposed Orange Route	Cutfoot Variation
Transmission Line	Length (mi)	4.2	4.8
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	0	0
State Forests	Count within 0-1,500 ft	3	3

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

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

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

Table 6-144 Land Uses within the ROI in the Cutfoot Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	Cutfoot Variation Area	
			Proposed Orange Route	Cutfoot Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	1,697	1,887
	Developed or Disturbed	Acres within 0–1,500 ft	15	13
	Agricultural	Acres within 0–1,500 ft	0	0
	Forested and/or Swamp	Acres within 0–1,500 ft	1,652	1,874
	Other	Acres within 0–1,500 ft	30	0

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

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

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

Table 6-145 Land Ownership/Management within the Anticipated ROW in the Cutfoot Variation Area

Resource	Type	Evaluation Parameter	Cutfoot Variation Area	
			Proposed Orange Route	Cutfoot Variation
Total Lands	--	Acres within ROW	103	116
State Forests	--	Acres within ROW	103	116
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	95	93
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	0	0
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	30	20
	Trust Fund	Acres within ROW	65	73
	Federal - State Lease	Acres within ROW	0	0
Private Lands⁽²⁾	--	Acres within ROW	8	23

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

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

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

importance that would be impacted by the Proposed Orange Route and Cutfoot Variation in the ROI.

The Cutfoot Variation would pass through more acres of farmland, including prime farmland if drained (Figure 6-94). The Proposed Orange Route and Cutfoot Variation would each impact less than 5 acres of farmland of statewide importance and no prime farmland. Because there are fewer acres of farmland in the ROI of the Proposed Orange Route, it would be expected to result in fewer impacts on farmland.

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

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

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

Table 6-146 Land-Based Economy Resources within the Anticipated ROW in the Cutfoot Variation Area

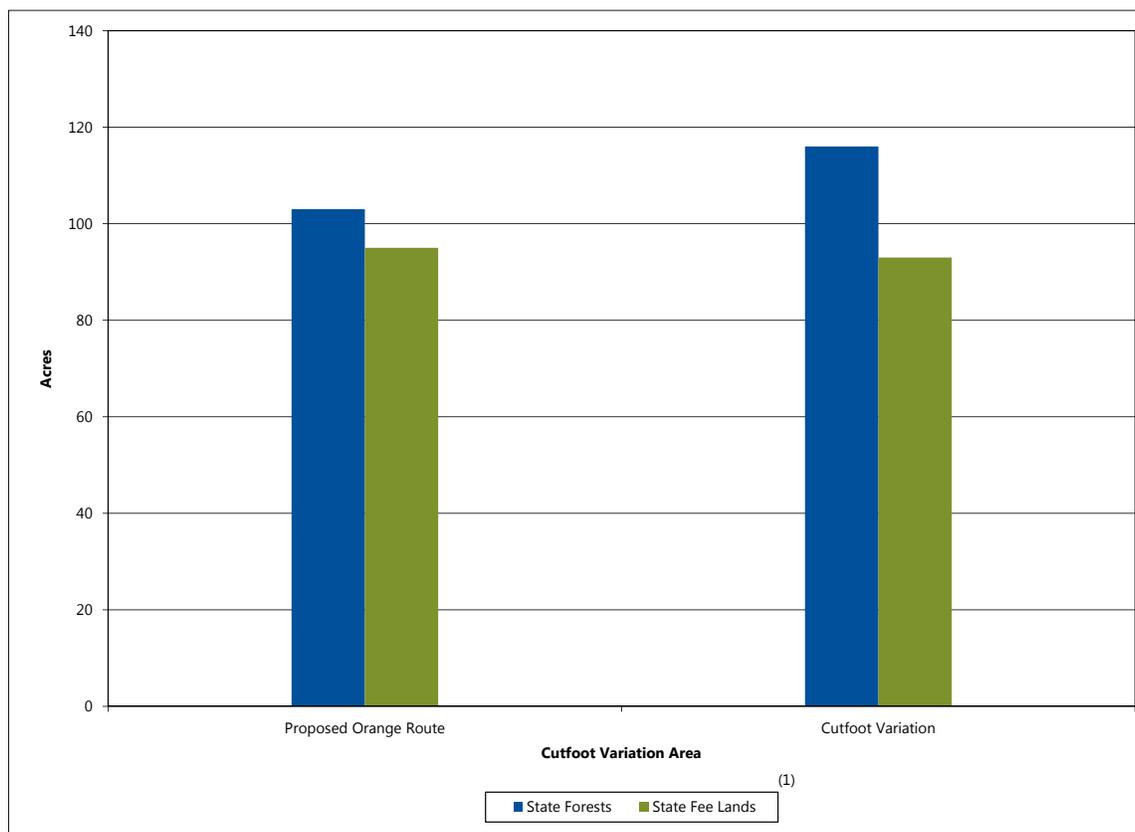
Resource	Type	Evaluation Parameter	Cutfoot Variation Area	
			Proposed Orange Route	Cutfoot Variation
Transmission Line	--	Length (mi)	4.2	4.8
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	0	0
Farmland	Not Farmland	Acres within ROW	48	81
	Prime Farmland if Drained	Acres within ROW	53	32
	Farmland of Statewide Importance	Acres within ROW	2	4
	All Areas are Prime Farmland	Acres within ROW	0	0
State Forest	--	Acres within ROW	103	116
State Mineral Leases (active and/or terminated/expired)	--	Acres within ROW	29	4

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

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

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

Figure 6-93 Public Land Ownership/Management within the ROI in the Cutfoot Variation Area

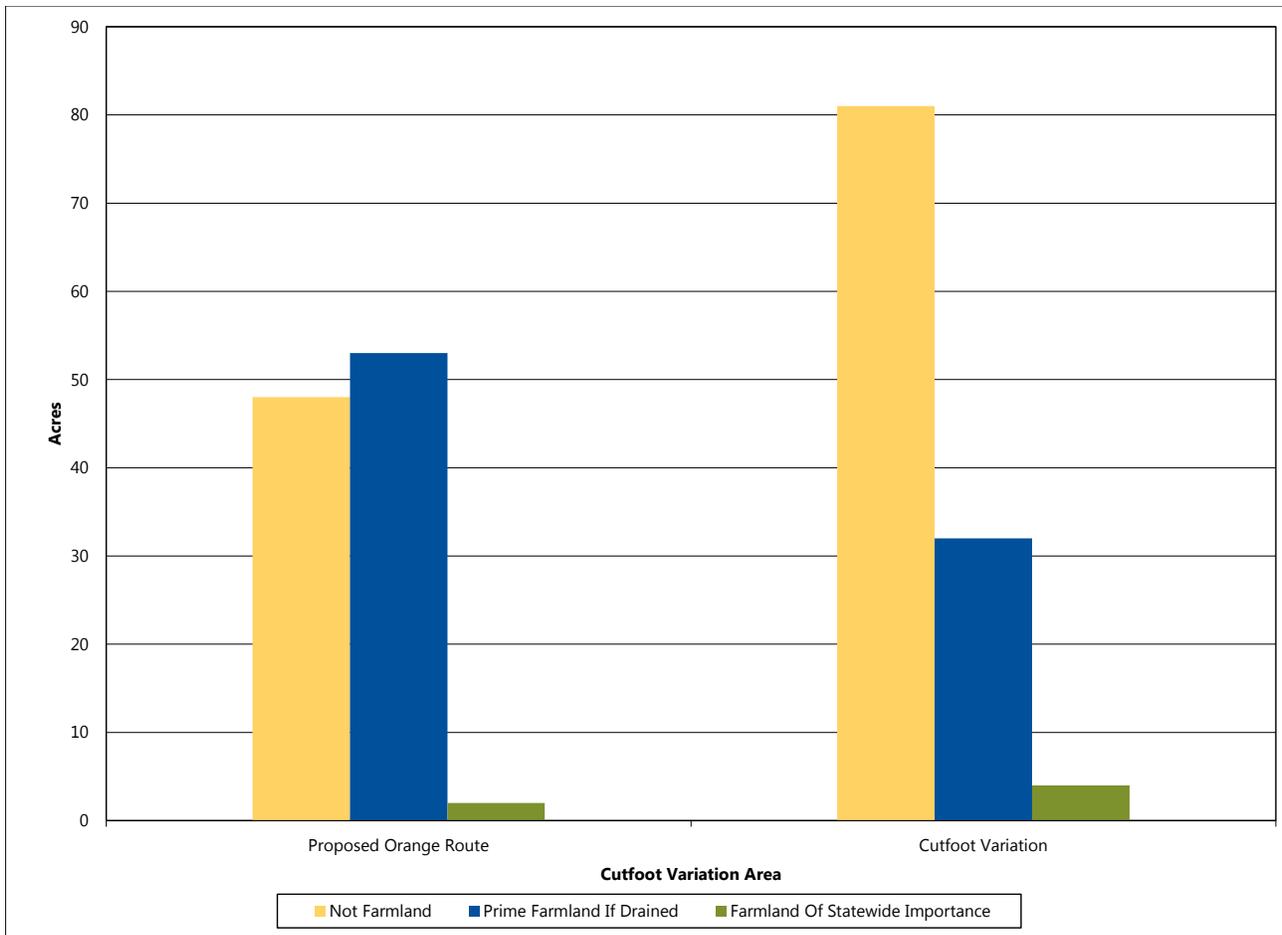


Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152)

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

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

Figure 6-94 Acres of Farmland by Type within the Anticipated ROW in the Cutfoot Variation Area



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

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

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-146 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Orange Route and the Cutfoot Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Orange Route or the Cutfoot Variation in the Cutfoot Variation Area.

The Cutfoot Variation would cross more acres of state forest lands—the Koochiching and Big Fork State Forests—than the Proposed Orange Route (Figure 6-95); therefore the Proposed Orange Route would be expected to have fewer impacts on timber activities on State Forest lands.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct

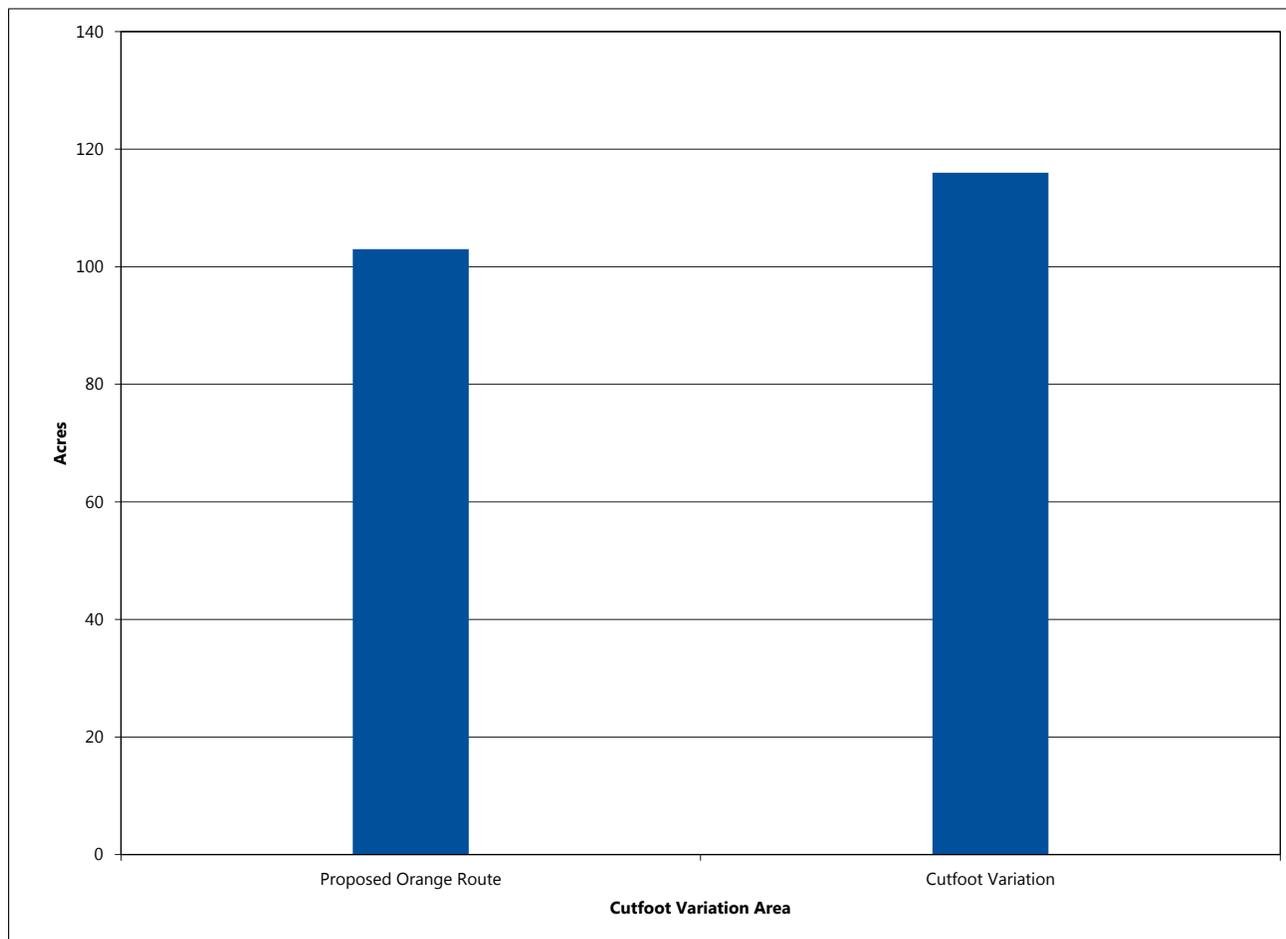
adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

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

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-146, Figure 6-96, and Map 6-46 identify the acreage of mining lands with terminated/expired state mineral leases that may be

Figure 6-95 Acres of State Forest Land within the Anticipated ROW in the Cutfoot Variation Area



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

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

impacted in the Cutfoot Variation Area. **There are no active mineral leases in the ROI of either the Proposed Orange Route or the Cutfoot Variation.** Map 6-46 identifies the state aggregate resources that may be impacted in the Cutfoot Variation Area.

The Proposed Orange Route traverses several acres of mining lands with terminated/expired state mineral leases, while the Cutfoot Variation deviates away from the majority of these state mineral lease lands (Map 6-46). Due to the higher concentration of state mineral lease lands in the ROI, the Proposed Orange Route could potentially result in greater interference with future mining activities in this area.

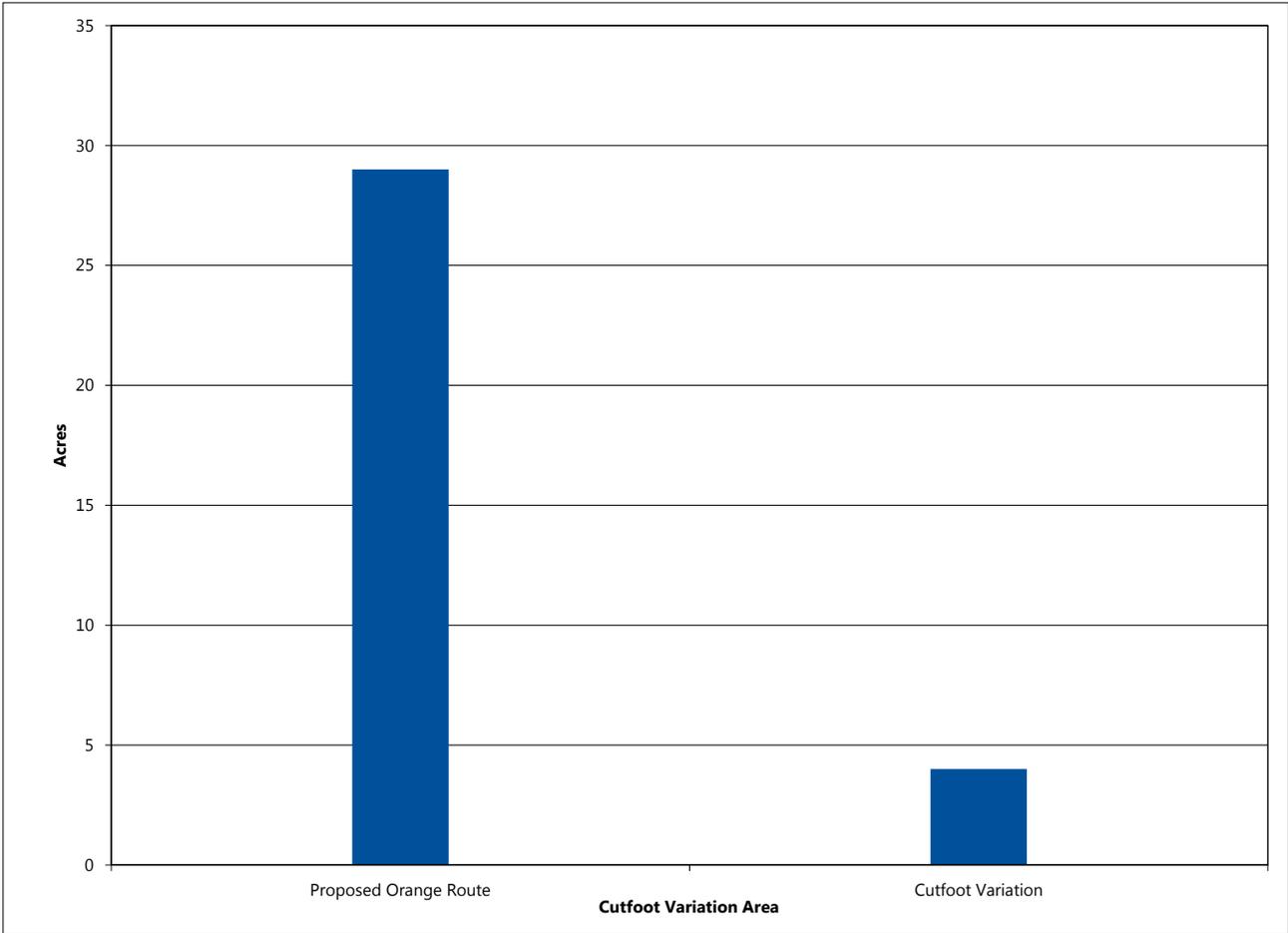
According to the Minnesota Department of Transportation Aggregate Source Information System data, aggregate resources are present within the vicinity of both the Proposed Orange Route and the Cutfoot Variation (Map 6-46). Based on review of the aggregate resource data in conjunction with 2013 aerial photographs (described in Section 5.3.2.3), there is one aggregate resource within the ROI of the

Proposed Orange Route and one aggregate resource within the ROI of the Cutfoot Variation. Both the Proposed Orange Route and the Cutfoot Variation could interfere with current or future aggregate mining activities. The full extent of impacts on aggregate resources in the Proposed Orange Route and Cutfoot Variation, and whether micro siting of the anticipated alignment within an approved route width can avoid these impacts, cannot be determined without field surveys.

As discussed in Section 5.4.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

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

Figure 6-96 Acres of State Mineral Leases within the Anticipated ROW in the Cutfoot Variation Area



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

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

6.3.8.3 Archaeology and Historic Architectural Resources

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

Table 6-147 provides a summary of the previously recorded archaeological and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Orange Route and Cutfoot Variation in the Cutfoot Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

Within the Cutfoot Variation Area, there are no previously recorded archaeological sites or historic architectural resources within the proposed ROW. Additionally, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Orange Route and Cutfoot Variation in the Cutfoot Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Additionally, there are no historic architectural sites documented within the indirect APE (one mile) of the proposed transmission line for either the Proposed Orange Route or Cutfoot Variation.

There is currently no known potential for direct, long-term, adverse, effects to archaeological sites or historic architectural resources within the Cutfoot Variation Area since none are documented within the

ROW. Since there are not any historic architectural sites within the indirect APE of either the Proposed Orange Route or the Cutfoot Variation, no adverse indirect long-term effects are expected to occur.

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

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

effects to these resources, including TCPs, from the proposed Project.

6.3.8.4 Natural Environment

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

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Cutfoot Variation Area are summarized in Table 6-148 and shown on Map 6-48. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmission structures in wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Orange Route and the Cutfoot Variation. Neither the Proposed Orange Route nor the Cutfoot Variation ROWs contain PWIs, trout streams, impaired waters, or floodplains.

The Proposed Orange Route would cross two non-PWI waterbodies, while the Cutfoot Variation

Table 6-147 Archaeological and Historic Resources within the Cutfoot Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Cutfoot Variation Area	
		Proposed Orange Route	Cutfoot Variation
Historic Architectural Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	0
	Count within 0–5,280 ft	0	0
Archaeological Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	0

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

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

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

Table 6-148 Water Resources within the Anticipated ROW in the Cutfoot Variation Area

Resource	Evaluation Parameter	Cutfoot Variation Area	
		Proposed Orange Route	Cutfoot Variation
Transmission Line	Length (mi)	4.2	4.8
Non-PWI Waters ⁽¹⁾	Number of Crossings	2	0
NWI Wetlands	Acres within ROW	57	67

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

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

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

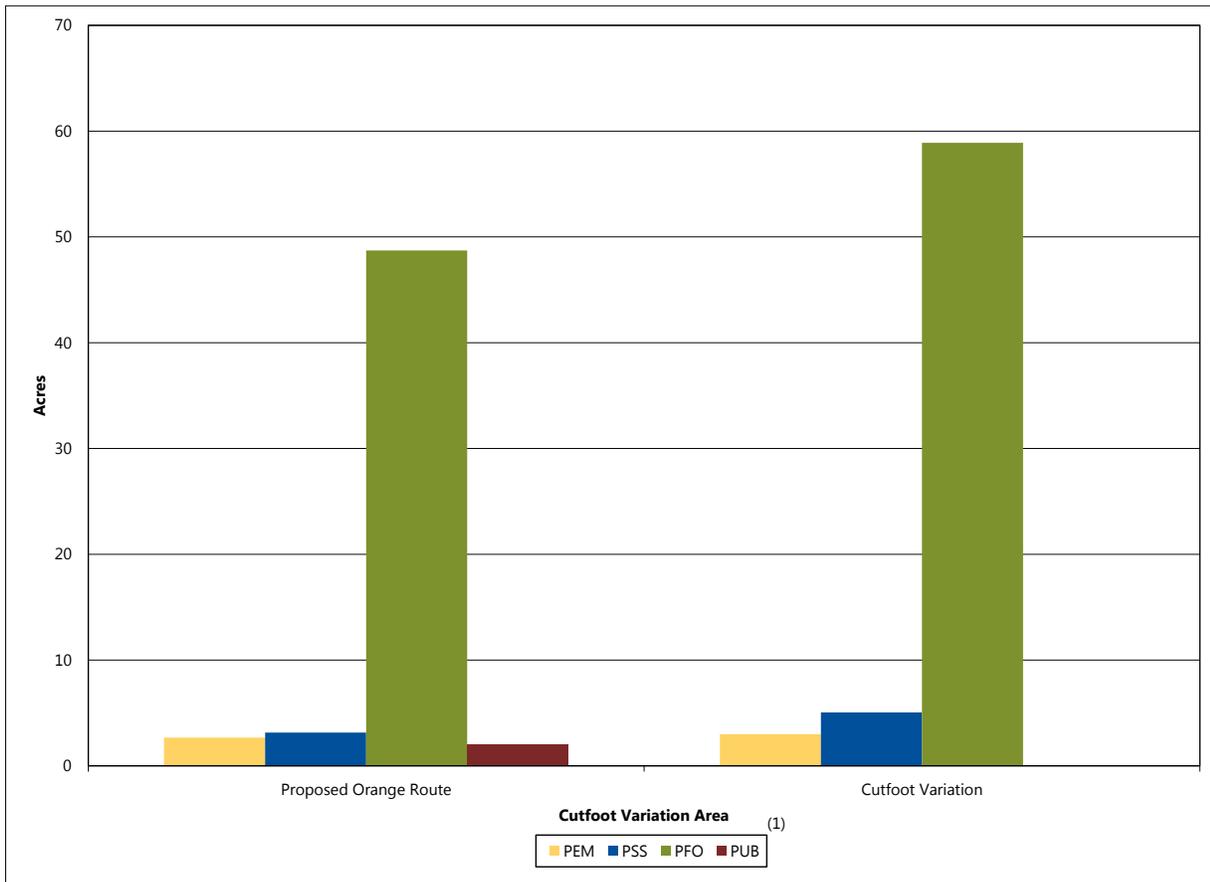
would not require crossing non-PWI watercourses or waterbodies. It is anticipated that these non-PWI water crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Based on the NWI, the Proposed Orange Route and the Cutfoot Variation would both require conversion of forested shrub and wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-97, the Cutfoot Variation contains more forested and shrub wetlands compared to the Proposed Orange Route and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would

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

Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-

Figure 6-97 Acres of Wetland by Type within the Anticipated ROW in the Cutfoot Variation Area



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

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

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

Table 6-149 Vegetation Resources within the Anticipated ROW in the Cutfoot Variation Area

Resource	Evaluation Parameter	Cutfoot Variation Area	
		Proposed Orange Route	Cutfoot Variation
Transmission Line	Length (mi)	4.2	4.8
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0
State Forest	Acres within ROW	103	116
Total Forested GAP Land Cover	Acres within ROW	99	115
GAP Land Cover - Dominant Types ⁽³⁾			
North American Boreal Flooded and Swamp Forest	Acres within ROW	28	30
North American Boreal Forest	Acres within ROW	30	64
Eastern North American Flooded and Swamp Forest	Acres within ROW	39	20

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

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

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

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

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Cutfoot Variation Area are summarized in Table 6-149 and shown on Maps 5-12 and 6-48. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

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

As indicated in Table 6-149 and Figure 6-98, due to its slightly longer length, the Cutfoot Variation would pass through slightly more forested land, including approximately 13 more acres of state forest land, therefore resulting in more permanent removal of forested vegetation. Both the Proposed Orange Route and the Cutfoot Variation would require creation of new corridor for their entire length (Table 6-149). Because the Cutfoot Variation is 0.6 miles longer, it would result in more fragmentation of intact forest in areas where forest

vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-12).

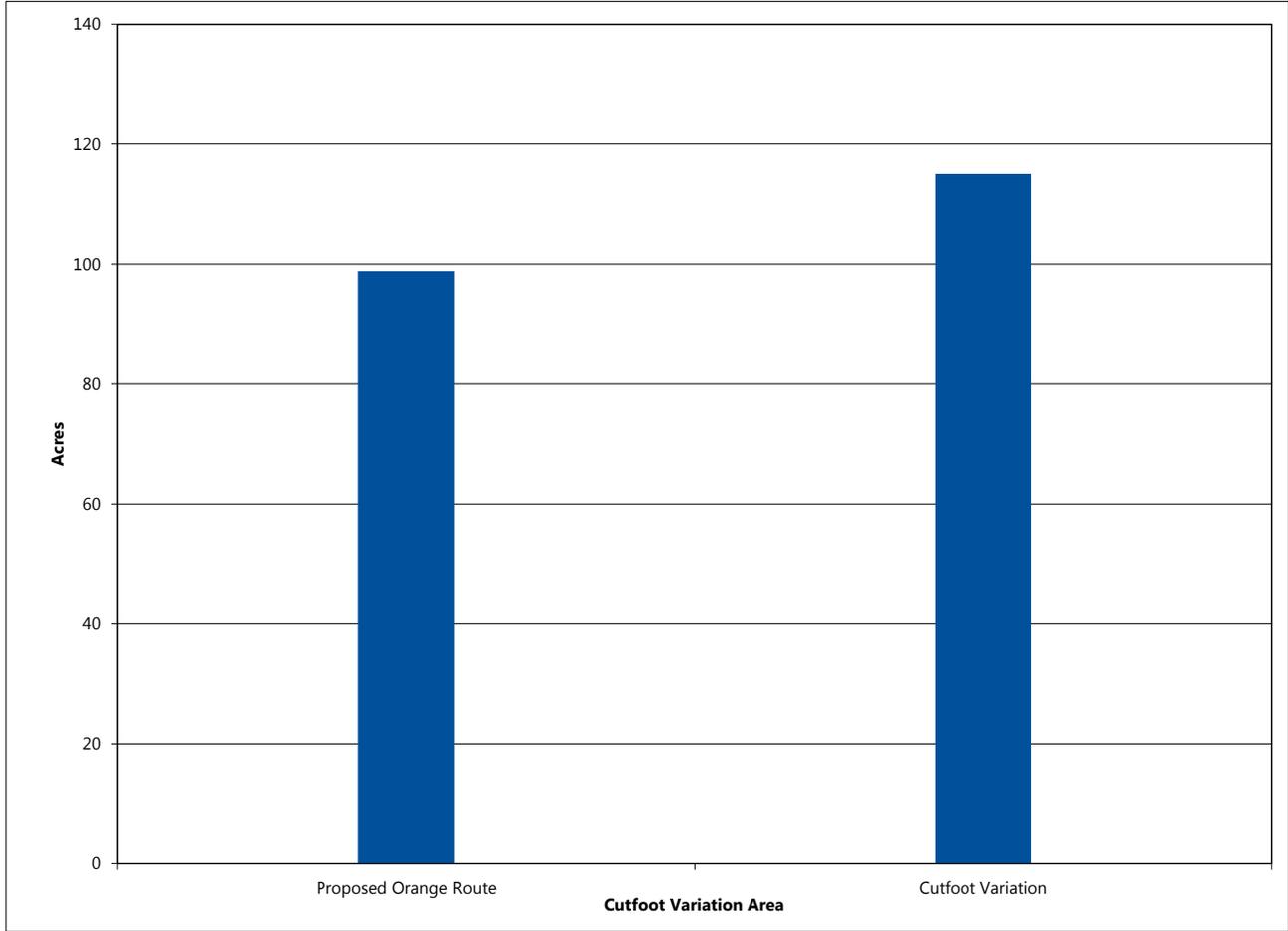
Potential construction, operation, maintenance, and emergency repair-related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Cutfoot Variation Area are shown on Map 6-48. Additional, more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Orange Route and Cutfoot Variation include loss and fragmentation of natural wildlife habitat; no managed wildlife habitats are present within the ROI of the Proposed Orange Route or Cutfoot Variation. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.3.8.4 (Vegetation) summarizes potential

Figure 6-98 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Cutfoot Variation Area



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

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

impacts on forested vegetation from the Proposed Orange Route and Cutfoot Variation.

Both the Proposed Orange Route and the Cutfoot Variation would require creation of new transmission line corridor for their entire length, with the Cutfoot Variation requiring approximately 0.6 more miles of new corridor than the Proposed Orange Route. The longer length of the Cutfoot Variation would result in more habitat fragmentation and potentially more impacts on wildlife currently inhabiting the area.

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

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

6.3.8.5 Rare and Unique Natural Resources

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

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased

habitat fragmentation, including critical habitat designated for gray wolf.

No state or federally listed species have been documented within one mile of the Proposed Orange Route or Cutfoot Variation. However, the full extent of potential impacts from either the Proposed Orange Route or Cutfoot Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Both the Proposed Orange Route and the Cutfoot Variation would cross critical habitat designated for gray wolf, with the Proposed Orange Route crossing this habitat for approximately 4 miles and the Cutfoot Variation crossing it for approximately 5 miles. Neither the Proposed Orange Route nor the Cutfoot Variation would parallel and existing transmission line corridor. The Proposed Orange Route would be expected to have less potential impact on critical habitat designated for gray wolf because it would cross slightly less of this resource than the Cutfoot Variation.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding forested habitat and woody vegetation. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

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

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Cutfoot Variation Area are summarized in Table 6-150 and shown on Map 6-49; additional, more detailed data on rare communities and resources is provided in Appendix E.

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

As indicated in Table 6-150 and on Map 6-49, the Cutfoot Variation, which is just over one-half mile longer than the Proposed Orange Route, would pass through more acres of MBS Sites of Biodiversity Significance than the Proposed Orange Route. Because of this, the Cutfoot Variation would likely result in more impacts on MBS Sites of Biodiversity Significance and the rare communities and species associated with them.

The rare communities and resources listed in Table 6-150 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

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

6.3.8.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-50 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Cutfoot Variation Area.

The Proposed Orange Route and Cutfoot Variation would not parallel any existing corridors or linear features in the Cutfoot Variation Area.

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

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

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-151 summarizes the costs associated with constructing the Proposed Orange Route and the Cutfoot Variation in the Cutfoot Variation Area. As indicated in Table 6-151, the Cutfoot Variation would cost more to construct than the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$7,000 to \$7,700 annually for these alternatives in the Cutfoot Variation Area.

6.3.9 Relative Merits Summary

As discussed in Section 1.2.1.1, the MN PUC is charged with selecting routes that minimize adverse human and environmental impacts while ensuring continuing electric power system reliability and integrity. MN PUC must take into account the 14 factors identified in Minnesota Rules, part 7850.4100 when making a decision on a Route Permit. See Section 6.2.6 for additional details on the relative merits analysis methodology.

6.3.9.1 Pine Island Variation Area

Within the Pine Island Variation Area, the analysis indicates a trade-off between impacts to human settlement factors and impacts to natural environment factors. Though both **alternatives** would pass through reaches of forest lands and floodplain and forested wetlands too large to span, the Proposed Orange Route would cross **fewer**, resulting in placement of fewer structures in floodplains and requiring the least wetland type conversion. The Proposed Blue Route would have a greater impact on the watercourse/waterbody crossing indicator of the water resources element as it would cross a trout stream, potentially requiring vegetation along the banks of the stream to be cleared. **With respect to the wildlife element of the natural environment factor, the Proposed Orange Route would cross more of the WMA and Important Bird Area. The Proposed Orange Route may have more impacts on the federal and state**

Table 6-150 Rare Communities and Resources within the Vicinity of the Cutfoot Variation Area

Resource	Evaluation Parameter	Cutfoot Variation Area	
		Proposed Orange Route	Cutfoot Variation
Transmission Line	Length (mi)	4.2	4.8
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0
MBS Sites of Biodiversity Significance ⁽³⁾	Acres within ROW	43	60

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

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

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

Table 6-151 Construction Costs in the Cutfoot Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
Cutfoot	Proposed Orange Route	\$5,640,538	\$1,336,620	4.2
	Cutfoot Variation	\$6,222,257	\$1,309,949	4.8

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

listed species element of the rare and unique natural resources factor because there are more NHIS records present within one mile. In contrast, the Proposed Blue Route may have more impacts to the rare community element of the rare and unique natural resources factor because it crosses more Ecologically Important Lowland Conifer stands.

The Proposed Blue Route would impact the aesthetics element of the human settlement factor by passing near more residences than the Proposed Orange Route. **Although** the Proposed Orange Route would pass near the Big Bog Recreation area, a valued resource with respect to both the aesthetics element and the recreation and tourism element of the human settlement factor, the Proposed Orange Route would not be visible from the Big Bog Recreation Area. **The Proposed Blue Route crosses more private land and both the Proposed Blue Route and the Proposed Orange Route would cross USFWS Interest Lands, affecting the land use compatibility element of the human settlement factor; however, the Proposed Blue Route could avoid USFWS Interest Lands, by using the Silver Creek Alignment Modification. The Proposed Blue Route would cross more expired/terminated state mineral lease lands, affecting the mining and mineral resources element of the land based economies factor, although the Proposed Orange Route would pass in close proximity to more aggregate resources. The Proposed Blue Route would parallel existing corridors, including transmission line corridors, for a greater length than the Proposed Orange Route. The Proposed Blue Route would cost less to construct.**

Table 6-152 provides an overview of this relative merits assessment for the alternatives in the Pine Island Variation Area. **Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.**

6.3.9.2 Beltrami South Central Variation Area

The Beltrami South Central Variation would avoid USFWS Interest Lands, having less impact on the land use compatibility element of the human settlement factor. However, the Beltrami South Central Variation would have more impacts on the water resources and wildlife elements of the natural environment factor, as it would cross more forested and shrub wetland, requiring the most wetland type conversion, and would cross more

Important Bird Area. Furthermore, the Beltrami South Central Variation would not parallel any existing corridors and would be longer than the Proposed Orange Route, requiring more corner structures and costing more to build.

Table 6-153 provides an overview of this relative merits assessment for the alternatives in the Beltrami South Central Variation Area. **Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.**

6.3.9.3 Beltrami South Variation Area

The Beltrami South Variation would avoid USFWS Interest Lands, having less impact on the land use compatibility element of the human settlement factor. However, the Beltrami South Variation would have more impact on the mining and mineral resources element of the land based economies factor because it would cross more expired/terminated state mineral lease lands. The Beltrami South Variation may also have more impact on the federal and state listed species element of the rare and unique resources factor because there are more NHIS records documented within one mile of it, including a state-threatened species. Furthermore, the Beltrami South Variation would not parallel any existing corridors and would be longer than the Proposed Orange Route, requiring more corner structures and costing more to build.

Table 6-154 provides an overview of this relative merits assessment for the alternatives in the Beltrami South Variation Area. **Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.**

6.3.9.4 North Black River Variation Area

The North Black River Variation would have more impacts to the aesthetics and land use compatibility elements of the human settlement factor as it would pass close to more residences and crosses more private land than the Proposed Blue Route, but these impacts are moderated to some extent by paralleling existing roadway and transmission line corridors.

Some impacts associated with the North Black River Variation may be moderated by paralleling existing corridors for its entire length; the proposed Blue Route would not parallel any existing corridors. The North Black River Variation is longer and would have a slightly higher construction cost.

Table 6-155 provides an overview of this relative merits assessment for the alternatives in the North Black River Variation Area. **Appendix X** provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.5 C2 Segment Option Variation Area

The C2 Segment Option Variation would have more potential impacts to the aesthetic and land use compatibility elements of human settlement factor as it would pass near more residences and private land; but these impacts are moderated to some extent by paralleling existing roadway and transmission line corridors for much of its length. The C2 Segment Option Variation could have more impact on the mining and mineral resources element of the land based economies factor, as it would also cross more state expired/terminated mineral lease lands. However, the Proposed Blue Route would have more impact on the forestry element of the land based economies factor, as it would cross almost three times more state forest land and would primarily do so while not paralleling existing corridor.

The C2 Segment Option Variation may have more impacts on the rare and unique natural resources factor, as it has a NHIS record for threatened species within one mile, has an SNA within 1,500 feet of the anticipated alignment and would pass through a SNA WPA. However, the C2 Segment Option Variation would moderate impacts to some extent by paralleling existing corridors. Due to its longer length and many angle structures, the C2 Segment Option Variation would cost more to construct than the Proposed Blue Route.

Table 6-156 provides an overview of this relative merits assessment for the alternatives in the C2 Segment Option Variation Area. **Appendix X** provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.6 J2 Segment Option Variation Area

The J2 Segment Option Variation would have more impacts on the aesthetics and land use compatibility elements of the human settlement factor, as it would pass by more residences and private land and would cross USFWS Interest Lands. The J2 Segment Option Variation may also have more impact on the archaeological and historic architectural resources factor, as it would cross several sections with known archaeological and historic architectural resources. The J2 Segment Option Variation would cost more to construct due to its greater length.

The Proposed Orange Route may have more impact on the mining and mineral resources element of the land based economies factor, as it would cross more state expired/terminated mineral lease lands and aggregate resources. The Proposed Orange Route may also have more impact on the wildlife element of the natural environment factor, as it would cross more than three times as much Important Bird Area. Furthermore, the Proposed Orange Route may have more impact on both the federal and state listed species and rare communities elements of the rare and unique natural resources factor, as it would cross more critical habitat designated for gray wolf, has more NHIS records within one mile, and crosses more MBS Sites of Biodiversity Significance.

Table 6-157 provides an overview of this relative merits assessment for the alternatives in the J2 Segment Option Variation Area. **Appendix X** provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.7 Northhome Variation Area

The J2 Segment Option Variation would have a greater impact on the land use compatibility element of the human settlement factor by crossing USFWS Interest Lands. The J2 Segment Option Variation would also have more impact on the water resources element of the natural environment factor, as it would cross the most forested and shrub wetland, requiring the most wetland type conversion.

The Northhome Variation would have more impact on the wildlife element of the natural environment factor, as it would cross a MnDNR-designated shallow lake. The Northhome Variation may

also have more impacts on the archaeological and historic architectural resources factor, as it would cross a section with known archaeological resource. The Northome Variation is longer and would cost more to construct.

Table 6-158 provides an overview of this relative merits assessment for the alternatives in the Northome Variation Area. **Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area.** For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.3.9.8 Cutfoot Variation Area

The Cutfoot Variation may have more impact on the land use compatibility element of the human settlement factor, as it would cross more private land. The Cutfoot Variation may also have more impact on the rare community element of the rare and unique natural resources factor because it would cross more MBS Sites of Biodiversity Significance. The Cutfoot Variation would also cost more to construct.

The Proposed Orange Route may have more impact on the mining and mineral resources element of the land based economies factor because it would cross more state expired/terminated mineral lease lands.

Table 6-159 provides an overview of this relative merits assessment for the alternatives in the Cutfoot Variation Area. **Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area.** For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

Table 6-152 Relative Merits Assessment for the Pine Island Variation Area⁽²⁾

Relative Merits ⁽¹⁾		Pine Island Variation Area		
Factor	Element	Proposed Blue Route	Proposed Orange Route	Notes
Human settlement	Aesthetics			Proposed Blue Route would pass by more residences within 1,500 feet of the anticipated alignment. Proposed Orange Route would pass near the Big Bog Recreation Area, but is not visible.
	Land use compatibility			Proposed Blue Route and Proposed Orange Route would cross USFWS Interest Lands (8 acres and 16 acres, respectively), but the Proposed Blue Route could avoid it by using the Silver Creek Alignment Modification. Proposed Orange Route would pass near the Big Bog Recreation Area, but is not visible. Proposed Blue Route crosses more private land than the Proposed Orange Route.
Land-based economies	Agriculture			Proposed Blue Route and Proposed Orange Route would cross a relatively similar amounts of farmland.
	Forestry			Proposed Blue Route and Proposed Orange Route would cross relatively similar amounts of state forest land.
	Mining and mineral resources			Proposed Blue Route would cross more expired/terminated mineral lease lands. Proposed Orange route would pass in close proximity to more aggregate resources.
Archaeological and historic architectural resources				Proposed Blue Route would cross a section identified as containing known archaeological resources; Proposed Orange Route does not cross any of these sections. Proposed Orange Route has more historic architectural sites within 1 mile than the Proposed Blue Route.
Natural environment	Water resources			Proposed Blue Route and Proposed Orange Route would cross similar numbers of watercourses/ waterbodies; however, the Proposed Blue Route would cross one trout stream. All crossings are expected to be spanned, although clearing vegetation adjacent to trout streams could result in increased water temperature, potentially resulting in less suitable trout habitat. Both alternatives would cross relatively similar areas of FEMA-designated floodplain that cannot be spanned. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion.
	Vegetation			Proposed Blue Route and Proposed Orange Route would cross a relatively similar amount of forested land cover.
	Wildlife			Both alternatives would cross a WMA and Important Bird Area. Proposed Orange Route would cross a greater portion of these areas.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. Both alternatives would cross critical habitat designated for gray wolf. Proposed Orange Route has more threatened and endangered NHIS records within 1 mile.
	State rare communities			Proposed Blue Route and Proposed Orange Route would have an SNA within 1,500 feet; however, the Proposed Blue Route would parallel an existing corridor in this area, while the Proposed Orange Route would not. Proposed Orange Route would cross more SNA WPAs. Proposed Blue Route would cross more Ecologically Important Lowland Conifer Areas.
Use or paralleling of existing ROWs				Both alternatives would parallel existing transmission line, roadway, and/or trail corridor.
Electrical system reliability				There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the alternative is within 20% of the cost of the Proposed Blue Route.

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-153 Relative Merits Assessment for the Beltrami South Central Variation Area⁽²⁾

Relative Merits ⁽¹⁾		Beltrami South Central Variation Area		
Factor	Element	Proposed Orange Route	Beltrami South Central Variation	Notes
Human settlement	Aesthetics			No residences are present within 1,500 feet of the anticipated alignment for either alternative.
	Land use compatibility			Proposed Orange Route would cross USFWS Interest Lands (16 acres), while the Beltrami South Central Variation would not. Neither alternative would cross private land.
Land-based economies	Agriculture			Neither alternative would cross farmland.
	Forestry			Both alternatives cross relatively similar amounts of state forest land. Proposed Orange Route parallels existing corridor for its entire length.
	Mining and mineral resources			No active or expired/terminated mineral lease lands or aggregate resources are present in the ROW of any alternative.
Archaeological and historic architectural resources				There are no known archaeological or historic architectural resources that would be affected by the alternatives.
Natural environment	Water resources			There are no differences between the alternatives for crossing watercourses, waterbodies, and floodplains. Proposed Orange Route and Beltrami South Central Variation would cross wetlands that are too large to span. Proposed Orange Route and Beltrami South Central Variation would cross relatively similar areas of wetlands that are too large to span would result in relatively similar areas of forest wetland type conversion. Beltrami South Central Variation would have the most shrub wetland; therefore, would require the most shrub wetland type conversion.
	Vegetation			Both alternatives would cross a relatively similar amounts of forested land cover. Proposed Orange Route parallels existing corridor for its entire length.
	Wildlife			Both alternatives would cross a relatively similar amount of Important Bird Area. Proposed Orange Route parallels existing corridor for its entire length.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. Both alternatives have the same number of NHIS records within 1 mile.
	State rare communities			Both alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance. Proposed Orange Route would parallel existing corridor for its entire length.
Use or paralleling of existing ROWs				Proposed Orange Route would parallel an existing transmission line, roadway, and/or trail corridor for the entire length. Beltrami South Central Variation would not parallel any corridors.
Electrical system reliability				There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the alternative is more than 20% above the cost of the Proposed Orange Route.

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-154 Relative Merits Assessment for the Beltrami South Variation Area⁽²⁾

Relative Merits ⁽¹⁾		Beltrami South Variation Area		
Factor	Element	Proposed Orange Route	Beltrami South Variation Area	Notes
Human settlement	Aesthetics			No residences are present within 1,500 feet of the anticipated alignment for either alternative.
	Land use compatibility			Beltrami South Variation would avoid USFWS Interest Lands. It is unknown whether the anticipated alignment of the Proposed Orange Route would impact USFWS Interest Lands; land surveys would need to be completed to determine impacts. Beltrami South Variation would cross more private land.
Land-based economies	Agriculture			Neither alternative would cross farmland.
	Forestry			Both alternatives cross relatively similar amounts of state forest land. Proposed Orange Route would parallel an existing transmission line corridor for its entire length.
	Mining and mineral resources			Beltrami South Variation crosses more expired/terminated mineral lease lands.
Archaeological and historic architectural resources				There are no known archaeological and historic architectural resources that would be affected by the alternatives.
Natural environment	Water resources			There are no differences between the alternatives for crossing watercourses, waterbodies, or floodplains. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion.
	Vegetation			Both alternatives would cross relatively similar amounts of state forest land. Proposed Orange Route would parallel an existing transmission line corridor for its entire length.
	Wildlife			Both alternatives would cross a relatively similar amount of Important Bird Area. Proposed Orange Route would parallel existing corridor for its entire length.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. Both alternatives cross minimal amounts of critical habitat designated for gray wolf, with Beltrami South Variation crossing slightly more than the Proposed Orange Route. Beltrami South Variation has more NHIS records within 1 mile, including a NHIS record for a threatened species.
	State rare communities			Both alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance. Proposed Orange Route would parallel an existing transmission line corridor for its entire length.
Use or paralleling of existing ROWs				Proposed Orange Route would parallel an existing transmission line, roadway, and/or trail corridor for the entire length. Beltrami South Variation would not parallel any corridors.
Electrical system reliability				There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the alternative is more than 20% above the cost of the Proposed Orange Route.

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-155 Relative Merits Assessment for the North Black River Variation Area

Relative Merits ⁽¹⁾		North Black River Variation Area		
Factor	Element	Proposed Blue Route	North Black River Variation	Notes
Human settlement	Aesthetics			North Black River Variation would pass by more residences within 1,500 feet of the anticipated alignment. North Black River would parallel existing transmission line corridor for its entire length.
	Land use compatibility			North Black River Variation would cross more private land.
Land-based economies	Agriculture			Both alternatives would cross a relatively similar amount of farmland.
	Forestry			Both alternatives would cross a relatively similar amount of state forest land. North Black River Variation would parallel an existing transmission line corridor for its entire length.
	Mining and mineral resources			Both alternatives would cross a relatively similar amount of expired/terminated mineral lease lands. North Black River Variation would parallel an existing transmission line corridor for its entire length.
Archaeological and historic architectural resources				There are no known archaeological and historic architectural resources that would be affected by the alternatives.
Natural environment	Water resources			There would be no differences between the alternatives for crossing watercourses, waterbodies, and floodplains. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion.
	Vegetation			Both alternatives would cross a relatively similar amount of forested land cover. North Black River Variation would parallel an existing transmission line corridor for its entire length.
	Wildlife			Both alternatives would cross a relatively similar amount of Important Bird Area. North Black River Variation would parallel an existing transmission line corridor for its entire length.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. The alternatives avoid critical habitat designated for gray wolf. There are no documented NHIS records within 1 mile of these alternatives.
	State rare communities			Both alternatives would cross a relatively similar amount of a SNA WPA and MBS Sites of Biodiversity Significance. North Black River Variation would parallel an existing transmission line corridor for its entire length.
Use or paralleling of existing ROWs				North Black River Variation would parallel an existing transmission line, roadway, and/or trail corridor for its entire length. Proposed Blue Route would not parallel any corridors.
Electrical system reliability				There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the alternative is within 20% of the cost of the Proposed Blue Route.

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-156 Relative Merits Assessment for the C2 Segment Option Variation Area⁽²⁾

Relative Merits ⁽¹⁾		C2 Segment Option Variation Area		
Factor	Element	Proposed Blue Route	C2 Segment Option Variation	Notes
Human settlement	Aesthetics			C2 Segment Option Variation would pass by more residences within 1,500 feet of the anticipated alignment. C2 Segment Option Variation would parallel existing transmission line corridor for the majority of its length.
	Land use compatibility			C2 Segment Option Variation would pass near an airstrip, but could avoid potential impacts by using the Airstrip Alignment Modification. C2 Segment Option Variation would cross more private land.
Land-based economies	Agriculture			Both alternatives would cross farmland. C2 Segment Option Variation would parallel existing transmission line corridor for the majority of its length, while the Proposed Blue Route would not parallel any existing corridor.
	Forestry			Proposed Blue Route would cross more state forest land.
	Mining and mineral resources			C2 Segment Option Variation would cross more expired/terminated mineral lease lands.
Archaeological and historic architectural resources				There are no known archaeological and historic architectural resources that would be affected by the alternatives.
Natural environment	Water resources			Proposed Blue Route would cross the most watercourses/waterbodies; however, all crossings are expected to be spanned. Proposed Blue Route and the C2 Segment Option Variation cross FEMA-designated floodplain. C2 Segment Option Variation would cross the most floodplain. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion.
	Vegetation			Both alternatives would cross a relatively similar amount of forested land cover. C2 Segment Option Variation would parallel existing transmission line corridors for most of its length, while the Proposed Blue Route would not parallel any existing corridor.
	Wildlife			Both alternatives would cross a relatively similar amount of Important Bird Area. C2 Segment Option Variation would parallel existing transmission line corridors for most of its length, while the Proposed Blue Route would not parallel any existing corridor.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. Both alternatives would cross the same amount of critical habitat designated for gray wolf. Both alternatives have the same number of NHIS records within 1 mile; however, the C2 Segment Option Variation has a NHIS record for a state-threatened species.
	State rare communities			C2 Segment Option Variation would have an SNA within 1,500 feet; however, it would not have an SNA within its ROW. The C2 Segment Option Variation also would pass through a SNA WPA. Both alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance and Ecologically Important Lowland Conifer Areas. C2 Segment Option Variation would parallel existing transmission line corridors for most of its length, while the Proposed Blue Route would not parallel any existing corridor.
Use or paralleling of existing ROWs				C2 Segment Option Variation would parallel an existing transmission line, roadway, and/or trail corridor for most of its length. Proposed Blue Route would not parallel any existing transmission line, roadway, or trail corridor.
Electrical system reliability				There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the alternative is more than 20% above the cost of the Proposed Blue Route.

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-157 Relative Merits Assessment for the J2 Segment Option Variation Area⁽²⁾

Relative Merits ⁽¹⁾		J2 Segment Option Variation Area		
Factor	Element	Proposed Orange Route	J2 Segment Option Variation	Notes
Human settlement	Aesthetics			J2 Segment Option Variation would pass by more residences within 1,500 feet of the anticipated alignment.
	Land use compatibility			J2 Segment Option Variation would cross USFWS Interest Lands (28 acres) and would cross more private land.
Land-based economies	Agriculture			Both alternatives would cross a relatively similar amount of farmland.
	Forestry			Both alternatives would cross a relatively similar amount of state forest land.
	Mining and mineral resources			Both alternatives would cross a relatively similar amount of expired/terminated mineral lease lands. The Proposed Orange Route would pass by more aggregate resources.
Archaeological and historic architectural resources				J2 Segment Option Variation has more historic architectural sites within 1 mile than the Proposed Orange Route. There are no known archaeological sites that would be affected by the alternatives.
Natural environment	Water resources			Both alternatives would cross relatively similar numbers of watercourses/waterbodies, all of which are expected to be spanned. Proposed Orange Route would cross FEMA-designated floodplains; however the areas are small and would be spanned. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion.
	Vegetation			Both alternatives would cross a relatively similar amount of forested land cover.
	Wildlife			Proposed Orange Route would cross more of Important Bird Area.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. Proposed Orange Route crosses more critical habitat designated for gray wolf. Proposed Orange Route has more NHIS records within 1 mile. Proposed Orange Route has 2 threatened NHIS records within 1 mile.
	State rare communities			Proposed Orange Route would cross more MBS Sites of Biodiversity Significance.
Use or paralleling of existing ROWs				Neither alternative would parallel existing transmission line, roadways, or trails corridors.
Electrical system reliability				There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the alternative is within 20% of the cost of the Proposed Orange Route.

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-158 Relative Merits Assessment for the Northhome Variation Area⁽²⁾

Relative Merits ⁽¹⁾		Northhome Variation Area		
Factor	Element	J2 Segment Option Variation	Northhome Variation	Notes
Human settlement	Aesthetics			No residences are present within 1,500 feet of the anticipated alignment for either alternative.
	Land use compatibility			J2 Segment Option Variation would cross USFWS Interest Lands (28 acres). Both alternatives would cross a relatively similar amount of private land.
Land-based economies	Agriculture			Both alternatives cross a relatively similar amount of farmland.
	Forestry			Both alternatives would cross minimal state forest land.
	Mining and mineral resources			No active or expired/terminated mineral lease lands or aggregate resources are present in the ROW of any alternative.
Archaeological and historic architectural resources				Northhome Variation would cross a section identified with a known archaeological resource. There are no known historic architectural sites that would be affected by either alternative.
Natural environment	Water resources			J2 Segment Option Variation would cross the most watercourses/waterbodies; however, all crossings are expected to be spanned. There would be no differences between the alternatives for crossing floodplains. J2 Segment Option Variation and Northhome would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of forest wetland type conversion. J2 Segment Option Variation would have the most shrub wetland; therefore, would require the most shrub wetland type conversion.
	Vegetation			Both alternatives would cross a relatively similar amount of forested land cover.
	Wildlife			Northhome Variation would cross a shallow lake.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. There are no documented NHIS records within 1 mile of these alternatives.
	State rare communities			No records of rare resources or communities have been documented in the ROW of either alternative.
Use or paralleling of existing ROWs				Neither alternative would parallel existing transmission line, roadways, or trails corridors.
Electrical system reliability				There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the alternative is more than 20% above the cost of the Proposed Blue Route.

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.

Table 6-159 Relative Merits Assessment for the Cutfoot Variation Area⁽²⁾

Relative Merits ⁽¹⁾		Cutfoot Variation Area		
Factor	Element	Proposed Orange Route	Cutfoot Variation	Notes
Human settlement	Aesthetics			No residences are present within 1,500 feet of the anticipated alignment for either alternative.
	Land use compatibility			The Cutfoot Variation would cross more private land.
Land-based economies	Agriculture			Both alternatives would cross a relatively similar amount of farmland.
	Forestry			Both alternatives would cross a relatively similar amount of state forest land.
	Mining and mineral resources			Proposed Orange Route would cross more expired/terminated mineral lease lands. Both alternatives have aggregate resources within the ROW.
Archaeological and historic architectural resources				Proposed Orange Route would cross more expired/terminated mineral lease lands. Both alternatives have aggregate resources within the ROW.
Natural environment	Water resources			Proposed Orange Route would cross the most watercourses/waterbodies; however, all crossings are expected to be spanned. There would be no differences between the alternatives for crossing floodplains. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion.
	Vegetation			Both alternatives would cross a relatively similar amount of forested land cover.
	Wildlife			Neither alternative would cross designated wildlife resources.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. Both alternatives would cross minimal amounts of critical habitat designated for gray wolf. There are no NHIS records within 1 mile of these alternatives.
	State rare communities			Cutfoot Variation would cross more MBS Sites of Biodiversity Significance.
Use or paralleling of existing ROWs				Neither alternative would parallel existing transmission line, roadways, or trails corridors.
Electrical system reliability				There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the alternative is within 20% of the cost of the Proposed Orange Route.

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see appropriate sections in Chapter 6.