Rabbit River
Little Rabbit Lake
Little Rabbit
T-5052
T46N, R29W S18
CR 128
T46N, R29W S17
Irondale Twp 204
Little Blackhoof Lake
Ironton Creek
Alignment Alternative 8 and 9 begin here
T-5022
Snow Shoe Dr
CR 59
CSAH 59
AA8
Riverton
Crow Wing County
59
Hay Lake
Cuyuna Country
T46N, R29W S19
T46N, R29W S20
STATE PARK RD 18
Irondale Township
T-284
AA9
210
Alignment Alternative 8 and 9 end here
T46N, R29W S30
E2
T46N, R29W S29

Note:
Route segments on this map may be offset from their actual alignments so that multiple segments can be displayed at the same time. See Appendix C for detailed maps.

Imagery Source: USDA-FSA-APFO NAIP, 2023

- Alignment Alternative 8
- Alignment Alternative 9
- Applicants' AA8-9 Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Residence
- PWI Watercourse
- PWI Waterbody
- Shallow Wildlife Lake
- Native Plant Community
- Other DNR Land
- Municipal Boundary

Lakes of Biological Significance
- Moderate Significance

Wetlands
- Non-Forested Wetland

Site of Biodiversity Significance
- Moderate Significance

Feet
0 400 800

Map 6-19

ALIGNMENT ALTERNATIVES AA8 AND AA9
Cole Lake/Riverton Region
Northland Reliability Project

6.3.8.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. For some of the human settlement elements, project impacts are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter. These resources, which are discussed exclusively in Chapter 5.3, include cultural values, displacement, electronic interference, noise, property values, and zoning and land use.

6.3.8.1.1 Aesthetics

Aesthetic impacts differ by routing alternative. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure ROW. Proximity of residences to alignment alternatives AA8, AA9, and the applicants' equivalent are shown in Table 6-84, while ROW paralleling and sharing are shown in Table 6-85.

The applicants' equivalent has the least number of residences within 1,000 feet of the anticipated alignment, whereas alignment alternative AA9 has the most. However, each of these route alternatives are surrounded by trees and therefore, the route is not anticipated to be visible from those residences located within 1,000 feet. Alignment alternatives AA8 and AA9 would likely minimize aesthetic impacts more than the applicants' equivalent as both parallel an existing road, while the applicants' equivalent would be routed through a greenfield in this area.

Table 6-84 Cole Lake-Riverton Region Proximity of Residences to Alignment Alternatives AA8 and AA9

Residences, Distance from Anticipated Alignment	Alignment Alternative AA8	Alignment Alternative AA9	Applicants' Equivalent
Residences within 0-75 feet	0	0	0
Residences within 75-250 feet	1	0	1
Residences within 250-500 feet	3	4	4
Residences within 500-1,000 feet	12	14	7
Total Residences within 1,000 feet	16	18	12

Table 6-85 Cole Lake-Riverton Region ROW Sharing and Paralleling of Alignment Alternatives AA8 and AA9

Infrastructure	Alignment Alternative AA8 miles (percent)	Alignment Alternative AA9 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)	0 (0)
Follows Existing Roads	1.4 (90)	1.4 (91)	0 (0)
Follows Existing Transmission Line	0 (0)	0 (0)	0 (0)
Total – Follows Transmission Line, Road, or Railroad	1.4 (90)	1.4 (91)	0 (0)
Follows Field, Parcel, or Section Lines	1.5 (97)	1.6 (100)	1.0 (61)
Total – ROW Paralleling and Sharing	1.5 (97)	1.6 (100)	1.0 (61)
Total Length of Alignment Alternative	1.6	1.6	1.6

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line, and therefore, the sum may be greater than 100 percent.

6.3.8.1.2 Socioeconomics and Environmental Justice

Socioeconomic factors provide an indication of how economic activity affects and is shaped by social processes. Socioeconomic measures indicate how societies progress, stagnate, or regress because of the actions and interactions within or between the local, regional, or global economic scale. Transmission line projects can contribute to growth and progress at the local level over time, but generally do not have a significant socioeconomic impact.

The project would improve the socioeconomics of the region through the creation of jobs, generation of tax revenue, and providing more reliable electrical service to the surrounding communities. Alignment alternatives AA8 and AA9 intersect the city of Riverton, which is identified as an EJC. No adverse or permanent impacts to the identified communities with EJC are anticipated. While alignment alternatives AA8 and AA9 intersect an EJC, this community is not anticipated to experience disproportionately adverse impacts as a result of the project.

6.3.8.2 Land-Based Economies

Potential project impacts to land-based economies are assessed through an evaluation of several elements, summarized in Chapter 6.1.1. There are no agricultural lands, forestry resources, or active mining operations within the rights-of-way of alignment alternatives AA8 and AA9 or the applicants' equivalent. As a result, potential impacts to agriculture, forestry, and mining would be minimal and independent of the route selected.

6.3.8.2.1 Recreation and Tourism

Recreation and tourism opportunities within the Cole Lake-Riverton region include outdoor recreational activities and camping opportunities on state managed lands, various trails, and scenic byways. Since transmission line construction and operation generally has minimal permanent and temporary impacts to

trails, recreation, and tourism, project impacts in this region are expected to be minimal where it parallels existing ROWs.

Alignment alternatives AA8 and AA9 border the Cuyuna Country State Recreation Area, though both alignment alternatives parallel a roadway for the majority of their lengths, which has already created disturbance in the vicinity of recreational resources. In comparison, the applicants' equivalent in this area does not contain any recreation or tourism resources (Map Book 5C). Permanent impacts as a result of all of the alignment alternatives could include increased noise due to transmission line operation and a reduction in aesthetic value (Chapter 5.8.4.1). Temporary interruptions in recreational opportunities within the Cuyuna Country State Recreation Area are expected to have a minimal impact on recreation.

6.3.8.3 Archaeological and Historic Resources

Two previously documented historic architectural resources are located within the 1,000-foot route width of alignment alternatives AA8, AA9, and the applicants' equivalent (Table 6-86), as shown on Map Book 5F.

Table 6-86 Cultural Resources within the Route Width of Alignment Alternatives AA8, AA9, and the Applicants' Equivalent

Resource Number	Resource Type	NRHP Eligibility	Location
CW-XXX-00001	Cuyuna Iron Range Historic Mining Landscape District	Eligible	alignment alternative AA8; alignment alternative AA9; applicants' equivalent
XX-ROD-00153	Trunk Highway 210	Not Eligible	alignment alternative AA8; alignment alternative AA9; applicants' equivalent

As XX-ROD-00153 is not eligible for the NRHP and, therefore, cannot be adversely affected by the project, it is not discussed further. Resource CW-XXX-00001 consists of the Cuyuna Iron Range Historic Mining landscape. The route width of all three routing alternatives crosses a portion of this resource and at a location where an existing transmission line or other infrastructure is not present. As a result, the routing alternatives have the potential to alter that resource's setting, feeling, appearance, and/or association.

The primary means to minimize impacts to cultural resources is prudent routing or structure placement (i.e., avoiding known archaeological and historic resources). If they cannot be avoided, impacts to these resources could be mitigated by measures developed in consultation with the SHPO prior to construction. Based on the above discussion, alignment alternatives AA8, AA9, and the applicants' equivalent each have the potential to impact the same NRHP-eligible cultural resource in the same way.

6.3.8.4 Natural Environment

6.3.8.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This routing alternative comparison discussion addresses watercourses and

waterbodies and wetlands. Map 6-19 shows the water resources along alignment alternatives AA8 and AA9, as well as the applicants' equivalent.

6.3.8.4.1.1 Watercourses and Waterbodies

Table 6-87 identifies the watercourses and waterbodies crossed by alignment alternatives AA8 and AA9 and the applicants' equivalent. Alignment alternatives AA8 and AA9 would have similar watercourse and waterbodies impacts.

Table 6-87 Watercourses and Waterbodies Crossed by Alignment Alternative AA8 and AA9

Resources	Alignment Alternative AA8	Alignment Alternative AA9	Applicants' Equivalent
Number of NHD stream crossings	2	2	2
Number of impaired streams crossings	0	0	0
Number PWI stream crossings	1	1	1
Number of NHD lake crossings	2	2	2
Number of impaired lake crossings	0	0	0
Number of PWI basin crossings	1	1	0

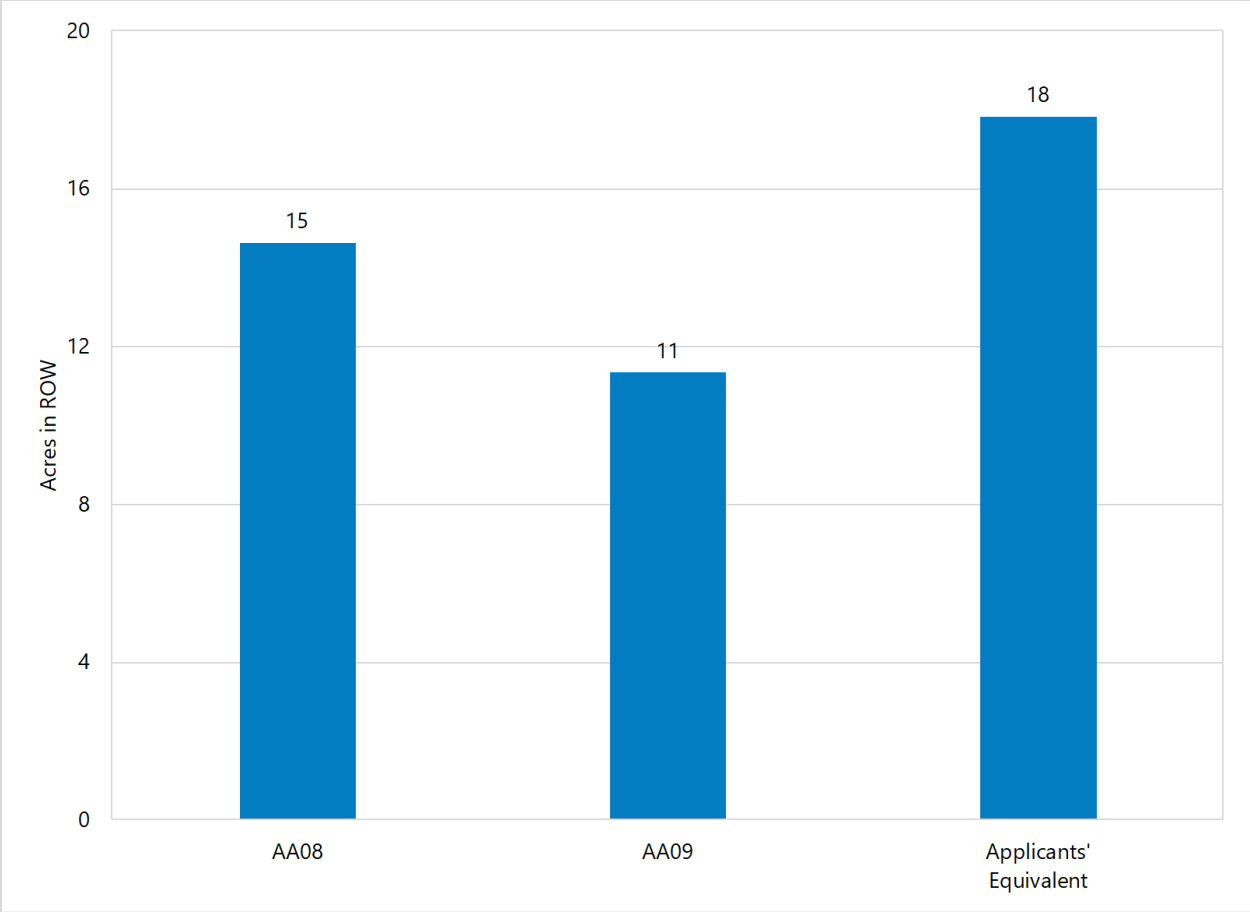
6.3.8.4.1.2 Wetlands

Table 6-83 identifies the acreage of wetlands crossed by alignment alternatives AA8 and AA9 and the applicants' equivalent. The applicants' equivalent would cross more forested wetlands (14 acres) than alignment alternatives AA8 and AA9 (5 acres or less). The applicants' equivalent would have one wetland crossing over 1,000 feet, which would require placing one or more transmission structures in wetland. Alignment alternatives AA8 and AA9 would not have any wetland crossing over 1,000 feet and would be able to be spanned. The applicants' equivalent would cross one PWI wetland.

6.3.8.4.2 Vegetation

The ROW of the applicants' equivalent would impact more forested vegetation than alignment alternatives AA8 and AA9 (Figure 6-10). In addition, the applicants' equivalent would not parallel any existing transmission line or road rights-of-way, resulting in forest fragmentation. Alignment alternatives AA8 and AA9 would parallel an existing road corridor for at least 90 percent of their lengths, thereby minimizing impacts associated with forest fragmentation. Alignment alternatives AA8 and AA9 would result in the least amount of impact to forested vegetation.

Figure 6-10 Forested Vegetation in the ROW of Alignment Alternative AA8, AA9, and the Applicants' Equivalent



6.3.8.4.3 Wildlife

Impacts to wildlife habitat would occur for alignment alternatives AA8, AA9, and the applicants' equivalent as a result of removal of forested habitat in the ROW, with the applicants' equivalent impacting the most forested habitat and resulting in the most habitat fragmentation because it does not parallel any existing transmission line or road rights-of-way. Neither alignment alternative or the applicants' equivalent would traverse areas that are managed or preserved for wildlife. Alignment alternatives AA8 and AA9 would have the least amount of impact to wildlife and associated habitat.

6.3.8.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined that no federally protected species have been documented within 1 mile of alignment alternatives AA8, AA9, or the applicants' equivalent. Two state protected species have been documented within 1 mile of alignment alternatives AA8, AA9, and the applicants' equivalent, neither species has documented within the ROW or route width of these alternatives (Appendix N). Several state special concern species have been documented within 1 mile of all alignment alternatives AA8, AA9, and the applicants' equivalent (Appendix N).

The ROW of alignment alternative AA9 would intersect approximately 6 acres of the edge of a native plant community while paralleling a road corridor (Map 6-19). The ROW of alignment alternative AA8 and the applicants' equivalent would not intersect sensitive ecological resources.

6.3.8.6 Reliability

When one transmission line crosses another, reliability risks increase because the failure of one line can unexpectedly de-energize the other. Additionally, there is increased risk that if one transmission line falls, it can bring down the other transmission line, resulting in two, rather than one, line failures. Furthermore, performing maintenance at the transmission line crossing creates a safety risk, as under normal operating conditions one line must remain energized while work is occurring on the other line. Therefore, where practical, new lines are typically designed to minimize transmission line crossings.

No transmission line crossings are required for these route alternatives.

6.3.8.7 Cost

Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-80). Alignment alternatives AA8, AA9, and the applicants' equivalent are very similar in cost, with no additional structure costs anticipated for any of these route alternatives. Alignment alternative AA8 is anticipated to cost approximately $8.7 million, alignment alternative AA9 is anticipated to cost approximately $8.6 million, and the applicants' equivalent is anticipated to cost approximately $9.1 million, making alignment alternative AA9 the least expensive option.

6.3.9 Alignment Alternative AA10 - Cole Lake-Riverton Region

Alignment alternative AA10 provides an alternative placement of the applicants' proposed alignment in the southern part of the Cole Lake-Riverton region. Alignment alternative AA10 is shifted north and west of the applicants' alignment to avoid impacts to private land. Alignment alternative AA10 would share an existing transmission line ROW for a small portion of its length (approximately 0.25 mile). Potential impacts of alignment alternative AA10 and the applicants' equivalent are summarized in Table 6-88 and shown on Map 6-16.

Table 6-88 Human and Environmental Impacts – Alignment Alternative AA10, Cole Lake-Riverton Region

Resource	Element	Alignment Alternative AA10	Applicants' Equivalent
Length (miles)		0.9	0.9
Human Settlement	Residences within 0-75 feet (count)	0	1
	Residences within 75-250 feet (count)	1	0
	Residences within 250-500 feet (count)	0	4
	Residences within 500–1,000 feet (count)	10	5
Land-Based Economies	Agricultural land in 150-ft ROW	2	1
Water Resources	Total wetlands in 150-foot ROW (acres)	5	5
	Forested wetlands in 150-ft ROW (acres)	0	0
Vegetation	Forested landcover in 150-foot ROW (acres)	8	7
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	6	12
	Native Plant Communities in 150-foot ROW (acres)	2	8
	Federal- or state-protected species documented in 150-foot ROW (count)	1	1
ROW Sharing and Paralleling	Transmission line (miles, percent)	0.3 (31)	0 (0)
	Roadway (miles, percent)	0 (0)	0 (0)
	Field, parcel, or section lines (miles, percent)	0.6 (69)	0.9 (100)
	Total ROW sharing and paralleling (miles, percent)	0.9 (100)	0.9 (100)
Reliability	Crossing of existing transmission lines (count)	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$4.7	$4.8

6.3.9.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. For some of the human settlement elements, project impacts are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter. These resources, which are discussed exclusively in Chapter 5.3, include cultural values, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.3.9.1.1 Aesthetics

Aesthetic impacts differ by routing alternative. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure and ROW. Proximity of residences to alignment alternative AA10 are shown in Table 6-89, while ROW paralleling and sharing are shown in Table 6-90.

While the applicant's equivalent has one less residence within 1,000 feet compared to alignment alternative AA10, it has more residences within 500 feet. Alignment alternative AA10 minimizes new aesthetic impacts by paralleling existing transmission line ROW for a portion of its length, while the applicants' equivalent does not. Both alternatives are routed along field, parcel, or section lines for the remainder of their lengths. Based on the number of residences within 500 feet and the paralleling of existing transmission line ROW, alignment alternative AA10 minimizes aesthetic impacts to a greater extent than the applicants' equivalent.

Table 6-89 Cole Lake-Riverton Region Proximity of Residences to Alignment Alternative AA10

Residences, Distance from Anticipated Alignment	Alignment Alternative AA10	Applicants' Equivalent
Residences within 0-75 feet	0	1
Residences within 75-250 feet	1	0
Residences within 250-500 feet	0	4
Residences within 500-1,000 feet	10	5
Total Residences within 1,000 feet	11	10

Table 6-90 Cole Lake-Riverton Region ROW Sharing and Paralleling of Alignment Alternative AA10

Infrastructure	Alignment Alternative AA10 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0 (0)
Follows Existing Transmission Line	0.3 (31)	0 (0)
Total – Follows Transmission Line, Road, or Railroad	0.3 (31)	0 (0)
Follows Field, Parcel, or Section Lines	0.6 (69)	0.9 (100)
Total – ROW Paralleling and Sharing	0.9 (100)	0.9 (100)
Total Length of Alignment Alternative	0.9	0.9

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line and therefore the sum may be greater than 100 percent.

6.3.9.1.2 Displacement

Residences or other buildings are typically not allowed within the transmission line ROW, due to electrical safety code and maintenance reasons. Any residences or other buildings located within a proposed ROW are generally removed or displaced.

There are no churches, childcare centers, or schools located within the 150-foot ROW for the applicants' equivalent. However, there is one permanent residential building and one non-residential building (storage shed, agricultural outbuildings, etc.) located within the 150-foot ROW of the applicants' equivalent.

The residential building located within the 150-foot ROW of the applicants' equivalent could potentially be displaced as a result of the project. Similarly, the non-residential building may or may not be displaced as a result of the applicants' equivalent. Though buildings are generally not allowed with the ROW of a transmission line, there are instances where the activities taking place in these buildings are compatible with the safe operation of the line (e.g., storage, animal production, etc.). For each of the buildings noted here, the applicants would need to conduct a site-specific analysis to determine if the building would need to be displaced.

6.3.9.2 Land-Based Economies

Potential project impacts to land-based economies are assessed through an evaluation of several elements, summarized in Chapter 6.1.1. There are no agricultural lands, forestry resources, or active mining operations within the rights-of-way of alignment alternative AA10 or the applicants' equivalent. Additionally, there are few recreation and tourism opportunities, and these opportunities do not differ between alignment alternative AA10 or the applicants' equivalent. As a result, potential impacts to land-based economies would be minimal and independent of the route selected.

6.3.9.3 Archaeological and Historic Resources

There are no documented archaeological or historic architectural resources within the 1,000-foot route width of alignment alternative AA10 or the applicants' equivalent. As a result, impacts to cultural resources are anticipated to be minimal and independent of the route selected.

6.3.9.4 Natural Environment

6.3.9.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This routing alternative comparison discussion addresses watercourses and waterbodies and wetlands. Map 6-16 shows the water resources along alignment alternative AA10 and the applicants' equivalent.

6.3.9.4.1.1 Watercourses and Waterbodies

Alignment alternative AA10 and the applicants' equivalent would not cross any watercourses or waterbodies.

6.3.9.4.1.2 Wetlands

Table 6-88 identifies the acreage of wetlands crossed by alignment alternative AA10 and the applicants' equivalent. Alignment alternative AA10 and the applicants' equivalent have the same amount of wetland in their rights-of-way (5 acres) and do not cross forested wetland. In addition, the alignment alternative AA10 and the applicants' equivalent would not have a wetland crossing longer than 1,000 feet, meaning all wetland areas would be spanned.

6.3.9.4.2 Vegetation

The ROW of the alignment alternative AA10 and the applicants' equivalent would impact 7 to 8 acres of forested vegetation. However, the applicants' equivalent would fragment more forest, as it traverses the middle of a forested area, while alignment alternative AA10 would traverse the edge of forested areas. In addition, alignment alternative AA10 would also parallel an existing transmission line for 30 percent of its length, while the applicants' equivalent would not parallel any transmission line ROW.

6.3.9.4.3 Wildlife

Impacts to wildlife habitat would occur for alignment alternative AA10 and the applicants' equivalent as a result of removal of forested habitat in the ROW, with the applicants' equivalent resulting in the most habitat fragmentation because it does not parallel any existing transmission line or road ROW. As a result, the applicants' equivalent could pose an increased potential for impacts to avian species; however, as discussed in Chapter 5.10.5.2, these impacts can be minimized through use of bird flight diverters. Neither alignment alternative AA10 or the applicants' equivalent would traverse areas that are managed or preserved for wildlife.

6.3.9.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined that no federally protected species have been documented within 1 mile of alignment alternative AA10 or the applicants' equivalent. One state protected species, the Blanding's turtle has been documented within the ROW of alignment alternative AA10 and the applicants' equivalent (Appendix N).

The ROW of alignment alternative AA10 and the applicants' equivalent would intersect an SBS ranked high and native plant communities, with the applicants' equivalent intersecting significantly more acreage of both resources (Table 6-91; Map 6-16).

Table 6-91 Sensitive Ecological Resources in the ROW of Alignment Alternative AA10 and the Applicants' Equivalent

Sensitive Ecological Resource	Area within ROW of AA10	Area within ROW of Applicants' Equivalent
Sites of Biodiversity Significance	6 acres - ranked high	12 acres - ranked high
Native Plant Communities	2 acres - conservation status S3-S5	8 acres - conservation status S3-S5

6.3.9.6 Reliability

When one transmission line crosses another, reliability risks increase because the failure of one line can unexpectedly de-energize the other. Additionally, there is increased risk that if one transmission line falls,

it can bring down the other transmission line, resulting in two, rather than one, line failures. Furthermore, performing maintenance at the transmission line crossing creates a safety risk, as under normal operating conditions one line must remain energized while work is occurring on the other line. Therefore, where practical, new lines are typically designed to minimize transmission line crossings.

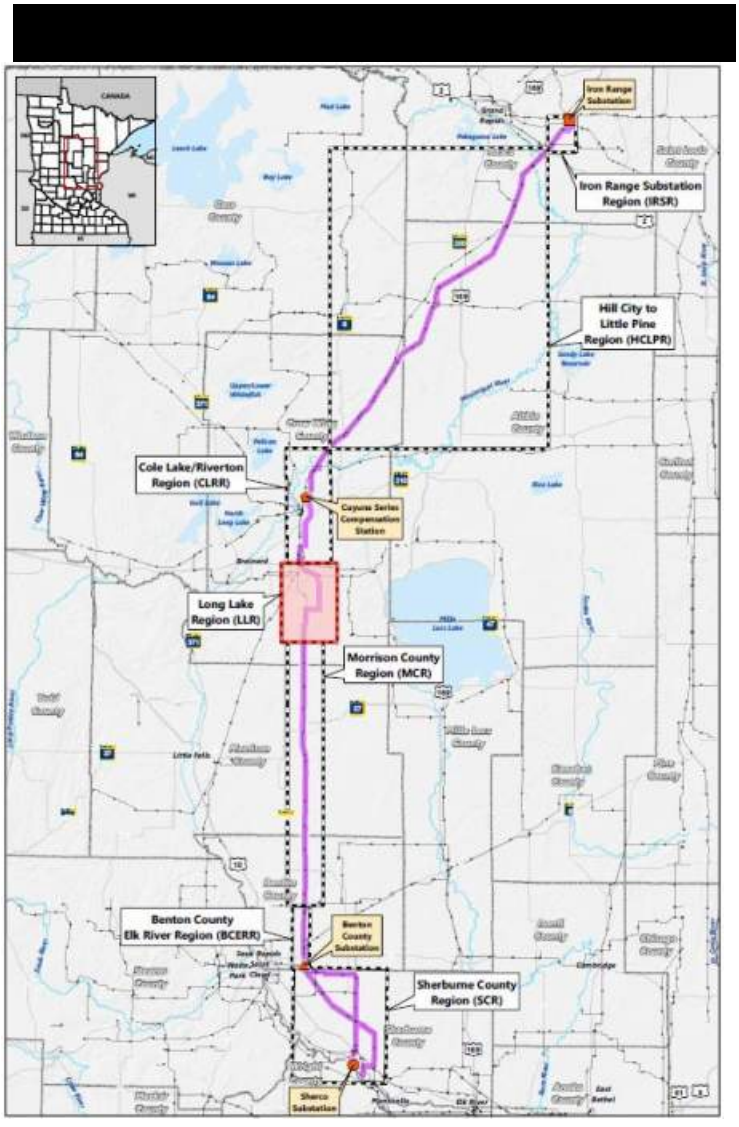
No transmission line crossings are required for these route alternatives.

6.3.9.7 Cost

Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-88). Alignment alternative AA10 and the applicants' equivalent are each very similar in cost, with no additional structure costs anticipated for these route alternatives. Alignment alternative AA10 is anticipated to cost approximately $4.7 million and the applicants' equivalent is anticipated to cost approximately $4.8 million, making alignment alternative AA10 slightly less expensive.

6.4 Long Lake Region

The Long Lake region is located in the central part of the project, in Crow Wing County (Figure 6-11). In addition to the applicants' proposed route, the region has eight route alternatives (H1, H2, H3, H4, H5, H6, H7, and K) and four alignment alternatives (AA12, AA13, AA14, and AA17) (Map Book 3A). Chapter 6.4.1 summarizes the potential impacts resulting from construction and operation of the applicants' proposed route in the Long Lake region. Chapter 6.4.2 provides a comparison of the potential impacts resulting from construction and operation of route alternatives H1, H2, H3, H4, H5, H6, H7, and the applicants' equivalent. Chapter 6.4.3 provides a comparison of the potential impacts resulting from construction and operation of route alternative K and the applicants' equivalent. Chapter 6.4.4 provides a comparison of the potential impacts resulting from construction and operation of alignment alternative AA12 and the applicants' equivalent. Chapter 6.4.5 provides a comparison of the potential impacts resulting from construction and operation of alignment alternative AA13 and the applicants' equivalent. Chapter 6.4.6 provides a comparison of the potential impacts resulting from



construction and operation of alignment alternative AA14 and the applicants' equivalent. Chapter 6.4.7 provides a comparison of the potential impacts resulting from construction and operation of alignment alternative AA17 and the applicants' equivalent.

6.4.1 Applicants' Proposed Route – Long Lake Region

Potential impacts of the applicants' proposed route in the Long Lake region are summarized in Table 6-92Table 6-1 and discussed in Chapters 6.4.1.1 through 6.4.1.5.

Table 6-92 Human and Environmental Impacts – Applicants' Proposed Route, Long Lake Region

Resource	Element	Applicants' Proposed Route
Length (miles)		14.3
Human Settlement	Residences within 0-75 feet (count)	0
	Residences within 75-250 feet (count)	3
	Residences within 250-500 feet (count)	4
	Residences within 500–1,000 feet (count)	22
Land-Based Economies	Agricultural land in 150-foot ROW	52
Water Resources	Total wetlands in 150-foot ROW (acres)	104
	Forested wetlands in 150-foot ROW (acres)	7
Vegetation	Forested landcover in 150-foot ROW (acres)	126
Wildlife	Grassland Bird Conservation Area in 150-foot ROW (acres)	84
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	114
	Federal- or state-protected species documented in 150-foot ROW (count)	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	7.4 (52)
	Roadway (miles, percent)	0 (0)
	Field, parcel, or section lines (miles, percent)	8.9 (62)
	Total ROW sharing and paralleling (miles, percent)	13.7 (96)
Estimated Cost	Total estimated cost (2022 dollars in millions)	$70.6

6.4.1.1 Human Settlements

As discussed in Chapter 5.3, potential human settlement impacts were assessed by looking at several human settlement evaluation elements: aesthetics, displacement, noise, property values, zoning and land-use compatibility, electronic interference, and cultural values. Proximity to homes, schools, and other human settlement features and the extent of ROW sharing with existing infrastructure are the primary

indicators of potential human settlement impacts. Human settlement impacts are minimized by routes that are located aware from homes and that share ROW with existing infrastructure.

For some of the human settlement elements in the Long Lake region, project impacts are anticipated to be minimal. For the Long Lake region, aesthetics is the only human settlement element for which impacts are anticipated to be non-minimal.

6.4.1.1.1 Aesthetics

Aesthetic impacts are assessed, in part, through a consideration of the existing viewshed, landscape, character, and setting of any given area, followed by an evaluation of how a proposed route alternative would change these aesthetic attributes (Chapter 5.3.1). Determining the relative scenic value or visual importance in any given area depends, in large part, on the values and expectations held by individuals and communities about the aesthetic resource in question.

Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure ROW. The proximity of the applicants' proposed route to residences is shown in Table 6-93. The sharing and paralleling of existing infrastructure ROW is shown in Table 6-94. Approximately half of the applicants' proposed route in the Long Lake Region would follow existing infrastructure ROW

Table 6-93 Long Lake Region Proximity of Residences to Applicants' Proposed Route

Residences, Distance from Anticipated Alignment	Applicants' Proposed Route
Residences within 0-75 feet	0
Residences within 75-250 feet	3
Residences within 250-500 feet	4
Residences within 500-1,000 feet	22
Total Residences within 1,000 feet	29

Table 6-94 Long Lake Region ROW Sharing and Paralleling of Applicants' Proposed Route

Infrastructure	Applicants' Proposed Route miles (percent)
Follows Existing Railroad	0 (0)
Follows Existing Roads	0 (0)
Follows Existing Transmission Line	7.4 (52)
Total – Follows Transmission Line, Road, or Railroad	7.4 (52)
Follows Field, Parcel, or Section Lines	8.9 (62)
Total – ROW Paralleling and Sharing	13.7 (96)
Total Length of Alternative	14.3

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line and therefore the sum may be greater than 100 percent.

6.4.1.2 Land-Based Economies

As discussed in Chapter 5.8, impacts on land-based economies are assessed by considering four elements: agriculture, forestry, mining, and recreation and tourism. For some of the elements of land-based economies in the Long Lake region, impacts from the project are anticipated to be minimal.

For the Long Lake region, agriculture, forestry, and recreation and tourism are the only elements of land-based economies for which impacts are anticipated to be non-minimal. There are no active mining operations within ROW of the applicants' proposed route. As a result, potential project impacts to mining would be minimal.

6.4.1.2.1 Agriculture

Project impacts to agriculture within the Long Lake region were evaluated through land use and soil types within the 150-foot ROW of the applicants proposed route. Map Book 5C provides an overview of land cover types crossed by the applicants' proposed route. Approximately 52 acres of the applicants' proposed route ROW (20 percent of the ROW in this region) consists of agricultural land comprised of cultivated crops and hay/pasture lands.

According to the MDA Organic Farm Directory, no registered organic producers are within the 150-foot ROW (reference (105)). According to the Minnesota Apiary Registry, no apiaries are located within the ROW (reference (106)). In addition, no agricultural lands are enrolled in the USDA FSA CREP program within the 150-foot ROW (reference (107)).

Potential construction and operation-related impacts to agricultural land are summarized in Chapter 5.8.1. Several measures could be implemented to avoid, minimize, or mitigate impacts to agricultural land, as described in Chapter 5.8.1.1.

6.4.1.2.2 Forestry

Impacts to forestry within the Long Lake region were primarily assessed by evaluating the designated forestry resources within the 150-foot ROW (Chapter 5.8.2). Approximately 126 acres of the applicants'

proposed route ROW consists of forested land (reference (108)) comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands (Map Book 5C).

The only designated forestry resources within the ROW of the applicants' proposed route are 16 acres of Minnesota School Trust land. Minnesota School Trust Lands are DNR-administered lands that are set aside to provide a continual source of funding for public education (reference (4)).

On whole, there are minimal potential impacts to designated forestry resources within the ROW of the applicants' proposed route. Vegetation clearing would include permanently removing trees from the ROW before construction. These physical impacts to forestry resources may result in negative financial impacts to state-owned forest lands and privately-owned commercial forest lands. As noted in Chapter 5.8.2.1, impacts to forestry resources could be mitigated by prudent routing and siting of staging areas. Where these areas cannot be avoided, commercial foresters and private landowners would be compensated for loss of timber from ROW clearing.

6.4.1.2.3 Recreation and Tourism

Recreation and tourism opportunities within the Long Lake region consist primarily of trail usage, including off-road vehicle trails and snowmobile trails. Since transmission line construction and operation generally has minimal permanent and temporary impacts to trails, recreation, and tourism, project impacts in this region are expected to be minimal.

The applicants' proposed route contains one off-road vehicle trail crossing and six snowmobile trail crossings (Map Book 5E). The applicants' proposed route parallels an existing transmission line ROW for approximately half of the route, reducing potential permanent impacts associated with operational noise and reduced aesthetic values (Chapter 5.8.4.1). Temporary impacts including trail closings during construction would occur but are expected to have a minimal impact on recreation.

6.4.1.3 Archaeological and Historic Resources

Archaeological and historic resource impacts are assessed by determining the presence of these resources within the project route width (Chapter 5.1.1). Map Book 5F provides an overview of archaeological and historic architectural resources in the Long Lake Region.

One previously documented historic architectural resource is located within the 1,000-ft route width of the applicants' proposed route (Table 6-95). Resource XX-ROD-00017, Trunk Highway 18, has been previously determined not eligible for the NRHP. Because this resource has been determined "not eligible", it cannot be adversely affected by the project and no additional work regarding this resource would be necessary.

Table 6-95 Cultural Resources within the Route Width of the Applicants' Proposed Route, Long Lake Region

Resource Number	Resource Type	NRHP Eligibility
XX-ROD-00017	Trunk Highway 18	Not Eligible

6.4.1.4 Natural Environment

6.4.1.4.1 Water Resources

Potential project impacts on water resources are examined by evaluating locations and conditions of watercourses and waterbodies, floodplains, wetlands, and groundwater. Project proximity to water bodies, watercourses, floodplains, wetlands, and groundwater wells and the necessity of crossing these features are the primary indicators of potential water resource impacts. Impacts to two elements of water resources, floodplains and groundwater, are anticipated to be minimal.

There are two water resource features where project impacts could be non-minimal: watercourses and waterbodies, and wetlands. This discussion focuses on those water resource features within the ROW or crossed by the routing alternatives. The number of surface water and wetland crossings is an important consideration when evaluating routes, even though there may be no direct impacts associated with these crossings. The crossings are important because of the potential indirect impacts associated with them (i.e., clearing of vegetation, soil movement). The amount of forested wetland within the ROW is also an important consideration when evaluating routes. Since large-growing woody vegetation would be cleared from the ROW, forested wetlands would be converted to other wetland types, resulting in permanent impacts. Map Book 5G shows the water resources along the applicants proposed route.

6.4.1.4.1.1 Watercourses and Waterbodies

According to the NHD, the applicants' proposed route would cross seven watercourses in the Long Lake region, including one public water watercourses (Nokasippi River) and two impaired streams: the Nokasippi River and an unnamed creek. The applicants' proposed route would also cross two NHD waterbodies, one of which is classified as impaired. The applicants' proposed route would not cross any public water basins in the Long Lake region.

It is anticipated that the watercourse and waterbodies would be spanned. Since no structures are anticipated to be placed within watercourses or waterbodies, no direct impacts to these resources are anticipated. Indirect impacts to these resources, such as increases in turbidity, could be minimized by using BMPs and by choosing a route alternative that has relatively fewer crossings of waterbodies and watercourses.

6.4.1.4.1.2 Wetlands

The applicants' proposed route cross approximately 104 acres of NWI wetlands in the Long Lake region. The NWI wetlands consist mainly of emergent wetlands (60 acres), shrub wetlands (35 acres), and forested wetlands (7 acres). The remaining area consists of 1 acre of ponded and riverine wetlands. There no PWI wetlands along the applicants' proposed route in the Long Lake region.

Although wetlands would be spanned to the extent possible, the applicants proposed route would cross several wetland areas wider than 1,000 feet, which may require one or more structures to be placed in a wetland. Placement of structures in a wetland would result in permanent impacts to that wetland. Permanent impacts to wetlands could also occur if wetlands in the ROW are forested. Forested wetlands would be converted to non-forested wetland types, as trees are not allowed within transmission line rights-of-way. Impacts associated with converting forested wetlands to non-forested wetland types could be minimized by selecting a route alternative with fewer forested wetlands in the ROW.

6.4.1.4.2 Vegetation

Vegetation impacts were evaluated by examining vegetative landcover within the 150-foot ROW (Chapter 5.10.4.1). Map Book 5C provides an overview of vegetative cover in the Long Lake region, and Table 6-96 summarizes the landcover types within the ROW of the applicants' proposed route within this region. The dominant vegetative landcover in the ROW of the applicants' proposed route in this region consists of forest, which represents approximately 48 percent of the ROW. Forest types include forested wetlands and upland deciduous, coniferous, and mixed forest communities.

Table 6-96 Landcover Types in the 150-foot ROW of the Applicants' Proposed Route in the Long Lake Region

Landcover Type	Acres in ROW	Percent of ROW[1]
Forested (upland and wetland)	126	48
Herbaceous (upland and wetland)	75	29
Agricultural (cultivated crops and hay/pasture)	52	20
Developed (low-high intensity; open space)	4	1
Shrub/Scrub	3	1
Open Water	<1	<1

Source: reference (110).
1 Totals may not sum to 100 percent due to rounding.

As discussed in Chapter 5.10.4.1, the applicants would clear forested vegetation from the ROW during construction, and the ROW would be maintained with low-growing vegetation to minimize potential interference with the transmission line. Approximately 52 percent of the applicants' proposed route in the Long Lake region would parallel an existing transmission line ROW where the forested areas have already been fragmented, thereby minimizing new impacts to forest vegetation in these areas.

6.4.1.4.3 Wildlife

Impacts to wildlife are primarily assessed by evaluating the presence of wildlife habitat, including areas that are preserved or managed for wildlife habitat, within the ROW. The applicants' proposed route in the Long Lake region would parallel an existing transmission line ROW for approximately 52 percent of its length. In these areas, the ROW of the applicants' proposed route would be placed adjacent to an area where wildlife habitat has been previously disturbed, thereby minimizing potential impacts associated with habitat fragmentation. In areas where the applicants' proposed route does not parallel an existing transmission line ROW, impacts to wildlife habitat could occur from conversion, fragmentation, or placement of structures. In addition, there would be increased potential for impacts to avian species in areas where the applicants' proposed route does not parallel an existing transmission line ROW.

The applicants' proposed route would traverse approximately 84 acres of USFWS GBCA (Map Book 5H). While the majority of these GBCA would be traversed by paralleling an existing transmission line ROW, the ROW of the applicants' proposed route would require the establishment of new transmission line ROW through approximately 19 acres of GBCA. This would result in fragmentation of wildlife habitat within these areas, as well as create an increased potential for impacts to avian species in this area. However, as discussed in Chapter 5.10.5.2, avian impacts can be minimized through use of bird flight diverters.

Potential construction and operation-related impacts to wildlife are summarized in Chapter 5.10.5. Several measures could be implemented to avoid, minimize, or mitigate impacts to wildlife, as described in Chapter 5.10.5.

6.4.1.5 Rare and Unique Natural Resources

Impacts to rare and unique natural resources are primarily assessed by evaluating the presence of federal- and state-protected species within a 1-mile radius of the anticipated alignments and the presence of sensitive ecological resources within the 150-foot ROW (Chapter 5.10). Map Book 5I provides an overview of sensitive ecological resources within the Long Lake region; in order to protect federally and state protected species from exploitation or destruction, documented locations of these species are not identified on any maps.

6.4.1.5.1 Protected Species

Using the NHIS database, it was determined that no federal- or state-protected species or state special concern species have been documented within 1 mile of the applicants' proposed route in the Long Lake region. Formal surveys for protected species have not been conducted for the project; as such, it is possible that protected species could be present where suitable habitat is available within the ROW. Potential impacts to protected species could occur should they be present within or near the ROW. While more mobile species would leave the area for nearby comparable habitats, non-mobile organisms, such as vascular plants or nesting birds, could be directly impacted.

Potential construction and operation-related impacts to protected species are summarized in Chapter 5.11.1.3. Several measures could be implemented to avoid, minimize, or mitigate impacts to protected species, as described in Chapter 5.11.1.3. In addition, the applicants may be required to conduct field surveys for protected species in coordination with the USFWS and/or DNR prior to construction.

6.4.1.5.2 Sensitive Ecological Resources

The ROW of the applicants' proposed route in the Long Lake region would traverse approximately 114 acres of SBS ranked high, approximately 20 acres of which would traverse the SBS while paralleling an existing transmission line ROW (Map Book 5I). As such, new impacts to approximately 94 acres SBS would occur as a result of establishing a new transmission line ROW through the SBS. In addition, because the SBS is too large to span, transmission line structures would need to be placed within it.

Potential construction and operation-related impacts to sensitive ecological resources are summarized in Chapter 5.11.2.1 and 5.11.1.3. Several measures could be implemented to avoid, minimize, or mitigate impacts to sensitive ecological resources, as described in Chapter 5.11.2.1. In addition, the applicants may be required to conduct field surveys in coordination with the USFWS and/or DNR for the potential presence of protected species within sensitive ecological resources that cannot be avoided.

6.4.2 Route Alternatives H1 through H7 – Long Lake Region

Route alternatives H1 through H7 provide different options to the applicants' proposed route in the northern half of the Long Lake region. Route alternatives H1 and H2 are shifted from the applicants' proposed route to avoid impacts to an AMA; however, as noted in Chapter 5.10.5, recent data from the DNR website and the latest spatial data downloaded in March 2024 from Minnesota Geospatial Commons do not list any AMA's within the ROW of the applicants' proposed route.

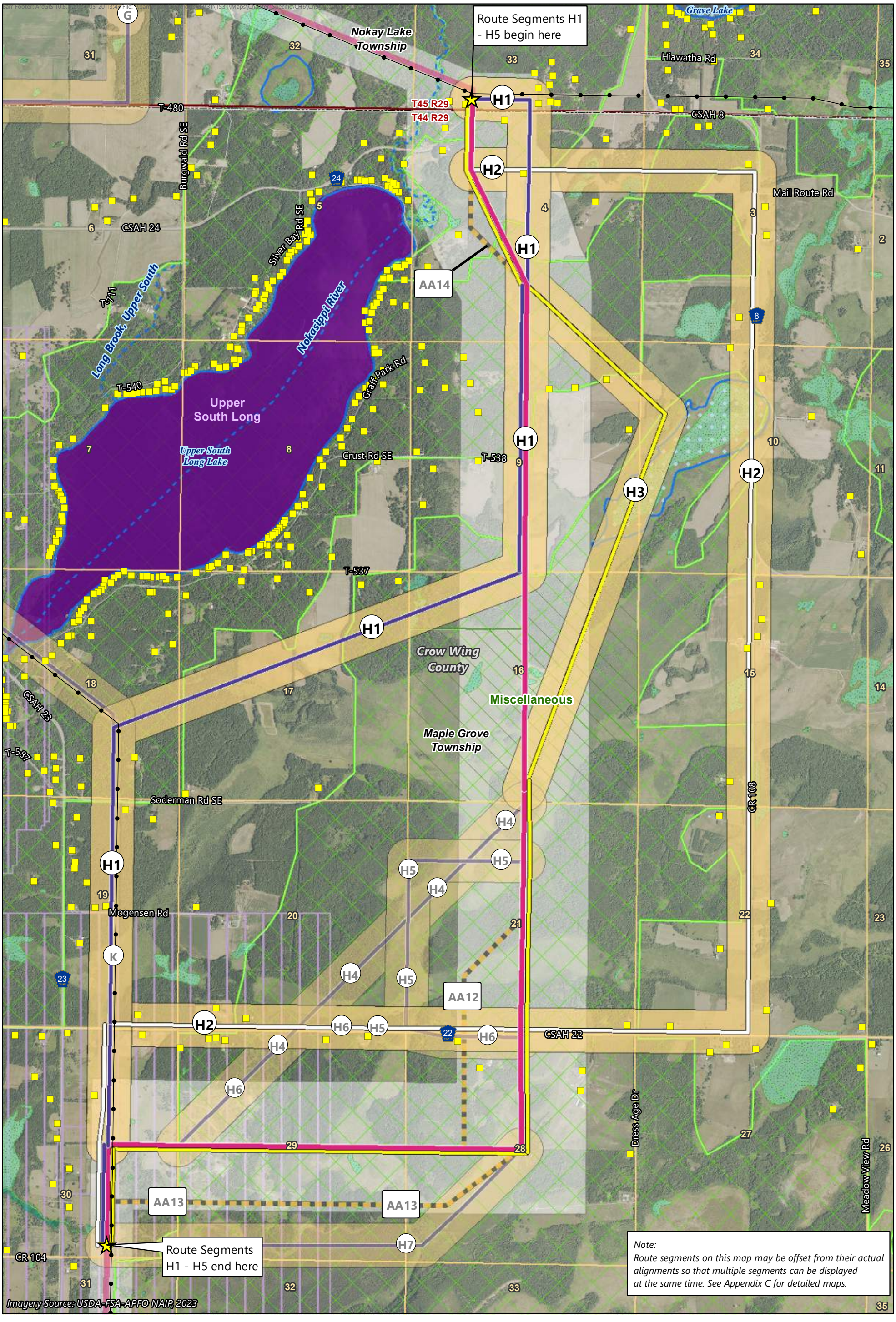
Route alternative H1 would parallel an existing transmission line ROW for approximately one-third of its length, while route alternative H2 would parallel existing transmission line ROW for approximately one-sixteenth of its length. Route alternative H3 is shifted from the applicants' proposed route to avoid impacts to private property enrolled in a state program. It does not include any transmission line ROW sharing, paralleling, or double-circuiting. Route alternative H4 is shifted from the applicants' proposed route to go through tax-forfeited land instead of private property and also does not include any transmission line ROW sharing, paralleling, or double-circuiting. Route alternatives H5, H6, and H7 are shifted from the applicants' proposed route to avoid impacts to private property and natural resources, and do not include any transmission line ROW sharing, paralleling, or double-circuiting. Potential impacts of the route alternatives and the applicants' equivalent are summarized in Table 6-97 and shown on Map 6-20 and Map 6-21.

Table 6-97 Human and Environmental Impacts – Route Alternatives H1 through H7, Long Lake Region

Resource	Element	Route Alternative H1	Route Alternative H2	Route Alternative H3	Route Alternative H4	Route Alternative H5	Route Alternative H6	Route Alternative H7	Applicants' Equivalent
Length (miles)		6.5	9.0	7.2	6.0	6.5	6.6	6.6	6.8
Human Settlement	Residences within 0-75 feet (count)	0	1	0	0	0	0	0	0
	Residences within 75-250 feet (count)	4	10	1	1	2	3	1	1
	Residences within 250-500 feet (count)	7	19	1	0	1	1	0	0
	Residences within 500–1,000 feet (count)	25	17	11	12	11	12	8	10
Land-Based Economies	Agricultural land in 150-foot ROW	26	59	16	14	14	15	4	14
Water Resources	Total wetlands in 150-foot ROW (acres)	25	31	54	42	48	38	65	47
	Forested wetlands in 150-foot ROW (acres)	<1	1	11	3	3	3	13	5
Vegetation	Forested landcover in 150-foot ROW (acres)	65	70	80	67	66	74	75	77
Wildlife	Grassland Bird Conservation Area in 150-foot ROW (acres)	26	35	26	31	30	30	18	26
	Shallow Wildlife Lake in 150-foot ROW (acres)	0	4	6	0	0	0	0	0

Resource	Element	Route Alternative H1	Route Alternative H2	Route Alternative H3	Route Alternative H4	Route Alternative H5	Route Alternative H6	Route Alternative H7	Applicants' Equivalent
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	55	65	107	79	90	90	100	95
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0	0	0	0	0	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	2.5 (39)	1.0 (11)	0.4 (6)	0.4 (7)	0.4 (7)	0.4 (7)	0 (0)	0.4 (6)
	Roadway (miles, percent)	0 (0)	2.8 (31)	0 (0)	0 (0)	0.5 (7)	1.0 (15)	0 (0)	0 (0)
	Field, parcel, or section lines (miles, percent)	2.2 (34)	8.2 (91)	3.7 (51)	2.9 (48)	4.8 (74)	4.8 (74)	4.1 (62)	5.8 (85)
	Total ROW sharing and paralleling (miles, percent)	4.5 (70)	9.0 (100)	4.1 (57)	3.3 (55)	5.2 (80)	5.3 (80)	4.1 (62)	6.3 (92)
Reliability	Crossing of existing transmission lines (count)	0	0	0	0	0	0	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$31.9	$45.2[1]	$36.4[2]	$30.3[3]	$35.3[4]	$34.7[5]	$33.3[6]	$33.9

1 One heavy-angle structure would be needed for an additional cost of approximately $740,000 ($44.4 million base cost).
2 One heavy-angle structure would be needed for an additional cost of approximately $740,000 ($35.6 million base cost).
3 One heavy-angle structure would be needed for an additional cost of approximately $740,000 ($32.3 million base cost).
4 Four heavy-angle structures would be needed for an additional cost of approximately $740,000 per structure ($32.3 million base cost).
5 Three heavy-angle structures would be needed for an additional cost of approximately $740,000 per structure ($32.5 million base cost).
6 One heavy-angle structure would be needed for an additional cost of approximately $740,000 ($32.5 million base cost).



- Route Segment H1
- Route Segment H2
- Route Segment H3
- Applicants' Route H Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Residence
- PWI Watercourse
- PWI Waterbody
- Shallow Wildlife Lake
- Grassland Bird Conservation Areas
- Other DNR Land

Lakes of Biological Significance
- Outstanding Significance

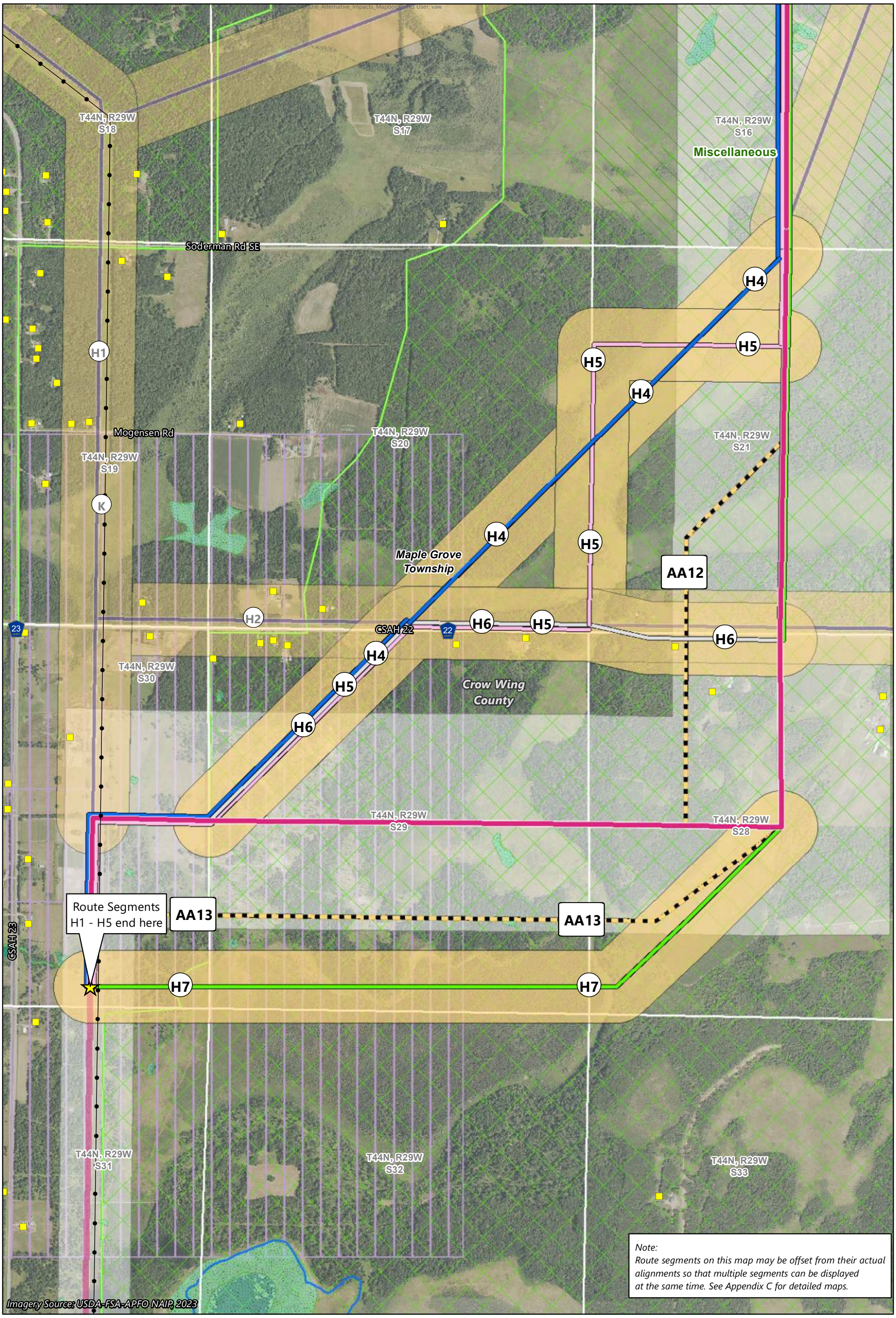
Wetlands
- Non-Forested Wetland
- Forested Wetland

Site of Biodiversity Significance
- Moderate Significance

Feet
0 1,000 2,000

Map 6-20

ROUTE ALTERNATIVES H1 - H3
Long Lake Region
Northland Reliability Project



Route Segment H4
Route Segment H5
Route Segment H6
Route Segment H7
Applicants' Route H Equivalent
Alignment Alternative 12
Alignment Alternative 13

Route Width
Route Alternative Width
Existing Transmission Line
Residence
PWI Waterbody
Grassland Bird Conservation Areas
Other DNR Land

Wetlands
Non-Forested Wetland
Forested Wetland

Site of Biodiversity Significance
Moderate Significance

Feet
0 600 1,200

Map 6-21

ROUTE ALTERNATIVES H4 - H7 AND ALIGNMENT ALTERNATIVES AA12 AND AA13

Long Lake Region
Northland Reliability Project

6.4.2.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. For some of these human settlement elements, project impacts are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter. These elements include cultural values, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.4.2.1.1 Aesthetics

Aesthetic impacts vary by routing alternative. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure and ROW. Proximity of residences to route alternatives H1 through H7 and the applicants' equivalent are shown in Table 6-98, while ROW paralleling and sharing are shown in Table 6-99.

Route alternatives H1 and H2 have more than double the number of residences in proximity to them compared to the other route alternatives, with route alternative H1 also having one residence in its ROW. Route alternative H7 is near the fewest number of residences. While route alternatives H1 and H2 have the most residences in proximity, they also have the greatest opportunity to follow existing infrastructure ROW (approximately 40 percent of the lengths of each). Route alternatives H3, H4, and the applicants' equivalent would follow very little existing infrastructure; route alternative H7 would not follow any infrastructure ROW. No route alternative best minimizes aesthetic impacts; the alternatives that share the most ROW with existing infrastructure also have the most homes in proximity.

Table 6-98 Long Lake Region Proximity of Residences to Route Alternatives H1 through H7

Residences, Distance from Anticipated Alignment	Route Alternative H1	Route Alternative H2	Route Alternative H3	Route Alternative H4	Route Alternative H5	Route Alternative H6	Route Alternative H7	Applicants' Equivalent
Residences within 0-75 feet	0	1	0	0	0	0	0	0
Residences within 75-250 feet	4	10	1	1	2	3	1	1
Residences within 250-500 feet	7	19	1	0	1	1	0	0
Residences within 500-1,000 feet	25	17	11	12	11	12	8	10
Total Residences within 1,000 feet	36	47	13	13	14	16	9	11

Table 6-99 Long Lake Region ROW Sharing and Paralleling of Route Alternatives H1 through H7

Infrastructure	Route Alternative H1 miles (percent)	Route Alternative H2 miles (percent)	Route Alternative H3 miles (percent)	Route Alternative H4 miles (percent)	Route Alternative H5 miles (percent)	Route Alternative H6 miles (percent)	Route Alternative H7 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Follows Existing Roads	0 (0)	2.8 (31)	0 (0)	0 (0)	0.5 (7)	1.0 (15)	0 (0)	0 (0)
Follows Existing Transmission Line	2.5 (39)	1.0 (11)	0.4 (6)	0.4 (7)	0.4 (7)	0.4 (7)	0 (0)	0.4 (6)
Total – Follows Transmission Line, Road, or Railroad	2.5 (39)	3.7 (41)	0.5 (6)	0.4 (7)	0.9 (14)	1.4 (21)	0 (0)	0.5 (7)
Follows Field, Parcel, or Section Lines	2.2 (34)	8.2 (91)	3.7 (51)	2.9 (48)	4.8 (74)	4.8 (74)	4.1 (62)	5.8 (85)
Total – ROW Paralleling and Sharing	4.5 (70)	9.0 (100)	4.1 (57)	3.3 (55)	5.2 (80)	5.3 (80)	4.1 (62)	6.3 (92)
Total Length of Route Alternative	6.5	9.0	7.2	6.0	6.5	6.6	6.6	6.8

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line, and therefore, the sum may be greater than 100 percent.

6.4.2.1.2 Displacement

Residences or other buildings are typically not allowed within the transmission line ROW, due to electrical safety code and maintenance reasons. Any residences or other buildings located within a proposed ROW are generally removed or displaced.

There are no permanent residences, churches, childcare centers, schools, or non-residential buildings located within the 150-foot ROW for route alternatives H1, H3, H4, H5, H6, H7, or the applicants' equivalent. However, route alternative H2 has one residential building and four non-residential buildings (storage shed, agricultural outbuildings, etc.) located within the proposed 150-foot ROW.

The permanent residence may potentially be displaced if route alternative H2 is selected. Similarly, the non-residential buildings may or may not be displaced as a result of route alternative H2. Though buildings are generally not allowed with the 150-foot transmission line ROW, there are instances where the activities taking place in these buildings are compatible with the safe operation of the line (e.g., storage, animal production, etc.). For each of the buildings noted here, the applicants would need to conduct a site-specific analysis to determine if the building would need to be displaced.

6.4.2.2 Land-Based Economies

Potential project impacts to land-based economies are assessed through an evaluation of several elements.. There are no active mining operations within the ROW of the route alternatives H1 through H7 or the ROW of the applicants' equivalent. Therefore, potential project impacts to mining would be minimal and independent of the route selected.

6.4.2.2.1 Agriculture

Agricultural land impacts differ between route alternatives H1 through H7 and the applicants' equivalent. The ROW of route alternative H7 contains the least amount of agricultural land (4 acres), while the ROW of route alternative H4 contains the most acres of agricultural land (59 acres).

According to the USDA FSA (reference (107)), MDA Organic Farm Directory (reference (105)), and MDA Apiary Registry (reference (106)), there are no CREP enrolled lands, registered organic producers, or apiaries within the 150-foot ROW of the route alternatives or the applicants' equivalent.

6.4.2.2.2 Forestry

Impacts to forestry within the Long Lake region were primarily assessed by evaluating the designated forestry resources within the 150-foot ROW (Chapter 5.8.2). Forestry impacts are fairly similar across the routing alternatives; impacts range from 65 to 80 acres of forested land within the ROW. (reference (108)).

The forested land is comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands within this region (Map Book 5C). The only designated forestry resource within the ROW of the routing alternatives is Minnesota School Trust land; however, the ROWs of route alternatives H1 and H2 do not contain this resource (Table 6-100).

Table 6-100 Designated Forestry Resources within the 150-foot ROW of Route Alternatives H1 Through H7

Forestry Resources	Route Alternative H1	Route Alternative H2	Route Alternative H3	Route Alternative H4	Route Alternative H5	Route Alternative H6	Route Alternative H7	Applicants' Equivalent
Acres of Minnesota School Trust Land[1] within 150-foot ROW	0	0	19	16	16	16	15	16

Data Sources: reference (4)

1 Minnesota School Trust Lands are DNR-administered lands that are set aside to provide a continual source of funding for public education (reference (4).

Route alternatives H3, H4, H5, H6, H7 and the applicants' equivalent would have similar minimal potential impacts to designated forestry resources within the 150-foot ROW. Route alternative H1 and H2 would both have the fewest impacts because their rights-of-way do not contain designated forestry resources.

6.4.2.2.3 Recreation and Tourism

Recreation and tourism opportunities within the Long Lake region consist primarily of trail usage, including off-road vehicle trails and snowmobile trails. Since transmission line construction and operation generally has minimal permanent and temporary impacts to trails, recreation, and tourism, project impacts in this region are expected to be minimal.

Each of the route alternatives and the applicants' equivalent have trail crossings, which include off-road vehicle trail crossings and snowmobile trail crossings (Map Book 5E). Each route alternative would have a similar number of trail crossings with one off-road vehicle use crossing and at least two snowmobile trail crossings; route alternatives H2 and H5 would have four snowmobile trail crossings. Permanent impacts such as increased noise and reduced aesthetic values would be minimal. Additionally, temporary impacts including trail closings during construction would occur but are expected to have a minimal impact on recreation.

6.4.2.3 Archaeological and Historic Resources

Two previously documented cultural resources are located within the 1,000-foot route width of route alternative H2 (Table 6-101), as shown on Map Book 5F. No other cultural resources have been documented within the route widths of any of the "H series" route alternatives.

Table 6-101 Cultural Resources within the Route Width of Route Alternatives H1 through H7 and the Applicants' Equivalent

Resource Number	Resource Type	NRHP Eligibility	Location
21CWak	Precontact artifact scatter	Not evaluated	route alternative H2
CW-MGT-00001	Maple Grove Township Hall	Not evaluated	route alternative H2

Resource CW-MGT-0000, Maple Grove Township Hall, has not been evaluated for the NRHP. The route width of route alternative H2 has the potential to alter this resource's setting, feeling, appearance, and/or association.

Archaeological site 21CWak may also be impacted by the project if this site falls within the footprint of ground disturbance. Ground disturbing activities resulting from the project has the potential to impact this resource if it cannot be avoided by the project.

The primary means to minimize archaeological and historic architectural resource impacts is prudent routing or structure placement – i.e., avoiding known archaeological and historic resources. If they cannot be avoided, impacts to these resources could be mitigated by measures developed in consultation with the SHPO prior to construction. Based on the above discussion, route alternative H2 has the most potential to impact archaeological and historic architectural resources.

6.4.2.4 Natural Environment

6.4.2.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This routing alternative comparison discussion addresses watercourses and waterbodies, and wetlands. Map 6-20 and Map 6-21 show the water resources along route alternatives H1 through H7.

6.4.2.4.1.1 Watercourses and Waterbodies

Table 6-102 identifies the watercourses and waterbodies crossed by route alternatives H1 through H7 and the applicants' equivalent. None of the route alternatives or the applicants' equivalent would cross any impaired streams, PWI watercourses, or impaired lakes. Route alternative H1 has the most NHD stream crossings (5); however, all are small streams that could be spanned by the transmission line. Route alternative H1 also has the most waterbody crossings (2), both of which could be spanned.

Route alternative H2 and H3 would cross an unnamed PWI basin, which is large enough that it could not be spanned and would require placement of one or more structures in the PWI basin. Route alternatives H4, H5, H6, H7 and the applicants' equivalent would require new transmission line ROW, would have the same number of watercourse crossings, and would not cross any public water basins or lakes.

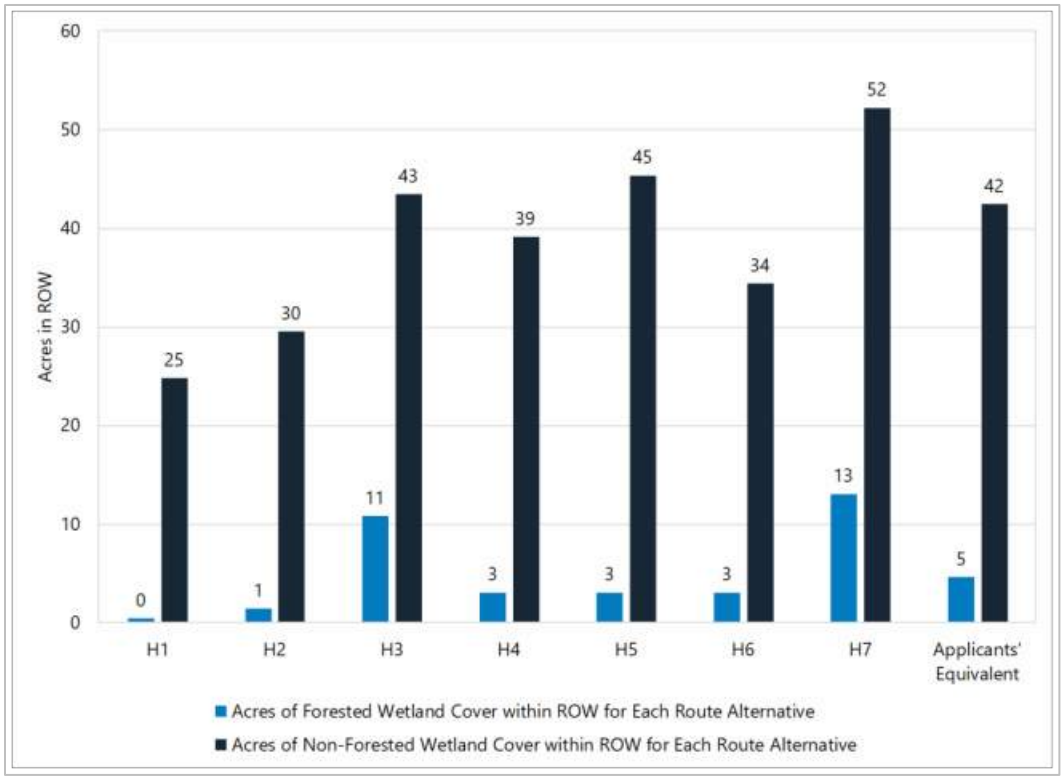
Table 6-102 Watercourses and Waterbodies Crossed by Route Alternative H1 through H7 and the Applicants' Equivalent

Resources	Route Alternative H1	Route Alternative H2	Route Alternative H3	Route Alternative H4	Route Alternative H5	Route Alternative H6	Route Alternative H7	Applicants' Equivalent
Number of NHD stream crossings	5	2	2	2	2	2	2	2
Number of impaired stream crossings	0	0	0	0	0	0	0	0
Number PWI stream crossings	0	0	0	0	0	0	0	0
Number of NHD lake crossings	2	1	0	0	0	0	0	0
Number of impaired lake crossings	0	0	0	0	0	0	0	0
Number of PWI basin crossings	0	1	1	0	0	0	0	0

6.4.2.4.1.2 Wetlands

Figure 6-12 identifies the acreage of wetlands crossed by route alternatives H1 through H7 and the applicants' equivalent. Route alternative H7 would cross more forested and non-forested wetland than the other route alternatives. Route alternative H1 would have the least amount of non-forested and forested wetland in its ROW. Route Alternative H1 would have one wetland crossing over 1,000 feet that could not be spanned; however, this crossing is adjacent to an existing transmission line that already crosses the same wetland. Route alternative H1 would be co-located with the existing transmission line for 2.6 miles, which would reduce the disturbance to forested wetlands. The applicants' equivalent would have the most wetland crossings (9) over 1,000 feet, which would require placement of one or more structures in wetlands.

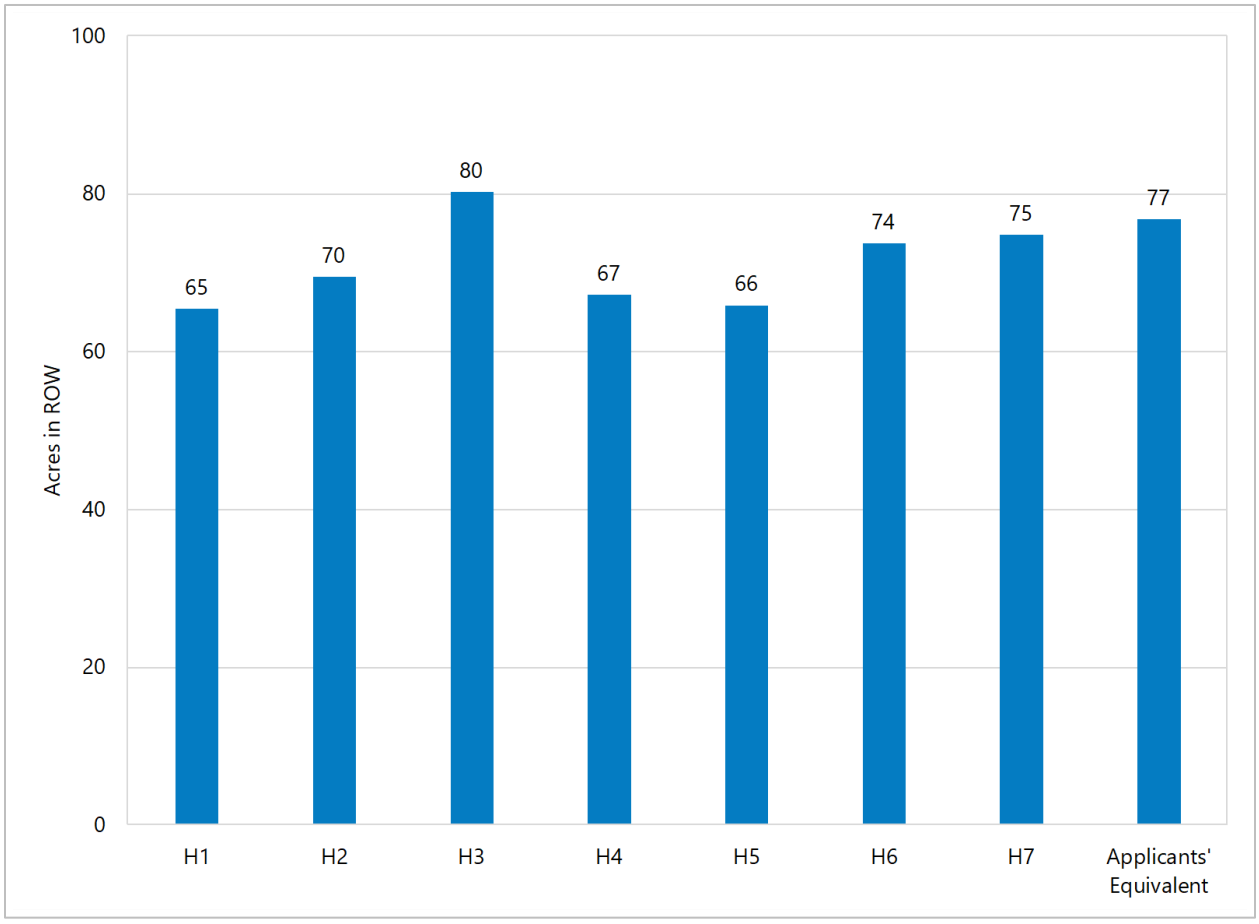
Figure 6-12 Acres of Wetlands Crossed by Route Alternatives H1 through H7 and the Applicants' Equivalent



6.4.2.4.2 Vegetation

Route alternatives H1 through H7 and the applicants' equivalent would all impact forested vegetation, with route alternative H3 having slightly more impact and route alternatives H1, H4, and H5 having slightly less impact on forested vegetation in the ROW (Figure 6-13). All route alternatives and the applicants' equivalent would fragment areas of dense forest despite paralleling existing ROW for some alternatives. Impacts to forested vegetation and forest fragmentation would be relatively comparable across route alternatives, with route alternative H3 having slightly more impact.

Figure 6-13 Forested Vegetation in the 150-foot ROW of Route Alternatives H1 through H7 and the Applicants' Equivalent



6.4.2.4.3 Wildlife

Impacts to wildlife habitat would occur for route alternatives H1 though H7 and the applicants' equivalent. However, route alternatives H1 and H2 would minimize impacts associated with habitat fragmentation by paralleling existing ROW (39 percent transmission line for H1 and 41 percent road/transmission line for H2), while H7 would parallel existing rights-of-way for less than 1 percent of its length.

All route alternatives and the applicants' equivalent would traverse a Grassland Bird Conservation Area (Table 6-103; Map 6-20 and Map 6-21). Route alternative H1 would minimize impacts to the Grassland Bird Conservation Area by paralleling an existing transmission line ROW while traversing it, while route alternatives H2 through H7 and the applicants' equivalent would all require new transmission line ROW through it. The ROW of route alternatives H2 and H3 would traverse Swamp Lake, a DNR-identified shallow wildlife lake; both route alternatives would require establishing a new transmission line ROW through it (Table 6-103; Map 6-20 and Map 6-21). Construction of new transmission line ROW through the Grassland Bird Conservation Area and Swamp Lake could increase the potential for impacts to avian species traveling through these areas. However, as discussed in Chapter 5.10.5.2, avian impacts can be minimized through use of bird flight diverters.

Table 6-103 Acres of Grassland Bird Conservation Area in 150-foot ROW for Route Alternatives H1 through H7 and the Applicants' Equivalent

Resource	Route Alternative H1	Route Alternative H2	Route Alternative H3	Route Alternative H4	Route Alternative H5	Route Alternative H6	Route Alternative H7	Applicants' Equivalent
Grassland Bird Conservation Area	26 acres	35 acres	26 acres	31 acres	30 acres	30 acres	18 acres	26 acres
DNR Shallow Wildlife Lake	0 acres	4 acres	6 acres	0 acres	0 acres	0 acres	0 acres	0 acres

Route alternative H1 would minimize impacts to wildlife by avoiding Swamp Lake and paralleling the most existing transmission line ROW, including through the Grassland Bird Conservation Area.

6.4.2.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined that no federal- or state-protected species, or state species of special concern have been documented within 1 mile of route alternatives H1 through H7 and the applicants' equivalent.

The ROW of route alternatives H1 through H7 and the applicants' equivalent would intersect a DNR SBS ranked moderate, with the ROW of route alternative H1 intersecting the least (55 acres) and H3 intersecting the most (107 acres; Table 6-97; Map 6-20 and Map 6-21).

6.4.2.6 Reliability

When one transmission line crosses another, reliability risks increase because the failure of one line can unexpectedly de-energize the other. Additionally, there is increased risk that if one transmission line falls, it can bring down the other transmission line, resulting in two, rather than one, line failures. Furthermore, performing maintenance at the transmission line crossing creates a safety risk, as under normal operating conditions one line must remain energized while work is occurring on the other line. Therefore, where practical, new lines are typically designed to minimize transmission line crossings.

No transmission line crossings are required for these route alternatives.

6.4.2.7 Cost

Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-97). Route alternatives H2, H3, and H4 would each require one heavy angle structure. Route alternative H5 would require four additional heavy-angle structures while route alternative H6 would require three additional heavy-angle structures. Route alternative H7 would require one additional heavy angle structure. Route alternative H1 and the applicants' equivalent require only tangent structures.

Of these eight route alternatives, route alternative H1 is the least expensive at approximately $30 million and route alternative H2 is the most expensive at approximately $45 million. The remaining route alternatives range between $31 million to $36 million.

6.4.3 Route Alternative K – Long Lake Region

Route alternative K provides an option to the applicants' equivalent in the northern part of the Long Lake region. Route alternative K shifts west from the applicants' equivalent in an effort to reduce cost and limit impacts to natural resources. Route alternative K would share existing transmission line ROW for its entire length, including where the line would cross between South Long Lake and North Long Lake. Potential impacts of route alternative K and the applicants' equivalent are summarized in Table 6-104 and shown on Map 6-22.

Table 6-104 Human and Environmental Impacts – Route Alternative K, Long Lake Region

Resource	Element	Route Alternative K	Applicants' Equivalent
Length (miles)		6.8	9.8
Human Settlement	Residences within 0-75 feet (count)	2	0
	Residences within 75-250 feet (count)	3	2
	Residences within 250-500 feet (count)	10	4
	Residences within 500–1,000 feet (count)	38	13
Land-Based Economies	Agricultural land in 150-foot ROW	60	20
Water Resources	Total wetlands in 150-foot ROW (acres)	28	78
	Forested wetlands in 150-foot ROW (acres)	1	5
Vegetation	Forested landcover in 150-foot ROW (acres)	33	98
Wildlife	Grassland Bird Conservation Area in 150-foot ROW (acres)	52	18
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	30	114
	Lake of Biological Significance in 150-foot ROW (acres)	1	0
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	6.8 (100)	3.0 (30)
	Roadway (miles, percent)	0 (0)	0 (0)
	Field, parcel, or section lines (miles, percent)	0.1 (2)	6.3 (64)
	Total ROW sharing and paralleling (miles, percent)	6.8 (100)	9.3 (94)
Reliability	Crossing of existing transmission lines (count)	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$33.7[1]	$48.6

1 This route alternative may require displacing residences and non-residential buildings. There is no way to estimate displacement cost at this time.

Route Segments
K begins here

Alignment
Alternative 11
begins here

Alignment
Alternative
11 ends here

AA14

AA12

AA13

AA13

Route Segments
K ends here

Mud Lake

CR 159

Oak Lawn
Township

T45 R30

T45 R29

Nokay Lake
Township

Nokassippi River State
Aquatic Management
Area (Crow Wing)

Grave Lake

Sand Creek

T45 R30

T44 R30

T45 R29

T44 R29

Telef
Paulson
WMA

CR 148

CR 144

Long Brook, Upper South

Nokasippi River

Upper
South Long

Upper South
Long Lake

Crow Wing
County

Long Lake
Township

T44 R30

T44 R29

South Long

South
Long
Lake

South Long Lake State
Aquatic Management
Area (Crow Wing)

Maple Grove
Township

Miscellaneous

CR 108

CR 104

Note:
Route segments on this map may be offset from their actual alignments so that multiple segments can be displayed at the same time. See Appendix C for detailed maps.

Imagery Source: USDA-FSA-APFO NAIP, 2023

- Route Segment K
- Applicants' Route K Equivalent
- Alignment Alternative 14
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Residence
- PWI Watercourse
- PWI Waterbody
- Shallow Wildlife Lake
- Native Plant Community
- Grassland Bird Conservation Areas
- Wildlife Management Area
- Aquatic Management Area
- Other DNR Land

Lakes of Biological Significance
- Outstanding Significance
- High Significance

Wetlands
- Non-Forested Wetland
- Forested Wetland

Site of Biodiversity Significance
- High Significance
- Moderate Significance

Feet
0 1,500 3,000

Map 6-22

ROUTE ALTERNATIVE K AND ALIGNMENT ALTERNATIVE AA14
Long Lake Region
Northland Reliability Project

6.4.3.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. For some of the human settlement elements, project impacts are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter. These resources include cultural values, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.4.3.1.1 Aesthetics

Aesthetic impacts differ by routing alternative. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure and ROW. Proximity of residences to route alternative K are shown in Table 6-105, while ROW paralleling and sharing are shown in Table 6-106.

Route alternative K would be located near more than double the number of residences compared to the applicants' equivalent. Additionally, route alternative K has five residences within 250 feet of the anticipated alignment, with two residences within the anticipated ROW. With respect to ROW sharing and paralleling, route alternative K follows an existing infrastructure ROW for 100 percent of its length; the applicants' equivalent follows existing infrastructure ROW for only 30 percent Thus, the indicators for aesthetic impacts point in opposite directions – the applicants' equivalent is near the least number of residences; route alternative K minimizes aesthetic impacts by following significantly more infrastructure ROW than the applicants' equivalent.

Table 6-105 Long Lake Region Proximity of Residences to Route Alternative K

Residences, Distance from Anticipated Alignment	Route Alternative K	Applicants' Equivalent
Residences within 0-75 feet	2	0
Residences within 75-250 feet	3	2
Residences within 250-500 feet	10	4
Residences within 500-1,000 feet	38	13
Total Residences within 1,000 feet	53	19

Table 6-106 Long Lake Region ROW Sharing and Paralleling of Route Alternative K

Infrastructure	Route Alternative K miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0 (0)
Follows Existing Transmission Line	6.8 (100)	3.0 (30)
Total – Follows Transmission Line, Road, or Railroad	6.8 (100)	3.0 (30)
Follows Field, Parcel, or Section Lines	0.1 (2)	6.3 (64)
Total – ROW Paralleling and Sharing	6.8 (100)	9.3 (94)
Total Length of Route Alternative	6.8	9.8

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line and therefore the sum may be greater than 100 percent.

6.4.3.1.2 Displacement

Residences or other buildings are typically not allowed within the transmission line ROW, due to electrical safety code and maintenance reasons. Any residences or other buildings located within a proposed ROW are generally removed or displaced.

There are no churches, childcare centers, or schools located within the 150-foot ROW the applicants equivalent or route alternative K. However, there are two permanent residences and three non-residential buildings (storage shed, agricultural outbuildings, etc.) located within the proposed 150-foot ROW for route alternative K.

These residential buildings located with the ROW for route alternative K may potentially be displaced as a result of the project. Similarly, the non-residential buildings may or may not be displaced as a result of the project. Though buildings are generally not allowed with the ROW of a transmission line, there are instances where the activities taking place in these buildings are compatible with the safe operation of the line (e.g., storage, animal production, etc.). For each of the buildings noted here, the applicants would need to conduct a site-specific analysis to determine if the building would need to be displaced.

6.4.3.2 Land-Based Economies

Potential project impacts to land-based economies are assessed through an evaluation of several elements. There are no active mining operations within the rights-of-way of route alternative K or the applicants' equivalent. Additionally, there very few recreation and tourism opportunities in the vicinity, and they do not differ between the route alternatives. Therefore, potential impacts to mining and recreation and tourism would be minimal and independent of the route selected.

6.4.3.2.1 Agriculture

Agricultural land impacts differ between the 150-foot ROW route alternatives K and the applicants' equivalent. The ROW of route alternative K contains the greatest amount of agricultural land (60 acres), and the ROW of the applicants' equivalent contains the least amount of agricultural land (20 acres).

According to the USDA FSA (reference (107)), MDA Organic Farm Directory (reference (105)), and MDA Apiary Registry (reference (106)), there are no CREP enrolled lands, registered organic producers, or apiaries within the 150-foot ROW of route alternative K or the applicants' equivalent.

6.4.3.2.2 Forestry

Impacts to forestry within the Long Lake region were primarily assessed by evaluating the designated forestry resources within the 150-foot ROW (Chapter 5.8.2). Approximately 33 acres of the ROW of route alternative K consist of forested land while 98 acres of the ROW of the applicants' equivalent consist of forested land (Table 6-107). Forestry resources are comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands within this region (Map Book 5C). The ROW of route alternative K does not contain any designated forestry resources. The ROW of the applicants' equivalent route contains 16 acres of Minnesota School Trust Land (Table 6-107).

Table 6-107 Designated Forestry Resources within the 150-foot ROW of Route Alternative K

Forestry Resources	Route Alternative K	Applicants' Equivalent
Acres of forested land within 150-foot ROW	33	98
Acres of Minnesota School Trust Land[1] within 150-foot ROW	0	16

In some cases, multiple state land classifications are located within the same section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.
Data Sources: references (108); (4)
1 Minnesota School Trust Lands are DNR-administered lands that are set aside to provide a continual source of funding for public education (reference (4).

Only the applicants' equivalent would have potential impacts to designated forestry resources within the 150-foot ROW, while route alternative K would not impact designated forestry resources due to it paralleling an existing transmission line. Impacts to forestry resources would include permanently removing trees from the ROW before construction.

6.4.3.3 Archaeological and Historic Resources

Three previously documented cultural resources are located within the 1,000-foot route width of route alternative K, and one previously documented cultural resource is located within the 1,000-foot route width of the applicants' equivalent (Table 6-108), as shown on Map Book 5F.

Table 6-108 Cultural Resources within the Route Width of Route Alternative K and the Applicants' Equivalent

Resource Number	Resource Type	NRHP Eligibility	Location
21CW0198	Precontact lithic scatter	Not eligible	route alternative K
21CWad	Precontact earthwork	Not evaluated	route alternative K
XX-ROD-00017	Trunk Highway 18	Not eligible	route alternative K, applicants' equivalent

Resource XX-ROD-00017, Trunk Highway 18, has been previously determined not eligible for the NRHP. Because this resource has been determined “not eligible”, it cannot be adversely affected by the project and no additional work regarding this resource would be necessary.

Archaeological sites 21CW0198 and 21CWad may be impacted by the project if they are located within the footprint of ground disturbance. Ground disturbing activities resulting from the project have the potential to impact these resources if they cannot be avoided by the project.

The primary means to minimize impacts to archaeological and historic architectural resources is prudent routing or structure placement (i.e., avoiding known archaeological and historic resources). If they cannot be avoided, impacts to these resources could be mitigated by measures developed in consultation with the SHPO prior to construction. Based on the above discussion, route alternative K has the most potential to impact archaeological and historic architectural resources.

6.4.3.4 Natural Environment

6.4.3.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This routing alternative comparison discussion addresses watercourses and waterbodies and wetlands. Map 6-22 shows the water resources along route alternative K and the applicants’ equivalent.

6.4.3.4.1.1 Watercourses and Waterbodies

Table 6-109Table 6-109 identifies the watercourses and waterbodies crossed by route alternative K and the applicants’ equivalent. Route alternative K would follow an existing transmission line alignment, which crosses the Nokasippi River and Upper South Long Lake (Photo 6-2). The applicants’ equivalent would cross Nokasippi River north of South Long Lake parallel to an existing transmission line ROW.

Photo 6-2 Route Alternative K: View of Existing Transmission Line Alignment Crossing South Long Lake

Table 6-109 Watercourses and Waterbodies Crossed by Route Alternative K and the Applicants' Equivalent

Resources	Route Alternative K	Applicants' Equivalent
Number of NHD stream crossings	3	6
Number of impaired stream crossings	1	4
Number PWI stream crossings	1	1
Number of NHD lake crossings	2	1
Number of impaired lake crossings	1	0
Number of PWI basin crossings	1	0
Number of PWI wetland crossings	0	0

6.4.3.4.1.2 Wetlands

Table 6-104 identifies the acreage of wetlands crossed by route alternative K and the applicants' equivalent. Route alternative K would cross less forested and non-forested wetlands than the applicants'

equivalent. Route alternative K would have two wetland crossings over 1,000 feet; however, these crossings would occur along an existing transmission line and, though the distance is not spannable, it would not require additional permanent disturbance to the wetlands. The applicants' equivalent would have nine wetland crossings over 1,000 feet, requiring new structures to be placed within the wetlands and additional tree removal within forested wetlands.

6.4.3.4.2 Vegetation

The ROW of both route alternative K and the applicants' equivalent would impact forested vegetation, with the applicants' equivalent impacting almost three times as much (98 acres) as route alternative K (33 acres). In addition, route alternative K would minimize forest fragmentation by following an existing transmission line ROW for its entire length, while the applicants' equivalent only parallels existing transmission line ROW for 30 percent of its length.

6.4.3.4.3 Wildlife

Impacts to wildlife habitat would occur for route alternative K and the applicants' equivalent. However, route alternative K would impact less forested habitat and would minimize habitat fragmentation by following an existing transmission line ROW for its entire length. The applicants' equivalent would only parallel existing transmission line ROW for 30 percent of its length, thereby fragmenting habitat and potentially increasing impacts to avian species. As discussed in Chapter 5.10.5.2, avian impacts can be minimized through use of bird flight diverters.

The ROW of route alternative K and the applicants' equivalent would traverse a Grassland Bird Conservation Area, with route alternative K traversing significantly more acreage (52 acres) than the applicants' equivalent (18 acres; Map 6-22). However, route alternative K would minimize impacts to the Grassland Bird Conservation Area by paralleling an existing transmission line ROW while traversing it, while the applicants' equivalent would require new transmission line ROW through it.

6.4.3.5 Rare and Unique Natural Resources

During the NHIS database, it was determined that no federal- or state-protected species, or state species of special concern have been documented within 1 mile of route alternative K or the applicants' equivalent. The ROW of route alternative K and the applicants' equivalent would intersect a DNR SBS ranked moderate, with the ROW of the applicants' equivalent intersecting significantly more of this resource (Table 6-103; Map 6-22).

Route alternative K would minimize impacts to the SBS by traversing it while paralleling an existing transmission line ROW, while the applicants' equivalent would require new ROW through the SBS (Map 6-22). The ROW of route alternative K would traverse the edge of Upper South Long Lake, a DNR Lake of Biodiversity Significance ranked outstanding (Table 6-110; Map 6-22). However, impacts to any protected species associated with this lake would be minimized by paralleling an existing transmission line ROW in this area.

Table 6-110 Sensitive Ecological Resources in the ROW of Route Alternative K and the Applicants' Equivalent

Sensitive Ecological Resource	Area within ROW of Route Alternative K	Area within ROW of Applicants' Equivalent
Sites of Biodiversity Significance	30 acres ranked moderate	114 acres ranked moderate
Lake of Biological Significance	1 acre ranked outstanding	0 acres

6.4.3.6 Reliability

When one transmission line crosses another, reliability risks increase because the failure of one line can unexpectedly de-energize the other. Additionally, there is increased risk that if one transmission line falls, it can bring down the other transmission line, resulting in two, rather than one, line failures. Furthermore, performing maintenance at the transmission line crossing creates a safety risk, as under normal operating conditions one line must remain energized while work is occurring on the other line. Therefore, where practical, new lines are typically designed to minimize transmission line crossings.

No transmission line crossings are required for these route alternatives.

6.4.3.7 Cost

Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-104). When comparing base costs, route alternative K ($33 million) is approximately $14 million less than the applicants' equivalent ($48 million). However, route alternative K may require displacing multiple residences and non-residences between the Long Lakes. At this time, there is no way to estimate these displacement costs.

6.4.4 Alignment Alternative AA12 – Long Lake Region

Alignment alternative AA12 provides an alternative placement of the applicants' proposed alignment in the central part of the Long Lake region. Alignment alternative AA12 is shifted west to avoid impacts to private property. Alignment alternative AA12 does not include any transmission line ROW sharing, paralleling, or double-circuiting. Potential impacts of alignment alternative AA12 and the applicants' equivalent are summarized in Table 6-111 and shown on Map 6-21.

Table 6-111 Human and Environmental Impacts – Alignment Alternative AA12, Long Lake Region

Resource	Element	Alignment Alternative AA12	Applicants' Equivalent
Length (miles)		1.1	1.3
Human Settlement	Residences within 0-75 feet (count)	0	0
	Residences within 75-250 feet (count)	1	0
	Residences within 250-500 feet (count)	1	0
	Residences within 500–1,000 feet (count)	0	1
Land-Based Economies	Agricultural land in 150-foot ROW	<1	1
Water Resources	Total wetlands in 150-foot ROW (acres)	3	11
	Forested wetlands in 150-foot ROW (acres)	0	2
Vegetation	Forested landcover in 150-foot ROW (acres)	17	14
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	21	23
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	0 (0)	0 (0)
	Roadway (miles, percent)	<0.1 (2)	<0.1 (2)
	Field, parcel, or section lines (miles, percent)	0.7 (68)	1.3 (100)
	Total ROW sharing and paralleling (miles, percent)	0.7 (68)	1.3 (100)
Reliability	Crossing of existing transmission lines (count)	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$6.9[1]	$6.2

1 Two heavy-angle structures would be needed for an additional cost of approximately $740,000 per structure ($5.5 million base cost).

6.4.4.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. For some of the human settlement elements, project impacts are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter. These resources include cultural values, displacement, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.4.4.1.1 Aesthetics

Aesthetic impacts differ by routing alternative. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure and ROW. Proximity of residences to alignment alternative AA12 are shown in Table 6-112, while ROW paralleling and sharing are shown in Table 6-113.

Alignment alternative AA12 has two residences within 1,000 feet of its anticipated alignment, compared to one residence within 1,000 feet of the applicants' equivalent. While neither route alternative follows existing infrastructure for any meaningful extent, the applicants' equivalent has the potential to follow field, parcel, or section lines for its entire length while alignment alternative AA12 can only do so for a portion of its length. Due to greater opportunities for aligning with field, parcel, or section lines and having one less residence in proximity, the applicants' equivalent is anticipated to have fewer aesthetics impacts than alignment alternative AA12.

Table 6-112 Long Lake Region Proximity of Residences to Alignment Alternative AA12

Residences, Distance from Anticipated Alignment	Alignment Alternative AA12	Applicants' Equivalent
Residences within 0-75 feet	0	0
Residences within 75-250 feet	1	0
Residences within 250-500 feet	1	0
Residences within 500-1,000 feet	0	1
Total Residences within 1,000 feet	2	1

Table 6-113 Long Lake Region ROW Sharing and Paralleling of Alignment Alternative AA12

Infrastructure	Alignment Alternative AA12 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)
Follows Existing Roads	<0.1 (2)	<0.1 (2)
Follows Existing Transmission Line	0 (0)	0 (0)
Total – Follows Transmission Line, Road, or Railroad	<0.1 (2)	<0.1 (2)
Follows Field, Parcel, or Section Lines	0.7 (68)	1.3 (100)
Total – ROW Paralleling and Sharing	0.7 (68)	1.3 (100)
Total Length	1.1	1.3

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line and therefore the sum may be greater than 100 percent.

6.4.4.2 Land-Based Economies

Potential project impacts to land-based economies are assessed through an evaluation of several elements. There are no forestry resources or active mining operations within the rights-of-way of alignment alternative AA12 or the applicants' equivalent. Agricultural resources within the ROW of alignment alternative AA12 and the applicants' equivalent are both less than one acre. Additionally, there are few recreation and tourism opportunities, and those present do not differ between alignment alternative AA12 or the applicants' equivalent. As a result, potential impacts to land-based economies would be minimal and independent of the route selected.

6.4.4.3 Archaeological and Historic Resources

There are no documented archaeological or historic architectural resources within the 1,000-foot route width of alignment alternative AA12 or the applicants' equivalent. As a result, impacts to cultural resources are anticipated to be minimal and independent of the route selected.

6.4.4.4 Natural Environment

6.4.4.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This routing alternative comparison discussion addresses watercourses and waterbodies and wetlands. Map 6-21 shows the water resources along alignment alternative AA13 and the applicants' equivalent.

6.4.4.4.1.1 Watercourses and Waterbodies

Alignment alternative AA12 and the applicants' equivalent would not cross any watercourses or waterbodies.

6.4.4.4.1.2 Wetlands

Table 6-111 identifies the acreage of wetlands crossed by alignment alternative AA12 and the applicants' equivalent. Alignment alternative AA12 would not cross any forested wetlands and would cross less non-forested wetlands than the applicants' equivalent. In addition, alignment alternative AA12 would not have any wetland crossings over 1,000 feet (i.e. wetland areas would be spanned) whereas the applicants' equivalent would have two wetland crossings over 1,000 feet, which may require placement of one or more structures in wetland.

6.4.4.4.2 Vegetation

Alignment alternative AA12 would impact slightly more forested land (17 acres) than the applicants' equivalent (14 acres). Both alternatives would fragment areas of dense forest, as they follow an existing ROW for only two percent of their lengths.

6.4.4.4.3 Wildlife

Alignment alternative AA12 and the applicants' equivalent would have similar impacts on wildlife habitat because both alternatives would remove relatively similar amounts of forested habitat and neither alternative parallels an existing transmission line or road corridor for more than two percent of its length. Neither alternative would traverse any areas that are preserved or managed for wildlife habitat.

6.4.4.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined that no federal- or state-protected species, or state species of special concern, have been documented within 1 mile of alignment alternative AA12 or the applicants' equivalent. The ROW of alignment alternative AA12 and the applicants' equivalent would intersect similar amounts of an SBS ranked moderate, with the applicants' equivalent intersecting slightly more (23 acres) than alignment alternative AA12 (21 acres) (Map 6-21). Both alignment alternatives would require establishing a new ROW through the SBS.

6.4.4.6 Reliability

When one transmission line crosses another, reliability risks increase because the failure of one line can unexpectedly de-energize the other. Additionally, there is increased risk that if one transmission line falls, it can bring down the other transmission line, resulting in two, rather than one, line failures. Furthermore, performing maintenance at the transmission line crossing creates a safety risk, as under normal operating conditions one line must remain energized while work is occurring on the other line. Therefore, where practical, new lines are typically designed to minimize transmission line crossings.

No transmission line crossings are required for these route alternatives.

6.4.4.7 Cost

Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-111). Alignment alternative AA12 would require two heavy-angle structures, which cost more than three times that of a tangent structure. As a result, the applicants' equivalent (approximately $6.1 million) is less expensive than alignment alternative AA12 (approximately $6.9 million).

6.4.5 Alignment Alternative AA13 – Long Lake Region

Alignment alternative AA13 provides an alternative placement of the applicants' proposed alignment in the central part of the Long Lake region. Alignment alternative AA13 is shifted south to avoid impacts to private property and natural resources. Alignment alternative AA13 does not include any transmission line ROW sharing, paralleling, or double-circuiting. Potential impacts of alignment alternative AA13 and the applicants' equivalent are summarized in Table 6-114 and shown on Map 6-21.

Table 6-114 Human and Environmental Impacts – Alignment Alternative AA13, Long Lake Region

Resource	Element	Alignment Alternative AA13	Applicants' Equivalent
Length (miles)		1.9	2.0
Human Settlement	Residences within 0-75 feet (count)	0	0
	Residences within 75-250 feet (count)	0	0
	Residences within 250-500 feet (count)	0	0
	Residences within 500–1,000 feet (count)	1	2
Land-Based Economies	Agricultural land in 150-foot ROW	1	10
Water Resources	Total wetlands in 150-foot ROW (acres)	15	7
	Forested wetlands in 150-foot ROW (acres)	1	0
Vegetation	Forested landcover in 150-foot ROW (acres)	20	21
Wildlife	Grassland Bird Conservation Area in 150-foot ROW (acres)	18	22
Rare and Unique Natural Resources	Sites of Biodiversity Significance	29	27
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	0 (0)	0.2 (12)
	Roadway (miles, percent)	0 (0)	0 (0)
	Field, parcel, or section lines (miles, percent)	1.3 (70)	1.8 (88)
	Total ROW sharing and paralleling (miles, percent)	1.3 (70)	2.0 (100)
Reliability	Crossing of existing transmission lines (count)	1	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$10[1]	$10

1 One heavy-angle structure would be needed for an additional cost of approximately $740,000 ($9.3 million base cost).

6.4.5.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. For some of the human settlement elements, project impacts are anticipated to be minimal and independent of the route selected and, therefore, are not discussed in this Chapter. These resources include cultural values, displacement, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.4.5.1.1 Aesthetics

Aesthetic impacts differ by routing alternative. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure and ROW. Proximity of

residences to alignment alternative AA13 are shown in Table 6-115, while ROW paralleling and sharing are shown in Table 6-116.

Alignment alternative AA13 would be near one less residence compared to the applicants' equivalent. While neither route alternative follows existing infrastructure, the applicants' equivalent has the potential to follow field, parcel, or section lines for its entire length while alignment alternative AA13 can only do so for a portion of its length. Although the applicants' equivalent is located closer to one more home than alignment alternative AA13, it likely best minimizes aesthetic impacts by having greater opportunities to share ROW with existing infrastructure and field, parcel, or section lines.

Table 6-115 Long Lake Region Proximity of Residences to Alignment Alternative AA13

Residences, Distance from Anticipated Alignment	Alignment Alternative AA13	Applicants' Equivalent
Residences within 0-75 feet	0	0
Residences within 75-250 feet	0	0
Residences within 250-500 feet	0	0
Residences within 500-1,000 feet	1	2
Total Residences within 1,000 feet	1	2

Table 6-116 Long Lake Region ROW Sharing and Paralleling of Alignment Alternative AA13

Infrastructure	Alignment Alternative AA13 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0 (0)
Follows Existing Transmission Line	0 (0)	0.2 (12)
Total – Follows Transmission Line, Road, or Railroad	0 (0)	0.2 (12)
Follows Field, Parcel, or Section Lines	1.3 (70)	1.8 (88)
Total – ROW Paralleling and Sharing	1.3 (70)	2.0 (100)
Total Length	1.9	2.0

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line and therefore the sum may be greater than 100 percent.

6.4.5.2 Land-Based Economies

Potential project impacts to land-based economies are assessed through an evaluation of several elements. There are no forestry resources or active mining operations within the ROW of alignment alternative AA13 or the ROW of the applicants' equivalent. Additionally, there are few recreation and tourism opportunities, and those that are present do not differ between alignment alternative AA13 or the applicants' equivalent. As a result, potential impacts to forestry, mining, and recreation and tourism would be minimal and independent of the route selected.

6.4.5.2.1 Agriculture

Agricultural land impacts differ between the 150-foot ROW alternative alignment AA13 and the applicants' equivalent. The ROW of the applicants' equivalent contains the most agricultural land (10 acres) while the ROW of alignment alternative AA13 contains the least (1 acre).

According to the USDA FSA (reference (107)), MDA Organic Farm Directory (reference (105)), and MDA Apiary Registry (reference (106)), there are no CREP enrolled lands, registered organic producers, or apiaries within the 150-foot ROW of alternative alignment AA13 or the applicants' equivalent.

6.4.5.3 Archaeological and Historic Resources

There are no documented archaeological or historic architectural resources within the 1,000-foot route width of alignment alternative AA13 or the applicants' equivalent. As a result, impacts to cultural resources are anticipated to be minimal and independent of the route selected.

6.4.5.4 Natural Environment

6.4.5.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This routing alternative comparison discussion addresses watercourses and waterbodies, and wetlands. Map 6-21 shows the water resources along alignment alternative AA13 and the applicants' equivalent.

6.4.5.4.1.1 Watercourses and Waterbodies

Alignment alternative AA13 and the applicants' equivalent would not cross any watercourses or waterbodies.

6.4.5.4.1.2 Wetlands

Table 6-114 identifies the acreage of wetlands crossed by alignment alternative AA13 and the applicants' equivalent. Alignment alternative AA13 would cross more forested and non-forested wetlands than the applicants' equivalent. In addition, alignment alternative AA13 would have one wetland crossing over 1,000 feet, which would require placement of one or more structures in wetland. The applicants' equivalent would be able to span wetlands.

6.4.5.4.2 Vegetation

Impacts to forested vegetation would be similar for alignment alternative AA13 (20 acres) and the applicants' equivalent (21 acres). Both alternatives would fragment densely forested areas.

6.4.5.4.3 Wildlife

Alignment alternative AA13 and the applicants' equivalent would have similar impacts on wildlife habitat because both alternatives would remove relatively similar same amount of forested habitat. However, the applicants' equivalent would result in less habitat fragmentation by paralleling an existing transmission line ROW for 12 percent of its length. Alignment alternative AA13 and the applicants' equivalent would both traverse a Grassland Bird Conservation Area (Map 6-21). Although the applicants' equivalent traverses slightly more (22 acres) than AA13 (18 acres), the additional acreage traversed by the applicants' equivalent would do so by paralleling an existing transmission line ROW.

6.4.5.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined that no federal- or state-protected species, or state species of special concern, have been documented within 1 mile of alignment alternative AA13 or the applicants' equivalent. The ROW of alignment alternative AA13 and the applicants' equivalent would intersect similar amounts of an SBS ranked moderate, with AA13 intersecting slightly more (29 acres) than the applicants' equivalent (27 acres) (Map 6-21). Both routing alternatives would require establishing a new ROW through the SBS.

6.4.5.6 Reliability

When one transmission line crosses another, reliability risks increase because the failure of one line can unexpectedly de-energize the other. Additionally, there is increased risk that if one transmission line falls, it can bring down the other transmission line, resulting in two, rather than one, line failures. Furthermore, performing maintenance at the transmission line crossing creates a safety risk, as under normal operating conditions one line must remain energized while work is occurring on the other line. Therefore, where practical, new lines are typically designed to minimize transmission line crossings.

Alignment alternative AA13 would require one transmission line crossing, thereby introducing an increased reliability concern. The applicants' equivalent would require no transmission line crossings.

6.4.5.7 Cost

Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-114). Alignment alternative AA13 would require one heavy angle structure, which costs more than three times that of a tangent structure. Nevertheless, both alignment alternative AA13 and the applicants' equivalent would cost roughly the same amount (approximately $10 million).

6.4.6 Alignment Alternative AA14 – Long Lake Region

Alignment alternative AA14 provides an alternative placement of the applicants' proposed alignment in the northern part of the Long Lake region. Alignment alternative AA14 is shifted west to reduce costs and limit impacts to natural resources. It does not include any transmission line ROW sharing, paralleling, or double-circuiting. Potential impacts of alignment alternative AA14 and the applicants' equivalent are summarized in Table 6-117 and shown on Map 6-22.

Table 6-117 Human and Environmental Impacts – Alignment Alternative AA14, Long Lake Region

Resource	Element	Alignment Alternative AA14	Applicants' Equivalent
Length (miles)		0.6	0.6
Human Settlement	Residences within 0-75 feet (count)	0	0
	Residences within 75-250 feet (count)	0	0
	Residences within 250-500 feet (count)	1	0
	Residences within 500–1,000 feet (count)	1	2
Land-Based Economies	Agricultural land in 150-foot ROW	0	0
Water Resources	Total wetlands in 150-foot ROW (acres)	3	4
	Forested wetlands in 150-foot ROW (acres)	1	3
Vegetation	Forested landcover in 150-foot ROW (acres)	11	11
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	4	5
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	0 (0)	0 (0)
	Roadway (miles, percent)	0 (0)	0 (0)
	Field, parcel, or section lines (miles, percent)	0.2 (42)	0 (0)
	Total ROW sharing and paralleling (miles, percent)	0.2 (42)	0 (0)
Reliability	Crossing of existing transmission lines (count)	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$2.9	$2.7

6.4.6.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. For some of the human settlement elements, project impacts are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter. These resources include cultural values, displacement, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.4.6.1.1 Aesthetics

Aesthetic impacts differ by route alternative. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure and ROW. Proximity of residences to alignment alternative AA14 are shown in Table 6-118, while ROW paralleling and sharing are shown in Table 6-119.

Alignment alternative AA14 would be near the same number of residences as the applicants' equivalent. Neither route alternative would follow existing infrastructure; however, alignment alternative AA14 has more opportunity for paralleling field, parcel, or section lines, which may minimize aesthetic impacts. However, both route alternatives would result in the introduction of new transmission line infrastructure, which would cause a change in local aesthetics.

Table 6-118 Long Lake Region Proximity of Residences to Alignment Alternative AA14

Residences, Distance from Anticipated Alignment	Alignment Alternative AA14	Applicants' Equivalent
Residences within 0-75 feet	0	0
Residences within 75-250 feet	0	0
Residences within 250-500 feet	1	0
Residences within 500-1,000 feet	1	2
Total Residences within 1,000 feet	2	2

Table 6-119 Long Lake Region ROW Sharing and Paralleling of Alignment Alternative AA14

Infrastructure	Alignment Alternative AA14 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0 (0)
Follows Existing Transmission Line	0 (0)	0 (0)
Total – Follows Transmission Line, Road, or Railroad	0 (0)	0 (0)
Follows Field, Parcel, or Section Lines	0.25 (42)	0 (0)
Total – ROW Paralleling and Sharing	0.25 (42)	0 (0)
Total Length	0.60	0.56

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line and therefore the sum may be greater than 100 percent.

6.4.6.2 Land-Based Economies

Potential impacts to land-based economies are assessed through an evaluation of several elements. There are no agricultural lands, forestry resources, or active mining operations within the ROW of alignment alternative AA14 or the ROW of the applicants' equivalent. Additionally, there are few recreation and tourism opportunities, and these opportunities do not differ between alignment alternative AA14 and the applicants' equivalent. As a result, potential impacts to land-based economies would be minimal and independent of the route selected.

6.4.6.3 Archaeological and Historic Resources

There are no documented archaeological or historic architectural resources within the 1,000-foot route width of alignment alternative AA14 or the applicants' equivalent. As a result, impacts to cultural resources are anticipated to be minimal and independent of the route selected.

6.4.6.4 Natural Environment

6.4.6.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This routing alternative comparison discussion addresses watercourses and waterbodies and wetlands. Map 6-22 shows the water resources along alignment alternative AA14 and the applicants' equivalent.

6.4.6.4.1.1 Watercourses and Waterbodies

Alignment Alternative AA14 and the applicants' equivalent would both cross the Nokasippi River, a PWI stream. The stream crossing would be less than 1,000 long and could be spanned.

6.4.6.4.1.2 Wetlands

Table 6-116 identifies the acreage of wetlands crossed by alignment alternative AA14 (3 acres) and the applicants' equivalent (4 acres). Alignment alternative AA14 would cross less forested and non-forested wetlands than the applicants' equivalent. In addition, alignment alternative AA14 would be able to span wetlands, but the applicants' equivalent would have one wetland crossings over 1,000 feet, which would require replacement of one or more structures in wetland.

6.4.6.4.2 Vegetation

Alignment alternative AA14 and the applicants' equivalent would each impact approximately 11 acres of forested vegetation. Both alternatives would fragment forested areas, and neither alignment would parallel an existing transmission line or road corridor.

6.4.6.4.3 Wildlife

Alignment alternative AA14 and the applicants' equivalent would have similar impacts on wildlife habitat and fragmentation, as they would remove the same amount of forested habitat and neither alignment would parallel existing transmission line or road rights-of-way. Neither alternative would traverse any areas that are preserved or managed for wildlife habitat.

6.4.6.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined that no federal- or state-protected species, or state species of special concern, have been documented within 1 mile of alignment alternative AA14 or the applicants' equivalent. The ROW of alignment alternative AA14 and the applicants' equivalent would intersect similar amounts of an SBS ranked moderate, with AA14 intersecting slightly less (4 acres) than the applicants' equivalent (5 acres) (Map 6-22). Both alignment alternatives would require establishing a new ROW through the SBS.

6.4.6.6 Reliability

When one transmission line crosses another, reliability risks increase because the failure of one line can unexpectedly de-energize the other. Additionally, there is increased risk that if one transmission line falls, it can bring down the other transmission line, resulting in two, rather than one, line failures. Furthermore, performing maintenance at the transmission line crossing creates a safety risk, as under normal operating conditions one line must remain energized while work is occurring on the other line. Therefore, where practical, new lines are typically designed to minimize transmission line crossings.

No transmission line crossings are required for these route alternatives.

6.4.6.7 Cost

Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-117). There are no additional structure costs anticipated for alignment alternative AA14; therefore, alignment alternative AA14 (approximately $2.9 million) and the applicants' equivalent (approximately $2.7 million) are expected to cost roughly the same amount, though the applicants' equivalent is slightly less expensive.

6.4.7 Alignment Alternative AA17 – Long Lake Region

Alignment alternative AA17 provides an alternative placement of the applicants' proposed alignment in the southern part of the Long Lake region. Alignment alternative AA17 is shifted east to avoid residential property. It does not include any transmission line ROW sharing, paralleling, or double-circuiting. Potential impacts of alignment alternative AA17 and the applicants' equivalent are summarized in Table 6-120 and shown on Map 6-23.

Table 6-120 Human and Environmental Impacts – Alignment Alternative AA17, Long Lake Region

Resource	Element	Alignment Alternative AA17	Applicants' Equivalent
Length (miles)		0.3	0.3
Human Settlement	Residences within 0-75 feet (count)	0	0
	Residences within 75-250 feet (count)	0	1
	Residences within 250-500 feet (count)	1	0
	Residences within 500–1,000 feet (count)	2	1
Land-Based Economies	Agricultural land in 150-foot ROW	6	4
Water Resources	Total wetlands in 150-foot ROW (acres)	<1	0
	Forested wetlands in 150-foot ROW (acres)	0	0
Vegetation	Forested landcover in 150-foot ROW (acres)	0.5[1]	1
Rare and Unique Natural Resources	Federal- or state-protected species documented in 150-foot ROW (count)	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	0.19 (60)	0.28 (99)
	Roadway (miles, percent)	0 (0)	0 (0)
	Field, parcel, or section lines (miles, percent)	0 (0)	0.28 (99)
	Total ROW sharing and paralleling (miles, percent)	0.19 (60)	0.28 (99)
Reliability	Crossing of existing transmission lines (count)	2	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$7[2]	$1.4

1 The NLCD does not indicate that forested vegetation is present in the ROW of AA17; however, aerial photographs clearly show the presence of forested vegetation.

2 Two specialty structures would be needed to cross an existing transmission line for an estimated additional cost of approximately $4 million. In addition, two heavy-angle structures would be needed for an additional cost of approximately $740,000 per structure ($1.5 million base cost).

T43N, R29W
S7

Platte Lake
Township

Alignment Alternative
17 ends here

CSAH 2

2

AA17

T-532

Alignment Alternative
17 ends here

Crow Wing
County

T43N, R29W
S18

Imagery Source: USDA-FSA-APFO NAIP, 2023

Alignment Alternative 17
Applicants' AA17 Equivalent
Route Width
Route Alternative Width
Existing Transmission Line
Residence
Grassland Bird Conservation Areas

Wetlands

Non-Forested Wetland

Feet
0 250 500

Map 6-23

ALIGNMENT ALTERNATIVE AA17
Long Lake Region
Northland Reliability Project

6.4.7.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. For some of the human settlement elements of human settlements, project impacts from the project are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter. These resources include cultural values, displacement, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.4.7.1.1 Aesthetics

Aesthetic impacts differ by routing alternative. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure and ROW. Proximity of residences to alignment alternative AA17 are shown in Table 6-121, while ROW paralleling and sharing are shown in Table 6-122.

Alignment alternative AA17 would be near a similar number of residences as the applicants' equivalent, though the applicants' equivalent has one residence in closer proximity. The applicants' equivalent would follow existing transmission line ROW for nearly all of its length, minimizing overall aesthetic impacts when compared to alignment alternative AA17.

Table 6-121 Long Lake Region Proximity of Residences to Alignment Alternative AA17

Residences, Distance from Anticipated Alignment	Alignment Alternative AA17	Applicants' Equivalent
Residences within 0-75 feet	0	0
Residences within 75-250 feet	0	1
Residences within 250-500 feet	1	0
Residences within 500-1,000 feet	2	1
Total Residences within 1,000 feet	3	2

Table 6-122 Long Lake Region ROW Sharing and Paralleling of Alignment Alternative AA17

Infrastructure	Alignment Alternative AA17 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0 (0)
Follows Existing Transmission Line	0.19 (60)	0.28 (99)
Total – Follows Transmission Line, Road, or Railroad	0.19 (60)	0.28 (99)
Follows Field, Parcel, or Section Lines	0 (0)	0.28 (99)
Total – ROW Paralleling and Sharing	0.19 (60)	0.28 (99)
Total Length	0.32	0.28

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line and therefore the sum may be greater than 100 percent.

6.4.7.2 Land-Based Economies

Potential impacts to land-based economies are assessed through an evaluation of several elements. There are no forestry resources or active mining operations within the ROW of alignment alternative AA17 or the ROW of the applicants' equivalent. Additionally, there are few recreation and tourism opportunities, and these opportunities do not differ between alignment alternative AA17 or the applicants' equivalent. As a result, potential impacts to forestry, mining, and recreation and tourism would be minimal and independent of the route selected.

6.4.7.2.1 Agriculture

Agricultural impacts differ between alternative alignment AA17 and the applicants' equivalent. Alignment alternative AA17 has slightly more agricultural land (6 acres) in its ROW compared to the applicants' equivalent (5 acres).

According to the USDA FSA (reference (107)), MDA Organic Farm Directory (reference (105)), and MDA Apiary Registry (reference (106)), there are no CREP enrolled lands, registered organic producers, or apiaries within the 150-foot ROW of alternative alignment AA17 or the applicants' equivalent.

6.4.7.3 Archaeological and Historic Resources

There are no documented archaeological or historic architectural resources within the 1,000-foot route width of alignment alternative AA17 or the applicants' equivalent. As a result, impacts to cultural resources are anticipated to be minimal and independent of the route selected.

6.4.7.4 Natural Environment

6.4.7.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This routing alternative comparison discussion addresses watercourses and waterbodies, and wetlands. Map 6-23 shows the water resources along alignment alternative AA17 and the applicants' equivalent.

6.4.7.4.1.1 Watercourses and Waterbodies

Alignment alternative AA17 and the applicants' equivalent would not cross any watercourses or waterbodies.

6.4.7.4.1.2 Wetlands

Table 6-121 identifies the acreage of wetlands crossed by alignment alternative AA17 (less than 1 acre) and the applicants' equivalent (none). Neither alternative has forested wetland in its ROW. Wetlands in the ROW of alignment alternative AA17 are small enough to be spanned.

6.4.7.4.2 Vegetation

The applicants' equivalent would impact slightly more forested vegetation (1 acre) than alignment alternative AA17 (none). While the NLCD dataset indicates that no forested vegetation is present in the ROW of AA17, based on review of aerial photography, there is about half as much forested vegetation as the applicants' equivalent. Both alignments would parallel an existing transmission line ROW where tree removal would occur.

6.4.7.4.3 Wildlife

Alignment alternative AA17 and the applicants' equivalent would have similar impacts to wildlife and associated habitat given that they would impact similar amounts of forested vegetation and would follow an existing transmission line ROW. However, alignment alternative AA17 would also require two perpendicular crossings of the existing transmission line, which could increase the potential for impacts to avian species. However, as discussed in Chapter 5.10.5.2, avian impacts can be minimized through use of bird flight diverters.

6.4.7.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined that no federal- or state-protected species or state special concern species have been documented within 1 mile of alignment alternative AA17 or the applicants' equivalent. Neither alternative would traverse sensitive ecological resources. Potential impacts to rare and unique natural resources would be comparable for both alignments.

6.4.7.6 Reliability

When one transmission line crosses another, reliability risks increase because the failure of one line can unexpectedly de-energize the other. Additionally, there is increased risk that if one transmission line falls, it can bring down the other transmission line, resulting in two, rather than one, line failures. In addition, performing maintenance at the transmission line crossing creates a safety risk, as under normal operating conditions one line must remain energized while work is occurring on the other line. Therefore, where practical, new lines are typically designed to minimize transmission line crossings.

Alignment alternative AA17 would require two transmission line crossings, thereby introducing an increased reliability concern. The applicants' equivalent would require no transmission line crossings.

6.4.7.7 Cost

Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-120). Alignment alternative AA17 would require two specialty structures to cross an existing transmission line in two separate locations. They would also each require two heavy-angle structures, which cost more than three times that of a tangent structure. As a result, the applicants' equivalent (approximately $1 million) is less expensive than alignment alternative AA17 (approximately $7 million).

6.5 Morrison County Region

The Morrison County region is located in the south-central part of the project, in Crow Wing, Morrison, and Benton counties (Figure 6-14, Map Book 3A). This region only includes the applicants' proposed route; no route alternatives or alignment alternatives are analyzed in this region. Chapter 6.5.1 summarizes the potential impacts resulting from construction and operation of the applicants' proposed route in the Morrison County region.

6.5.1 Applicants' Proposed Route – Morrison County Region

Potential impacts of the applicants' proposed route in the Morrison County region are summarized in Table 6-123 and discussed in Chapters 6.5.1.1 through 6.5.1.5.

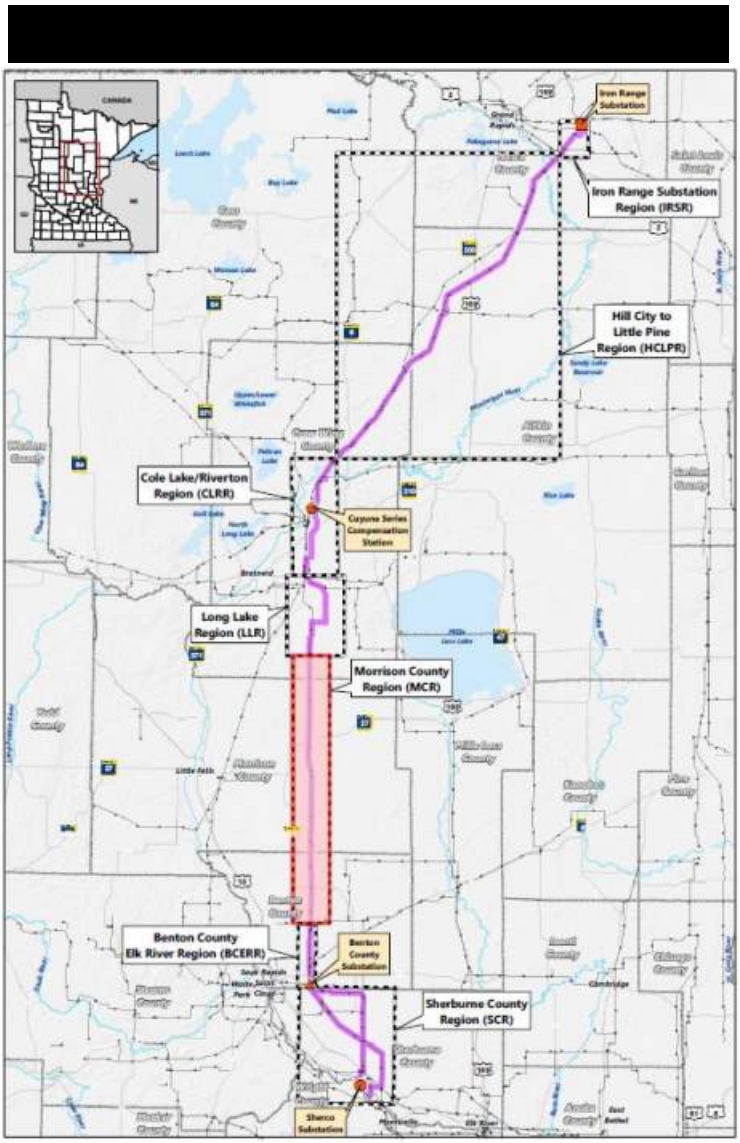


Table 6-123 Human and Environmental Impacts – Applicants' Proposed Route, Morrison County Region

Resource	Element	Applicants' Proposed Route
Length (miles)		38.5
Human Settlement	Residences within 0-75 feet (count)	0
	Residences within 75-250 feet (count)	3
	Residences within 250-500 feet (count)	14
	Residences within 500–1,000 feet (count)	27
Land-Based Economies	Agricultural land in 150-ft ROW	538
Water Resources	Total wetlands in 150-foot ROW (acres)	143
	Forested wetlands in 150-ft ROW (acres)	10
Vegetation	Forested landcover in 150-foot ROW (acres)	61
Wildlife	Grassland Bird Conservation Area in 150-foot ROW (acres)	559
Rare and Unique Natural Resources	Federal- or state-protected species documented in 150-foot ROW (count)	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	38.5 (100)
	Roadway (miles, percent)	0 (0)
	Field, parcel, or section lines (miles, percent)	10.7 (28)
	Total ROW sharing and paralleling (miles, percent)	38.5 (100)
Estimated Cost	Total estimated cost (2022 dollars in millions)	$190.7

6.5.1.1 Human Settlements

As discussed in Chapter 5.3, potential human settlement impacts are assessed by looking at several human settlement elements: aesthetics, displacement, noise, property values, zoning and land-use compatibility, electronic interference, and cultural values. Proximity to homes, schools, and other human settlement features and the extent of ROW sharing with existing infrastructure are the primary indicators of potential impacts to human settlements. Impacts to human settlements are minimized by routes that are located away from homes and that share ROW with existing infrastructure.

For some of the human settlement elements in the Morrison County region, project impacts are anticipated to be minimal and independent of the route selected. For the Morrison County region, aesthetics, displacement, and socioeconomics and EJCs are the only human settlement elements for which impacts may be non-minimal.

6.5.1.1.1 Aesthetics

Aesthetic impacts are assessed through a consideration of the existing viewshed, landscape, character, and setting of any given area, followed by an evaluation of how a proposed route alternative would

change these aesthetic attributes. Determining the relative scenic value or visual importance in any given area depends, in large part, on the values and expectations held by individuals and communities about the aesthetic resource in question. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure ROW. The proximity of residential buildings is shown in Table 6-124. The applicants' proposed route in the Morrison County Region would follow existing transmission line ROW for the entirety of its length, as shown in Table 6-125.

Table 6-124 Morrison County Region Proximity of Residences to Applicants' Route

Residences, Distance from Anticipated Alignment	Applicants' Proposed Route
Residences within 0-75 feet	0
Residences within 75-250 feet	3
Residences within 250-500 feet	14
Residences within 500-1000 feet	27
Total Residences within 1,000 feet	44

Table 6-125 Morrison County Region ROW Sharing and Paralleling of Applicants' Route

Infrastructure	Applicants' Proposed Route miles (percent)
Follows Existing Railroad	0 (0)
Follows Existing Roads	0 (0)
Follows Existing Transmission Line	38.5 (100)
Total – Follows Transmission Line, Road, or Railroad	38.5 (100)
Follows Field, Parcel, or Section Lines	10.7 (28)
Total – ROW Paralleling and Sharing	38.5 (100)
Total Length	38.5

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line and therefore the sum may be greater than 100 percent.

6.5.1.1.2 Displacement

Residences or other buildings are typically not allowed within the transmission line ROW, due to electrical safety code and maintenance reasons. Any residences or other buildings located within a proposed ROW are generally removed or displaced.

There are no permanent residences, churches, childcare centers, or schools located within the 150-foot ROW for the applicants' proposed route. However, there is one non-residential building located within the 150-foot ROW of the applicants' proposed route.

This non-residential building may or may not be displaced as a result of the project for the applicants' proposed route. Though buildings are generally not allowed with the ROW of a transmission line, there

are instances where the activities taking place in these buildings are compatible with the safe operation of the line (e.g., storage, animal production, etc.). For each the building noted here, the applicants would need to conduct a site-specific analysis to determine if the building would need to be displaced.

6.5.1.1.3 Socioeconomics and Environmental Justice

Socioeconomic factors provide an indication of how economic activity affects and is shaped by social processes. Socioeconomic measures indicate how societies progress, stagnate, or regress because of the actions and interactions within and between the local, regional, or global economic scale. Transmission line projects can contribute to growth and progress at the local level over time, but generally do not have a long-term significant socioeconomic impact.

The project would improve the socioeconomics of the region through the creation of jobs, generation of tax revenue, and providing more reliable electrical service to the surrounding communities. The applicants' proposed route intersects with Harding Township which was identified as an EJC. No adverse or permanent impacts to the identified EJC are anticipated. While the applicants' proposed route does intersect an EJC, this community is not anticipated to experience disproportionately adverse impacts as a result of the project.

6.5.1.2 Land-Based Economies

As discussed in Chapter 5.8, impacts on land-based economies are assessed by considering four elements: agriculture, forestry, mining, and recreation and tourism. For some of these elements in the Morrison County region, impacts from the project are anticipated to be minimal.

For the Morrison County region, agriculture and recreation and tourism are the only elements of land-based economies for which impacts are anticipated to be non-minimal. There are no forestry resources or active mining operations within the ROW of the applicants' proposed route. As a result, no impacts to forestry and mining are anticipated.

6.5.1.2.1 Agriculture

Project impacts to agriculture within the Morrison County region were evaluated through land use and soil types within the 150-foot ROW of the applicants proposed route. Map Book 5C provides an overview of land cover types crossed by the applicants' proposed route. Approximately 538 acres of the applicants' proposed route ROW (77 percent of the 150-foot ROW in this region) consists of agricultural land. This land is comprised primarily of cultivated crops and hay/pasture lands.

According to the MDA Organic Farm Directory, no registered organic producers are within the 150-foot ROW (reference (105)) of the applicants' proposed route. No apiaries are located within the ROW according to the Minnesota Apiary Registry (reference (106)). In addition, no agricultural lands are enrolled in the USDA FSA CREP within the 150-foot ROW (reference (107)) of the applicants' proposed route.

Potential construction and operation-related impacts to agricultural land are summarized in Chapter 5.8.1. Several measures could be implemented to avoid, minimize, or mitigate impacts to agricultural land, as described in Chapter 5.8.1.1.

6.5.1.2.2 Recreation and Tourism

Recreation and tourism activities within the Morrison County region consist primarily of trail usage, including off-road vehicle trails and snowmobile trails. Since transmission line construction and operation generally has minimal permanent and temporary impacts to trails, recreation, and tourism, project impacts in this region are expected to be minimal.

The applicants' proposed route has 17 trail crossings, which include off-road vehicle trail crossings and snowmobile trail crossings (Map Book 5E). The applicants' proposed route parallels an existing transmission line ROW for the entirety of the route, reducing introduction of new permanent impacts which include operational noise and reduced aesthetic values (Chapter 5.8.4.1). Additionally, temporary impacts including trail closings during construction would occur but are expected to have a minimal impact on recreation.

6.5.1.3 Archaeological and Historic Resources

Archaeological and historic architectural resource impacts are assessed by determining the presence of these resources within the project route width (Chapter 5.1.1). Map Book 5F provides an overview of archaeological and historic architectural resources in the Morrison County region.

There are four documented historic architectural resources within the route width (1,000-foot) of the applicants' proposed route in the Morrison County region (Table 6-126). As discussed in Chapter 5.9.3, impacts to these resources would mainly consists of changes in the resource's setting due to placement of the transmission line in proximity.

Table 6-126 Cultural Resources within the Route Width of the Applicants' Proposed Route, Morrison County Region

Resource Number	Resource Type	NRHP Eligibility
BN-GRM-00005	Bridge 05501	Not evaluated
MO-GRN-00003	Culvert 93169 over Skunk River	Not eligible
XX-ROD-00113	Trunk Highway 25	Not evaluated
XX-ROD-00180	Trunk Highway 28	Not eligible

The applicants' proposed route would cross resources XX-ROD-00113 and XX-ROD-00180 within an existing transmission line ROW. Similarly, resources BN-GRM-00005 and MO-GRN-00003, though within the route width, are adjacent to an existing transmission line. Because this transmission line ROW is existing, no changes in setting are anticipated in relation to these resources as a result of the project; therefore, the project would not adversely affect them.

6.5.1.4 Natural Environment

6.5.1.4.1 Water Resources

Potential project impacts on water resources are examined by evaluating locations and conditions of watercourses and waterbodies, floodplains, wetlands, and groundwater. Project proximity to water bodies, watercourses, floodplains, wetlands, and groundwater wells and the necessity of crossing these features

are the primary indicators of potential water resource impacts. Impacts to two elements of water resources, floodplains and groundwater, are anticipated to be minimal.

There are two elements of water resources for which impacts could be non-minimal: watercourses and waterbodies and wetlands. This discussion focuses on those elements that are within the ROW or are crossed by the routing alternatives. The number of surface water and wetland crossings is an important consideration when evaluating routes, even though there may be no direct impacts associated with these crossings. The crossings are important because of the potential indirect impacts associated with them (i.e., clearing of vegetation, soil movement). The amount of forested wetland within the ROW is also an important consideration when evaluating routes. Since large-growing woody vegetation would be cleared from the ROW, forested wetlands would be converted to other wetland types, resulting in permanent impacts.

6.5.1.4.1.1 Watercourses and Waterbodies

According to the NHD the applicants' proposed route would cross 50 watercourses in the Morrison County region, including 18 public water watercourses, and two impaired streams: Hillman Creek and the Platte River. The applicants' proposed route would also cross seven NHD waterbodies, one of which is classified as impaired. The applicants proposed route would not cross any public water basins or impaired lakes in the Morrison County region.

It is anticipated that the watercourse and waterbodies would be spanned. Since no structures are anticipated to be placed within waterbodies and watercourses, no direct impacts to these resources are anticipated. Indirect impacts to these resources, such as increases in turbidity, could be minimized by using BMPs.

6.5.1.4.1.2 Wetlands

The ROW of the applicants' proposed route in the Morrison County region contains approximately 143 acres of NWI wetland. The NWI wetlands consist mainly of emergent wetlands (104 acres), shrub wetlands (24acres), and forested wetlands (10 acres). The remaining area consist of five acres of ponded and riverine wetlands. There no PWI wetlands in the ROW of the applicants' proposed route in the Morrison County region.

Although wetlands would be spanned to the extent possible, the applicants' proposed route would cross wetland areas wider than 1,000 feet, which may require one or more structures to be placed in a wetland. Placement of structures in a wetland would result in permanent impacts to that wetland. Permanent impacts to wetlands could also occur if wetlands in the ROW are forested. Forested wetlands would be converted to non-forested wetland types, as trees are not allowed within transmission line rights-of-way. Impacts associated with converting forested wetlands to non-forested wetland types could be minimized by selecting a route alternative with fewer forested wetlands in the ROW.

6.5.1.4.2 Vegetation

Vegetation impacts were evaluated by examining vegetative landcover within the 150-foot ROW (Chapter 5.10.4.1). Map Book 5C provides an overview of vegetative landcover in the Morrison County region and Table 6-127 summarizes the landcover types within the ROW of the applicants' proposed route within this region. The dominant vegetative landcover in the ROW of the applicants' proposed route in this region consists of agricultural land, which represents approximately 78 percent of the ROW.

Agricultural vegetation in the ROW of applicants' proposed route for this region is discussed in Chapter 6.5.1.2.1.

Table 6-127 Landcover Types in the 150-foot ROW of the Applicants' Proposed Route in the Morrison County Region

Landcover Type	Acres in ROW	Percent of ROW[1]
Agricultural (cultivated crops and hay/pasture)	538	78
Herbaceous (upland and wetland)	77	11
Forested (upland and wetland)	61	9
Developed (low-high intensity; open space)	12	2
Shrub/Scrub	<1	<1
Barren Land	2	<1

Source reference (110)
1 Totals may not sum to 100 percent due to rounding.

The ROW of the applicants' proposed route contains approximately 61 acres of forested vegetation. Forested vegetation types include forested wetlands and upland deciduous and mixed forest communities. As discussed in Chapter 5.10.4.1, the applicants would clear forested vegetation from the ROW during construction, and the ROW would be maintained with low-growing vegetation to minimize potential interference with the transmission line. The entirety of the applicants' proposed route in the Morrison County region would parallel an existing transmission line ROW where the forested areas have already been fragmented, thereby minimizing new impacts to forest vegetation in these areas.

Potential construction and operation-related impacts to vegetation are summarized in Chapter 5.10.4.1. Several measures could be implemented to avoid, minimize, or mitigate impacts to vegetation, as described in Chapter 5.10.4.1. Potential impacts to agricultural vegetation and wetlands are discussed Chapters 5.8.1 and 5.10.1.3, respectively.

6.5.1.4.3 Wildlife

Impacts to wildlife are primarily assessed by evaluating the presence of wildlife habitat, including areas that are preserved or managed for wildlife habitat, within the ROW (Chapter 5.10.5.1 and 5.10.5.2). The applicants' proposed route in the Morrison County region would parallel an existing transmission line ROW for its entire length. As such, the applicants' proposed route would occur adjacent to an area where wildlife habitat has been previously disturbed, thereby minimizing new impacts associated with habitat fragmentation.

As shown on Map Book 5H, the majority of the applicants' proposed route would traverse USFWS GBCA (approximately 559 acres). However, it would traverse these GBCA while paralleling an existing transmission line ROW, thereby minimizing the potential for new impacts associated with habitat fragmentation and impacts to avian species.

Potential construction and operation-related impacts to wildlife are summarized in Chapter 5.10.5. Several measures could be implemented to avoid, minimize, or mitigate impacts to wildlife, as described in Chapter 5.10.5.

6.5.1.5 Rare and Unique Natural Resources

Impacts to rare and unique natural resources are primarily assessed by evaluating the presence of federal- and state-protected species within a 1-mile radius of the anticipated alignment and the presence of sensitive ecological resources within the 150-foot ROW (Chapter 5.10). Map Book 5I provides an overview of sensitive ecological resources within the Morrison County region; in order to protect federally and state protected species from exploitation or destruction, documented locations of these species are not identified on any maps.

6.5.1.5.1 Protected Species

Using the NHIS database, it was determined that no federally protected species have been documented within 1 mile of the applicants' proposed route in the Morrison County region. One state protected species, the Blanding's turtle, has been identified within 1 mile of the applicants' proposed route in this region, but has not been documented within the ROW or route width (Appendix N). In addition, one state special concern species has been documented within 1 mile of the applicants' proposed route in this region (Appendix N).

Formal surveys for protected species have not been conducted for the project; as such, it is possible that protected species could be present where suitable habitat is available within the ROW. Potential impacts to protected species could occur should they be present within or near the ROW. While more mobile species would leave the area for nearby comparable habitats, non-mobile organisms, such as vascular plants or nesting birds, could be directly impacted.

Potential construction and operation-related impacts to protected species are summarized in Chapter 5.11.1.3. Several measures could be implemented to avoid, minimize, or mitigate impacts to protected species, as described in Chapter 5.11.1.3. In addition, the applicants may be required to conduct field surveys for protected species in coordination with the USFWS and/or DNR prior to construction.

6.5.1.5.2 Sensitive Ecological Resources

The ROW of the applicants' proposed route in the Morrison County region would not traverse any sensitive ecological resources; as such, impacts to sensitive ecological resources are not anticipated in the ROW of the applicants' proposed route in this region.

6.6 Benton County Elk River Region

The Benton County Elk River region is in the southern part of the project, in Benton County (Figure 6-15). The Benton County Substation represents the southern extent of the region. In addition to the applicants' proposed route, the region has three route alternatives (J1, J2, and J3); no alignment alternatives are analyzed in this region (Map Book 3A). Chapter 6.6.1 summarizes the potential impacts resulting from construction and operation of the applicants' proposed route in the Benton County Elk River region. Chapter 6.6.2 provides a comparison of the potential impacts resulting from construction and operation of route alternatives J1, J2, J3, and the applicants' equivalent.

6.6.1 Applicants' Proposed Route – Benton County Elk River Region

Potential impacts of the applicants' proposed route in the Benton County region are summarized in Table 6-128 and discussed in Chapters 6.6.1.1 through 6.6.1.5.

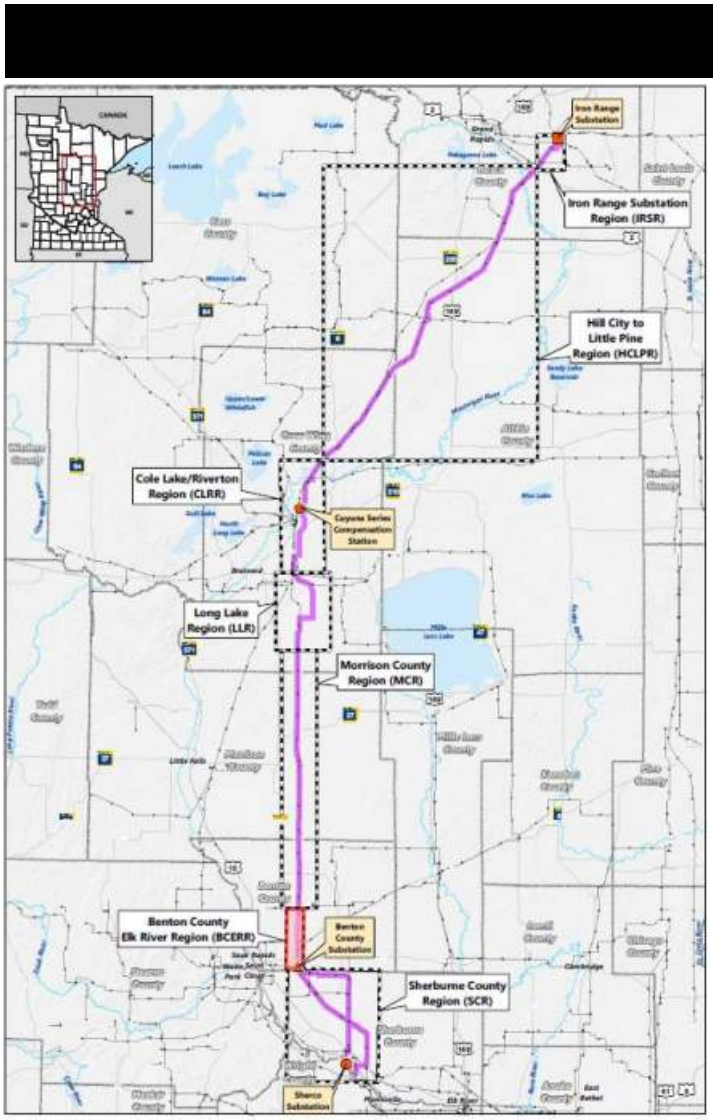


Table 6-128 Human and Environmental Impacts – Applicants' Proposed Route, Benton County Elk River Region

Resource	Element	Applicants' Proposed Route
Length (miles)		8.7
Human Settlement	Residences within 0-75 feet (count)	0
	Residences within 75-250 feet (count)	3
	Residences within 250-500 feet (count)	13
	Residences within 500–1,000 feet (count)	12
Land-Based Economies	Agricultural land in 150-ft ROW	100
Water Resources	Total wetlands in 150-foot ROW (acres)	39
	Forested wetlands in 150-ft ROW (acres)	19
Vegetation	Forested landcover in 150-foot ROW (acres)	39
Wildlife	Grassland Bird Conservation Area in 150-foot ROW (acres)	153
Rare and Unique Natural Resources	Federal- or state-protected species documented in 150-foot ROW (count)	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	8.3 (96)
	Roadway (miles, percent)	0 (0)
	Field, parcel, or section lines (miles, percent)	0.5 (6)
	Total ROW sharing and paralleling (miles, percent)	8.3 (96)
Estimated Cost	Total estimated cost (2022 dollars in millions)	$43.2

6.6.1.1 Human Settlements

As discussed in Chapter 5.3, potential human settlement impacts are assessed by looking at several human settlement elements: aesthetics, displacement, noise, property values, zoning and land-use compatibility, electronic interference, and cultural values. Proximity to homes, schools, and other human settlement features and the extent of ROW sharing with existing infrastructure are the primary indicators of potential impacts to human settlements. Impacts to human settlements are minimized by routes that are located aware from homes and that share ROW with existing infrastructure.

For some of the human settlements elements in the Benton County Elk River region, project impacts are anticipated to be minimal. For the Benton County Elk River region, aesthetics and displacement are the only human settlement elements for which impacts are anticipated to be non-minimal.

6.6.1.1.1 Aesthetics

Aesthetic impacts are assessed, in part, through a consideration of the existing viewshed, landscape, character, and setting of any given area, followed by an evaluation of how a proposed route alternative would change these aesthetic attributes (Chapter 5.3.1). Determining the relative scenic value or visual importance in any given area depends, in large part, on the values and expectations held by individuals

and communities about the aesthetic resource in question. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure ROW. The proximity of residential buildings is shown in Table 6-129. Approximately 96 percent of the applicants' proposed route in the Benton County Elk River region would parallel existing transmission line ROW, as shown in Table 6-130. This ROW paralleling helps to minimize aesthetic impacts.

Table 6-129 Benton County Elk River Region Proximity of Residences to Applicants' Route

Residences, Distance from Anticipated Alignment	Applicants' Proposed Route
Residences within 0-75 feet	0
Residences within 75-250 feet	3
Residences within 250-500 feet	13
Residences within 500-1,000 feet	12
Total Residences within 1,000 feet	28

Table 6-130 Benton County Elk River Region ROW Sharing and Paralleling of Applicants' Route

Infrastructure	Applicants' Proposed Route miles (percent)
Follows Existing Railroad	0 (0)
Follows Existing Roads	0 (0)
Follows Existing Transmission Line	8.3 (96)
Total – Follows Transmission Line, Road, or Railroad	8.3 (96)
Follows Field, Parcel, or Section Lines	0.5 (6)
Total – ROW Paralleling and Sharing	8.3 (96)
Total Length of Route Alternative	8.7

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line and therefore the sum may be greater than 100 percent.

6.6.1.1.2 Displacement

Residences or other buildings are typically not allowed within the transmission line ROW, due to electrical safety code and maintenance reasons. Any residences or other buildings located within a proposed ROW are generally removed or displaced.

There are no permanent residences, churches, childcare centers, or schools located within the 150-foot ROW for the applicants' proposed route. However, there are two non-residential buildings located within the 150-foot ROW of the applicants' proposed route.

These non-residential buildings may or may not be displaced as a result of the project. Though buildings are generally not allowed with the ROW of a transmission line, there are instances where the activities taking place in these buildings are compatible with the safe operation of the line (e.g., storage, animal

production, etc.). For each of the buildings noted here, the applicants would need to conduct a site-specific analysis to determine if the building would need to be displaced.

6.6.1.2 Land-Based Economies

As discussed in Chapter 5.8, impacts on land-based economies are assessed by considering four elements: agriculture, forestry, mining, and recreation and tourism. For some of the elements of land-based economies in the Benton County Elk River region, impacts from the project are anticipated to be minimal.

For the Benton County Elk River region, agriculture and mining are the only elements of land-based economies for which impacts are anticipated to be non-minimal. There are no forestry resources within the ROW of the applicants' proposed route. There are few recreation and tourism opportunities. As a result, potential impacts to forestry and recreation and tourism would be minimal.

6.6.1.2.1 Agriculture

Project impacts to agriculture within the Benton County Elk River region were evaluated through land use and soil types within the 150-foot ROW of the applicants proposed route. Map Book 5C provides an overview of land cover types crossed by the applicants' proposed route. Approximately 100 acres of the 150-foot ROW of the applicants' proposed route in this region consists of agricultural land (Table 6-128). This land is comprised primarily of cultivated crops and hay/pasture lands.

According to the MDA Organic Farm Directory, no registered organic producers are within the ROW (reference (105)). No apiaries are located within the ROW according to the Minnesota Apiary Registry (reference (106)). In addition, no agricultural lands are enrolled in the USDA FSA CREP within the ROW (reference (107)).

Potential construction and operation-related impacts to agricultural land are summarized in Chapter 5.8.1. Several measures could be implemented to avoid, minimize, or mitigate impacts to agricultural land, as described in Chapter 5.8.1.1.

6.6.1.2.2 Mining

Potential impacts on mining operations are likely to occur if the construction or operation of a transmission line prevents access to and recovery of resources. The construction of a transmission line could limit the ability to mine these resources, depending on the proximity of the resources to the route selected for the project.

There is one active aggregate mine, AM-1578, within the 150-foot ROW of the applicants' proposed route in the Benton County Elk River region. The ROW of the applicants' route passes along the eastern edge of this mine. As discussed in Chapter 5.8.3.1, construction of a transmission line could affect future mining operations if structures interfere with access to mineable resources or the recovery of those resources. These impacts could be either temporary or permanent depending on the location of the resource. Based on aerial imagery, the ROW of the applicants' route passes through the eastern edge of the mine, which may result in fewer impacts than crossing through a more central portion of it. Further, the applicants' route parallels an existing transmission line that, to date, has apparently not interfered with mining operations.

6.6.1.3 Archaeological and Historic Resources

Archaeological and historic architectural resource impacts are assessed by determining the presence of these resources within the project route width (Chapter 5.1.1). Map Book 5F provides an overview of archaeological and historic architectural resources in the Benton County Elk River Region.

Two documented archaeological sites and three documented historic architectural resources are located within the 1,000-ft route width of the applicants' proposed route (Table 6-131). Historic architectural resources XX-ROD-00021 (Trunk Highway 95), XX-ROD-00152 (Trunk Highway 23), and XX-ROD-00155 (MN State Hwy 23 from Paynesville to Mission Creek), have been previously determined not eligible for the NRHP. Because these resources are "not eligible", they cannot be adversely affected by the project and no additional work regarding these resources would be necessary.

Archaeological sites 21BN0013 and 21BN0016 may be impacted if either is present within the footprint of ground disturbance and if they cannot be avoided by the project. The primary means to minimize impacts to archaeological resources is prudent routing or structure placement (i.e., avoiding known archaeological resources). If they cannot be avoided, impacts to these resources could be mitigated by measures developed in consultation with the SHPO prior to construction.

Table 6-131 Cultural Resources within the Route Width of the Applicants' Proposed Route, Benton County Elk River Region

Resource Number	Resource Type	NRHP Eligibility
21BN0013	Precontact artifact scatter	Not evaluated
21BN0016	Precontact lithic scatter	Not evaluated
XX-ROD-00021	Trunk Highway 95	Not eligible
XX-ROD-00152	Trunk Highway 23	Not eligible
XX-ROD-00155	MN State Hwy 23 from Paynesville to Mission Creek	Not eligible

6.6.1.4 Natural Environment

6.6.1.4.1 Water Resources

Potential impacts on water resources are evaluated by assessing impacts to watercourses and waterbodies, floodplains, wetlands, and groundwater. Proximity of the project to waterbodies, watercourses, floodplains, wetlands, and groundwater wells and the necessity of crossing these features are the primary indicators of potential impacts on water resources. Impacts to two elements of water resources, floodplains and groundwater, are anticipated to be minimal in this region.

Thus, there are two elements of water resources for which impacts could be non-minimal: watercourses and waterbodies and wetlands. This discussion focuses on those elements that are within the ROW or are crossed by the route alternatives. The number of surface water and wetland crossings is an important consideration when evaluating routes, even though there may be no direct impacts associated with these crossings. The crossings are important because of the potential indirect impacts associated with them (i.e., clearing of vegetation, soil movement). The amount of forested wetland within the ROW is also an important consideration when evaluating routes. Since large-growing woody vegetation would be cleared

from the ROW, forested wetlands would be converted to other wetland types, resulting in permanent impacts.

6.6.1.4.1.1 Watercourses and Waterbodies

According to the NHD the applicants' proposed route would cross 30 watercourses in the Benton County Elk River region, including 26 public water watercourses, and one impaired stream: the Elk River. The applicants' proposed route would also cross one NHD waterbody. The applicants' proposed route would not cross any public water basins or impaired lakes in the Benton County Elk River region.

It is anticipated that the watercourse and waterbodies would be spanned. Since no structures are anticipated to be placed within waterbodies and watercourses, no direct impacts to these resources are anticipated. Indirect impacts to these resources, such as increases in turbidity, could be minimized by using BMPs and by choosing a route alternative that has relatively fewer crossings of waterbodies and watercourses.

6.6.1.4.1.2 Wetlands

The applicants' proposed route cross approximately 39 acres of NWI wetlands in the Benton County Elk River region. These NWI wetlands consist mainly of forested wetlands (19 acres), emergent wetlands (13 acres), and riverine wetlands (5 acres). The remaining areas consist of ponded and scrub/shrub wetlands. There is one PWI wetland along the applicants' proposed route in the Benton County Elk River region.

Although wetlands would be spanned to the extent possible, the applicants' proposed route would cross wetland areas wider than 1,000 feet, which may require one or more structures to be placed in a wetland. Placement of structures in a wetland would result in permanent impacts to that wetland. Permanent impacts to wetlands could also occur if wetlands in the ROW are forested. Forested wetlands would be converted to non-forested wetland types, as trees are not allowed within transmission line rights-of-way. Impacts associated with converting forested wetlands to non-forested wetland types could be minimized by selecting a route alternative with fewer forested wetlands in the ROW.

6.6.1.4.2 Vegetation

Vegetation impacts were evaluated by examining vegetative landcover within the 150-foot ROW (Chapter 5.10.4.1). Map Book 5C provides an overview of vegetative landcover in the Benton County Elk River region, and Table 6-132 summarizes the landcover types within the ROW of the applicants' proposed route within this region. The dominant vegetative landcover in the ROW of the applicants' proposed route in this region consists of agricultural land, which represents approximately 65 percent of the ROW. Agricultural vegetation in the ROW of applicants' proposed route for this region is discussed in Chapter 6.6.1.2.1.

Table 6-132 Landcover Types in the 150-foot ROW of the Applicants' Proposed Route in the Benton County Elk River Region

Landcover Type	Acres in ROW	Percent of ROW[1]
Agricultural (cultivated crops and hay/pasture)	100	65
Forested (upland and wetland)	39	26
Herbaceous (upland and wetland)	10	6
Developed (low-high intensity; open space)	4	3
Barren Land	<1	<1

Source: reference (110)
1 Totals may not sum to 100 percent due to rounding.

The ROW of the applicants' proposed route contains approximately 39 acres of forested vegetation. Forested vegetation types include forested wetlands and upland deciduous and mixed forest communities. As discussed in Chapter 5.10.4.1, the applicants would clear forested vegetation from the ROW during construction, and the ROW would be maintained with low-growing vegetation to minimize potential interference with the transmission line. The entirety of the applicants' proposed route in the Benton County Elk River region would parallel an existing transmission line ROW where the forested areas have already been fragmented, thereby minimizing forest fragmentation in these areas.

Potential construction and operation-related impacts to vegetation are summarized in Chapter 5.10.4.1. Several measures could be implemented to avoid, minimize, or mitigate impacts to vegetation, as described in Chapter 5.10.4.1. Potential impacts to agricultural vegetation and wetlands are discussed Chapters 5.8.1 and 5.10.1.3, respectively.

6.6.1.4.3 Wildlife

Impacts to wildlife are primarily assessed by evaluating the presence of wildlife habitat, including areas that are preserved or managed for wildlife habitat, within the ROW (Chapter 5.10.5.1 and 5.10.5.2). The applicants' proposed route in the Benton County Elk River region would parallel an existing transmission line ROW for its entire length. As such, the applicants' proposed route would occur adjacent to an area where wildlife habitat has been previously disturbed, thereby minimizing new impacts associated with habitat fragmentation.

As shown on Map Book 5H, the entirety of the ROW for the applicants' proposed route in this region would traverse USFWS GBCA. However, it would traverse the GBCA while paralleling an existing transmission line ROW, thereby minimizing the potential for new impacts associated with habitat fragmentation and impacts to avian species.

Potential construction and operation-related impacts to wildlife are summarized in Chapter 5.10.5. Several measures could be implemented to avoid, minimize, or mitigate impacts to wildlife, as described in Chapter 5.10.5.

6.6.1.5 Rare and Unique Natural Resources

Impacts to rare and unique natural resources are primarily assessed by evaluating the presence of federal- and state-protected species within a 1-mile radius of the anticipated alignment and the presence

of sensitive ecological resources within the 150-foot ROW (Chapter 5.10). Map Book 5I provides an overview of sensitive ecological resources within the Benton County Elk River region; in order to protect federally and state protected species from exploitation or destruction, documented locations of these species are not identified on any maps.

6.6.1.5.1 Protected Species

Using the NHIS database, it was determined that no federally protected species have been documented within 1 mile of the applicants' proposed route in the Benton County to Elk River region. As summarized in Table 6-133, three state protected species have been documented within 1 mile of the applicants' proposed route in this region. One state special concern mussel species has been documented within the ROW of the applicants' proposed route in this region (Appendix N).

Table 6-133 State Protected Species Documented in the Natural Heritage Information System Database – Applicants' Proposed Route in the Benton County Elk River Region

Scientific Name	Common Name	Type	State Status	Documented Records within ROW, Route Width, or 1 Mile
Lanius ludovicianus	Loggerhead shrike	Bird	Endangered	1 Mile
Emydoidea blandingii	Blanding's turtle	Turtle	Threatened	1 Mile
Platanthera flava var. herbiola	Tubercled rein orchid	Vascular plant	Threatened	1 Mile

None of the state-protected species identified in Table 6-133 have been documented within the ROW or route width of the applicants' proposed route. Formal surveys for protected species have not been conducted for the project; as such, it is possible that these species or additional protected species could be present where suitable habitat is available within the ROW. Potential impacts to protected species could occur should they be present within or near the ROW. While more mobile species would leave the area for nearby comparable habitats, non-mobile organisms, such as vascular plants or nesting birds, could be directly impacted.

Potential construction and operation-related impacts to protected species are summarized in Chapter 5.11.1.3. Several measures could be implemented to avoid, minimize, or mitigate impacts to protected species, as described in Chapter 5.11.1.3. In addition, the applicants may be required to conduct field surveys for protected species in coordination with the USFWS and/or DNR prior to construction.

6.6.1.5.2 Sensitive Ecological Resources

The ROW of the applicants' proposed route in the Benton County Elk River region would not traverse any sensitive ecological resources; as such, impacts to sensitive ecological resources are not anticipated in the ROW of the applicants' proposed route in this region.

6.6.2 Route Alternatives J1 through J3 – Benton County Elk River Region

Route alternatives J1 through J3 provide options to the applicants' proposed route in the southern part of the Benton County Elk River region. Route alternatives J1 was shifted from the applicants' proposed route to avoid Elk River crossings and multiple pole structures in the Elk River's 100-year floodplain, pivot irrigation systems, and to parallel existing roads. Route alternative J1 does not include any transmission line ROW sharing or paralleling, or double-circuiting. Route alternatives J2 and J3 were shifted from the applicants' proposed route to reduce the number of river crossings and avoid impacts to floodplains. The last 0.5-mile of route alternative J2 would parallel existing transmission line ROW; however, the remaining 7.9 miles of the route alternative does not include transmission line ROW sharing or paralleling, or double-circuiting. Route alternative J3 would parallel an existing transportation corridor for the first 0.75-mile and would parallel existing transmission line ROW for the last 0.5-mile of the proposed route. Potential impacts of the route alternatives and the applicants' equivalent are summarized in Table 6-134 and shown on Map 6-24.

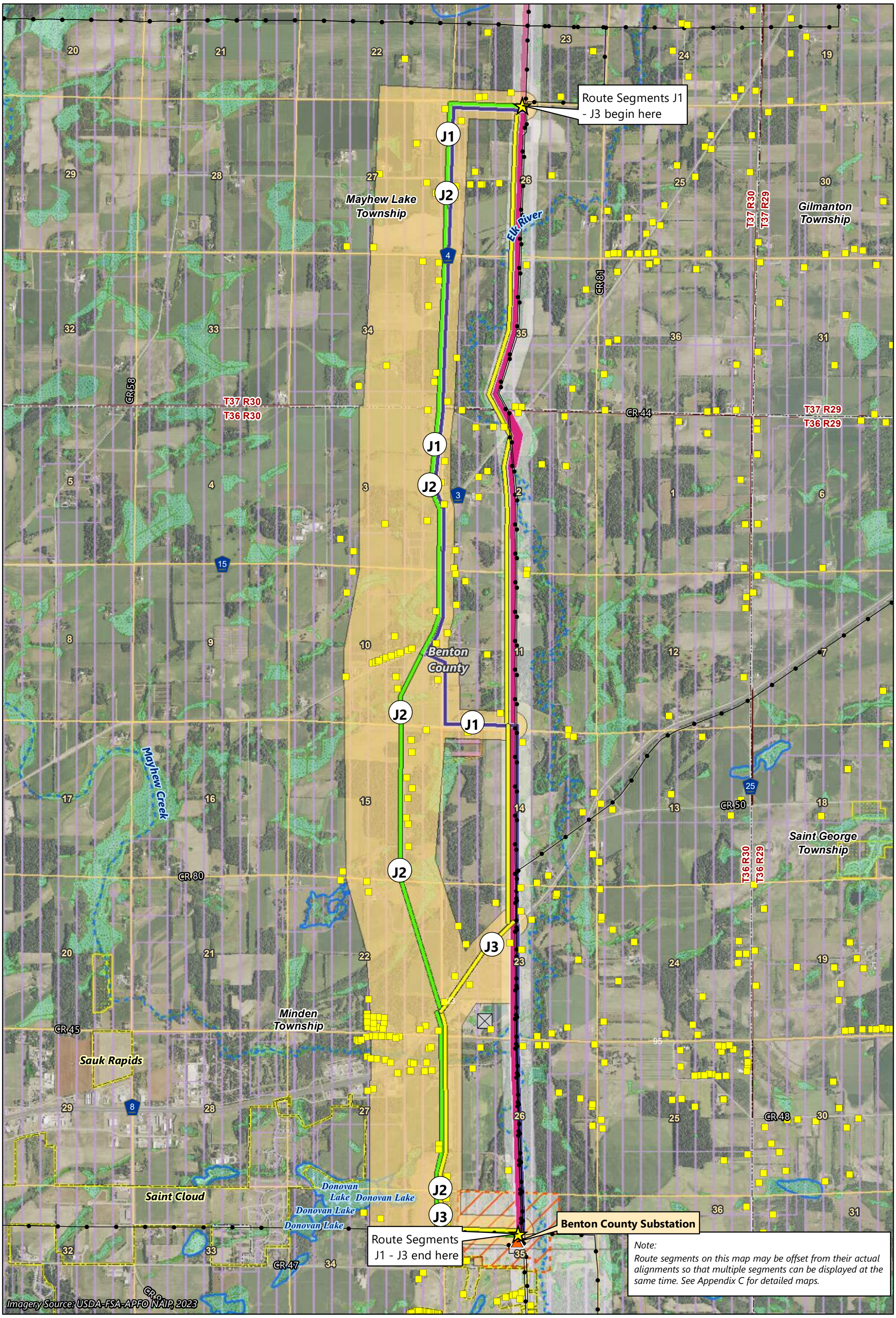
Table 6-134 Human and Environmental Impacts – Route Alternatives J1 through J3, Benton County Elk River Region

Resource	Element	Route Alternative J1	Route Alternative J2	Route Alternative J3	Applicants' Equivalent
Length (miles)		8.4	8.4	8.0	8.1
Human Settlement	Residences within 0-75 feet (count)	0	0	1	0
	Residences within 75-250 feet (count)	10	21	11	3
	Residences within 250-500 feet (count)	24	26	14	12
	Residences within 500–1,000 feet (count)	20	24	19	13
Land-Based Economies	Agricultural land in 150-ft ROW	112	105	105	93
Water Resources	Total wetlands in 150-foot ROW (acres)	18	8	21	38
	Forested wetlands in 150-ft ROW (acres)	7	0	10	19
Vegetation	Forested landcover in 150-foot ROW (acres)	22	20	20	35
Wildlife	Grassland Bird Conservation Area in 150-foot ROW (acres)	153	154	147	141
Rare and Unique Natural Resources	Federal- or state-protected species documented in 150-foot ROW (count)	0	0	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	3.3 (39)	0.5 (6)	5.9 (73)	7.7 (95)
	Roadway (miles, percent)	4.1 (49)	6.1 (73)	2.6 (32)	0 (0)
	Field, parcel, or section lines (miles, percent)	4.7 (56)	6.4 (76)	2.6 (32)	0.5 (6)
	Total ROW sharing and paralleling (miles, percent)	7.5 (90)	6.4 (76)	7.9 (99)	7.7 (95)
Reliability	Crossing of existing transmission lines (count)	0	0	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$45.9[1]	$46.2[2]	$42.7[3]	$40

1 Six heavy-angle structures would be needed for an additional cost of approximately $740,000 per structure ($41.4 million base cost). In addition, this route alternative may require residential displacement. There is no way to estimate the displacement cost at this time.

2 Six heavy-angle structures would be needed for an additional cost of approximately $740,000 per structure ($41.7 million base cost). In addition, this route alternative may require residential displacement. There is no way to estimate the displacement cost at this time.

3 Four heavy-angle structures would be needed for an additional cost of approximately $740,000 per structure ($39,796,169 base cost). In addition, this route alternative may require residential displacement. There is no way to estimate the displacement cost at this time.



- Route Segment J1
- Route Segment J2
- Route Segment J3
- Applicants' Route J Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Benton County Substation
- Substation Siting Area
- Residence
- Active Aggregate Mine
- PWI Watercourse
- PWI Waterbody
- Shallow Wildlife Lake
- Native Plant Community
- Grassland Bird Conservation Areas
- State Conservation Easement
- Municipal Boundary

Wetlands
- Non-Forested Wetland

Site of Biodiversity Significance
- High Significance

Feet
0 1,500 3,000

Map 6-24

ROUTE ALTERNATIVES J1 - J3
Benton County Elk River Region
Northland Reliability Project

6.6.2.1 Human Settlements

Potential impacts on human settlements are assessed through an evaluation of several elements. For some of these, project impacts are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter. These resources include cultural values, displacement, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.6.2.1.1 Aesthetics

Aesthetic impacts differ by routing alternative. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure and ROW. Proximity of residences to route alternatives J1 through J3 are shown in Table 6-135, while ROW paralleling and sharing are shown in Table 6-136.

Route alternative J2 has the greatest number of residences within 1,000 feet of its anticipated alignment, while the applicants' equivalent has the least. Route alternatives J1 and J3 have a similar number of residences within 1,000 feet; both have more residences than the applicants' equivalent.

The applicants' equivalent follows existing transmission line ROW for approximately 95 percent of its length. Route alternative J3 and the applicants' equivalent follow the greatest amount of existing infrastructure ROW.

On whole, the applicants' equivalent best minimizes aesthetic impacts by placing the line away from residences and by following the greatest amount of existing transmission line ROW.

Table 6-135 Benton County Elk River Region Proximity of Residences to Route Alternatives J1 through J3

Residences, Distance from Anticipated Alignment	Route Alternative J1	Route Alternative J2	Route Alternative J3	Applicants' Equivalent
Residences within 0-75 feet	0	0	1	0
Residences within 75-250 feet	10	21	11	3
Residences within 250-500 feet	24	26	14	12
Residences within 500-1,000 feet	20	24	19	13
Total Residences within 1,000 feet	54	71	45	28

Table 6-136 Benton County Elk River Region ROW Sharing and Paralleling of Route Alternatives J1 through J3

Infrastructure	Route Alternative J1 miles (percent)	Route Alternative J2 miles (percent)	Route Alternative J3 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)	0 (0)	0 (0)
Follows Existing Roads	4.1 (49)	6.1 (73)	2.6 (32)	0 (0)
Follows Existing Transmission Line	3.3 (39)	0.5 (6)	5.9 (73)	7.7 (95)
Total – Follows Transmission Line, Road, or Railroad	7.4 (88)	6.1 (73)	7.9 (99)	7.7 (95)
Follows Field, Parcel, or Section Lines	4.7 (56)	6.4 (76)	2.6 (32)	0.5 (6)
Total – ROW Paralleling and Sharing	7.5 (90)	6.4 (76)	7.9 (99)	7.7 (95)
Total Length	8.4	8.4	8.0	8.1

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line, and therefore, the sum may be greater than 100 percent.

6.6.2.1.2 Displacement

Residences or other buildings are typically not allowed within the transmission line ROW, due to electrical safety code and maintenance reasons. Any residences or other buildings located within a proposed ROW are generally removed or displaced.

There are no permanent residences, churches, childcare centers, or schools located within the 150-foot ROW for the applicants' equivalent or route alternatives J1 and J2. Route alternative J3 has one permanent residence and one non-residential building located within its ROW. Route alternative J1, and the applicants' equivalent have two non-residential buildings located within this route alternative's 150-foot ROW.

The project may potentially displace a residential building located within the 150-foot ROW of alternative J3; similarly, non-residential buildings may or may not be displaced. Though buildings are generally not allowed with the ROW of a transmission line, there are instances where the activities taking place in these buildings are compatible with the safe operation of the line (e.g., storage, animal production, etc.). For each of the buildings noted here, the applicants would need to conduct a site-specific analysis to determine if the building would need to be displaced.

6.6.2.2 Land-Based Economies

Potential project impacts to land-based economies are assessed through an evaluation of several elements. There are no forestry resources within the ROW of route alternatives J1 through J3 or the ROW of the applicants' equivalent. There are few recreation and tourism opportunities, and they do not differ between the route alternatives. Therefore, potential impacts to forestry and recreation and tourism would be minimal and independent of the route selected.

6.6.2.2.1 Agriculture

Impacts to agricultural land in the 150-foot ROW of route alternatives J1 through J3 and the applicants' equivalent are relatively similar. The applicants' equivalent has the least amount of agricultural land (93 acres) in the ROW. Route alternative J1 has the most amount of agricultural land (112 acres) in the ROW.

According to the USDA FSA (reference (107)), MDA Organic Farm Directory (reference (105)), and MDA Apiary Registry (reference (106)), there are no CREP enrolled lands, registered organic producers, or apiaries within the 150-foot ROW of the route alternatives or the applicants' equivalent.

6.6.2.2.2 Mining

Potential impacts on mining operations are likely to occur if the construction or operation of a transmission line prevents access to and retrieval of resources. The construction of a transmission line could limit the ability to mine these resources, depending on the proximity of the resources to the route selected for the project.

There is one active aggregate mine, AM-1578, within the 150-foot ROW of route alternatives J1, J2, J3, and the applicants' equivalent in the Benton County Elk River region. The ROW of route alternative J1 and the applicants' equivalent passes along the eastern edge of this mine, while the ROW of route alternatives J2 and J3 pass along the western edge of the mine. As discussed in Chapter 5.8.3, construction of a transmission line could affect future mining operations if structures interfere with access to mineable resources or the retrieval of those resources. These impacts could be either temporary or permanent depending on the location the resource. Since the routing alternatives pass through the mine site at its edges, impacts may be reduced compared to crossing through a more central portion of it.

6.6.2.3 Archaeological and Historic Resources

Multiple previously documented cultural resources are located within the 1,000-foot route width of route alternatives J1, J2, J3, and the applicants' equivalent (Table 6-137), as shown on Map Book 5F.

Table 6-137 Cultural Resources within the Route Width of Route Alternatives J1 through J3 and the Applicants' Equivalent

Resource Number	Resource Type	NRHP Eligibility	Location
21BN0013	Precontact artifact scatter	Not evaluated	route alternative J1, applicants' equivalent
21BN0014	Precontact lithic scatter	Not evaluated	route alternative J2 route alternative J3
21BN0016	Precontact lithic scatter	Not evaluated	route alternative J1, route alternative J3, applicants' equivalent
BN-MIN-00002	District No. 44 School	Not evaluated	route alternative J1, route alternative J2
BN-MIN-00026	Bridge No. L5807 over Mayhew Creek	Not eligible	route alternative J2, route alternative J3
BN-MIN-00035	Culvert 97591 over Mayhew Creek	Not eligible	route alternative J2, route alternative J3
XX-ROD-00021	Trunk Highway 95	Not eligible	route alternative J1, route alternative J2, route alternative J3, applicants' equivalent
XX-ROD-00152	Trunk Highway 23	Not eligible	route alternative J1, route alternative J2, route alternative J3, applicants' equivalent
XX-ROD-00155	MN State Hwy 23 from Paynesville to Mission Creek	Not eligible	route alternative J1, route alternative J2, route alternative J3, applicants' equivalent

Historic architectural resources BN-MIN-00026 (bridge over Mayhew Creek), BN-MIN-00035 (culvert over Mayhew Creek), XX-ROD-00021 (Trunk Highway 95), XX-ROD-00152 (Trunk Highway 23), and XX-ROD-00155 (MN State Hwy 23 from Paynesville to Mission Creek) have been previously determined not eligible for the NRHP. Because these resources are "not eligible", they cannot be adversely affected by the project and no additional work regarding these resources would be necessary.

Archaeological sites 21BN0013, 21BN0014, and 21BN0016 may be impacted by the project if any of these sites are present within the footprint of ground disturbance. Ground disturbing activities resulting from the project have the potential to impact these resources if they cannot be avoided by the project.

The primary means to minimize impacts to archaeological and historic architectural resources is prudent routing or structure placement – i.e., avoiding known archaeological and historic resources. If they cannot be avoided, impacts to these resources could be mitigated by measures developed in consultation with the SHPO prior to construction.

6.6.2.4 Natural Environment

6.6.2.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This route alternative comparison discussion addresses watercourses and waterbodies, and wetlands. Map 6-24 shows the water resources along route alternatives J1 through J3.

6.6.2.4.1.1 Watercourses and Waterbodies

Table 6-138 identifies the watercourses and waterbodies crossed by route alternatives J1 through J3 and the applicants' equivalent. Route J2 would reduce the watercourse crossings by avoiding crossing the Elk River, a PWI and also an impaired watercourse. Route alternatives J1, J3, and the applicants' equivalent would cross the Elk River at multiple locations.

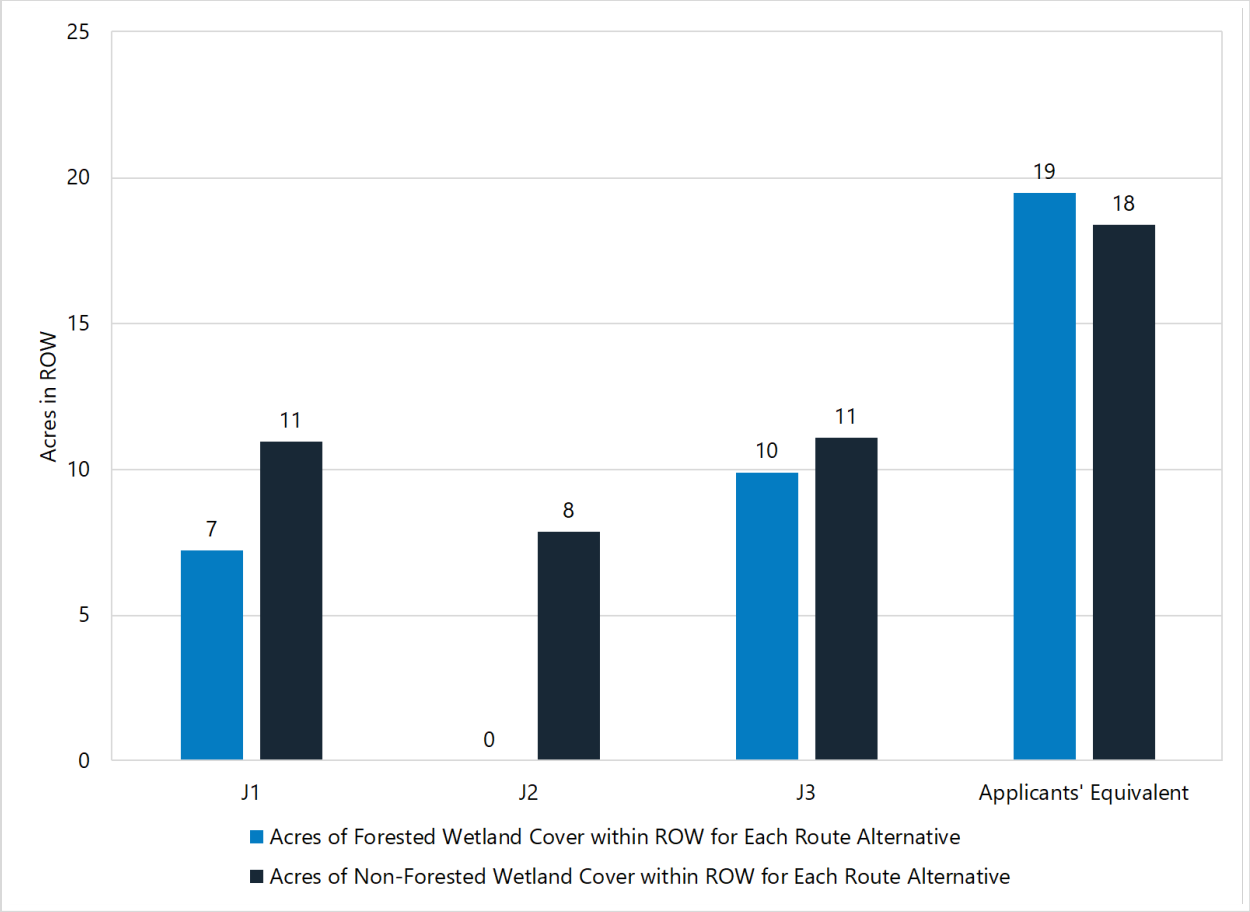
Table 6-138 Watercourses and Waterbodies Crossed by Route Alternatives J1 Through J3 and the Applicants' Equivalent

Resources	Route Alternative J1	Route Alternative J2	Route Alternative J3	Applicants' Equivalent
Number of NHD stream crossings	14	6	18	29
Number of impaired stream crossings	8	1	15	26
Number PWI stream crossings	8	1	15	26
Number of NHD lake crossings	4	3	0	1
Number of impaired lake crossings	0	0	0	0
Number of PWI basin crossings	0	0	0	0
Number of PWI wetland crossings	0	0	0	0

6.6.2.4.1.2 Wetlands

Figure 6-16 identifies the acreage of wetlands crossed by route alternatives J1 through J3 and the applicants' equivalent. The applicants' equivalent would cross the most forested and non-forested wetlands. Route alternative J2 would cross no forested wetlands and the least amount of non-forested wetlands. Similarly, the applicants' equivalent would have the most wetland crossings over 1,000 feet and may require the placement of one or more structures in wetlands. Route alternative J2 would not have any wetland crossings over 1,000 feet and would avoid placement of structures in wetlands.

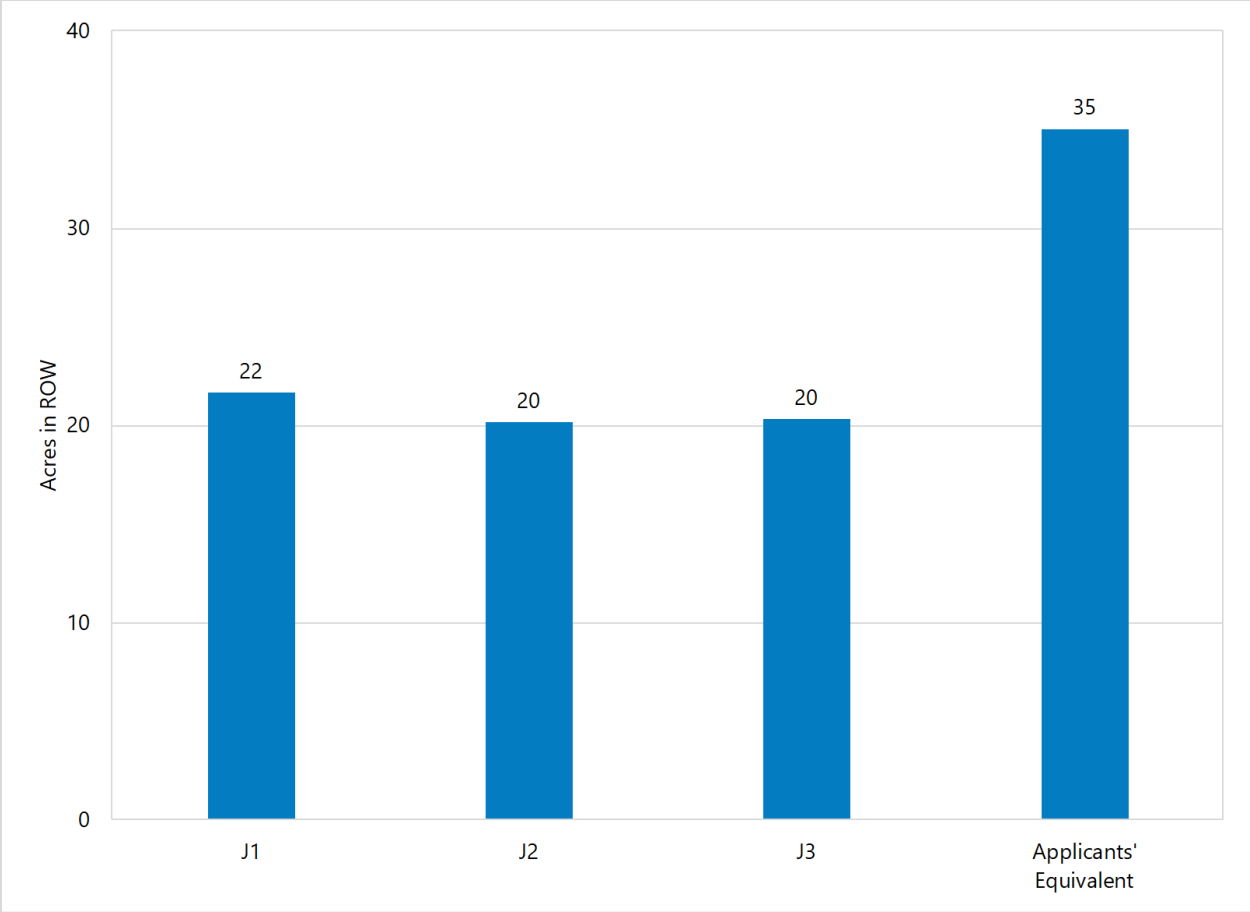
Figure 6-16 Acres of Wetlands Crossed by Route Alternatives J1 Through J3 and the Applicants' Equivalent



6.6.2.4.2 Vegetation

Route alternatives J1, J2, J3, and the applicants' equivalent would all impact forested vegetation, with the applicants' equivalent impacting the most vegetation (Figure 6-17). All route alternatives and the applicants' equivalent would minimize impacts associated with forest fragmentation, to varying extents, by paralleling existing transmission line or road ROW for 73 to 99 percent of their lengths.

Figure 6-17 Forested Vegetation in the 150-foot ROW of Route Alternatives J1, J2, J3, and the Applicants' Equivalent



6.6.2.4.3 Wildlife

Impacts to wildlife habitat would occur for route alternatives J1, J2, J3, and the applicants' equivalent. Route alternatives J1, J2, J3, and the applicants' equivalent would minimize impacts associated with habitat fragmentation, to varying extents, by paralleling existing transmission line or road ROW; the applicants' equivalent and route alternative J3 would parallel the greatest amount of ROW. The entire ROW of each route alternative and the applicants' equivalent would traverse a Grassland Bird Conservation Area (Map 6-24). The applicants' equivalent and route alterative J3 would minimize impacts to avian species associated with the Grassland Bird Conservation Area by paralleling an existing transmission line ROW for 95 percent and 73 percent of their lengths, respectively.

Route alternatives J1, J2 and J3 minimize impacts to wildlife by minimizing the loss of forested vegetation. The applicants' equivalent and route alternative J3 minimize impacts to wildlife due to fragmentation by paralleling the greatest amount of existing ROW.

6.6.2.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined that no federally protected species have been documented within 1 mile of route alternatives J1, J2, J3, and the applicants' equivalent. Three state protected species have been documented within 1 mile of all route alternatives and the applicants' equivalent (Appendix N).

None of these species has been documented within the ROW of any route alternative or the applicants' equivalent; however, one state threatened species, the tubercled rein orchid, has been documented within the route width of route alternative J1 (Appendix N). One state special concern species has been documented within 1 mile of all route alternatives and the applicants' equivalent (Appendix N). Route alternatives J1, J2, J3, or the applicants' equivalent would not traverse designated sensitive ecological resources.

6.6.2.6 Reliability

When one transmission line crosses another, reliability risks increase because the failure of one line can unexpectedly de-energize the other. Additionally, there is increased risk that if one transmission line falls, it can bring down the other transmission line, resulting in two, rather than one, line failures. Furthermore, performing maintenance at the transmission line crossing creates a safety risk, as under normal operating conditions one line must remain energized while work is occurring on the other line. Therefore, where practical, new lines are typically designed to minimize transmission line crossings.

No transmission line crossings are required for these route alternatives.

6.6.2.7 Cost

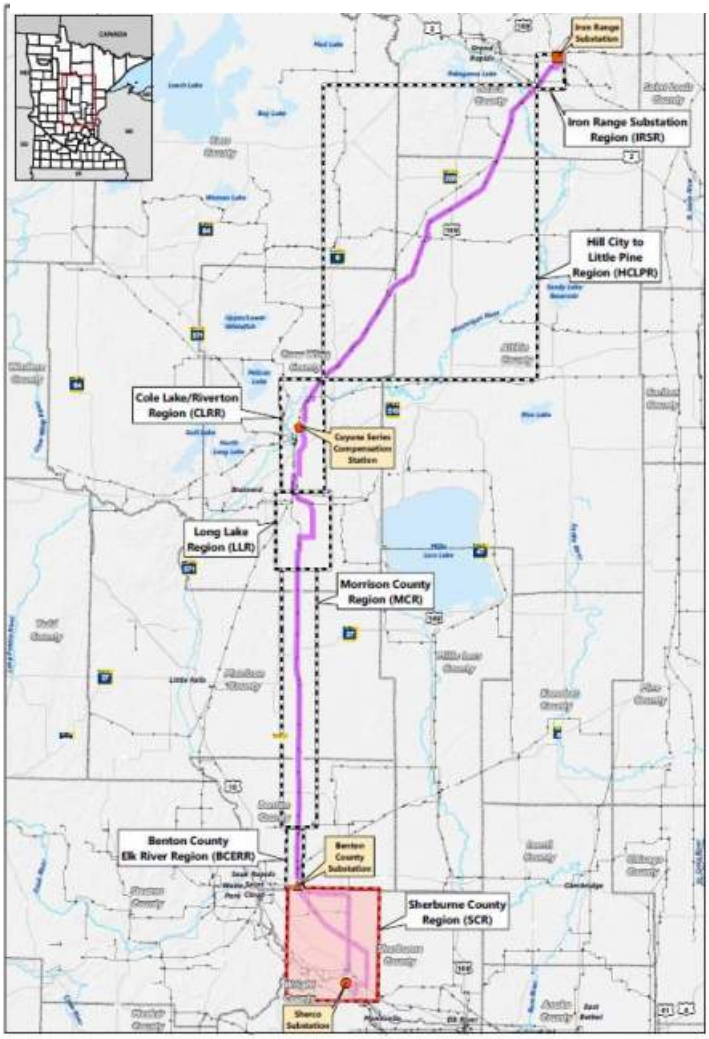
Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-134). Route alternative J1 (approximately $45.9 million) would require six heavy-angle structures, each of which costs more than three times that of a tangent structure. Route alternative J2 (approximately $46.1 million) would also require six heavy-angle structures, while route alternative J3 (approximately $42.7 million) would require four heavy-angle structures. As a result, the applicants' equivalent is the least expensive routing alternative in this region (approximately $40 million).

6.7 Sherburne County Region

The Sherburne County region is the southernmost region of the project (Figure 6-18). The majority of the region is contained within Sherburne County, with small portions located in Wright and Stearns counties. This region only includes the applicants' proposed route; no route alternatives or alignment alternatives are analyzed in this region (Map Book 3A). Chapter 6.7.1 summarizes the potential impacts resulting from construction and operation of the applicants' proposed route in the Sherburne County region.

The existing transmission line infrastructure for both the MR Line and the GRE-BS Line will be upgraded with larger, double-circuit capable structures. New structures will be located on these existing transmission line centerlines; however, the new structures will not be placed within the same footprint of the structures being removed (i.e., this portion of the project would not be replacement "in kind"). The existing piers and footings would be removed to approximately 4-6 feet below grade, and the existing poles and structures would be removed. The existing MR Line contains wooden H-frame structures, while the existing GRE-BS Line contains steel monopoles or lattice towers. Steel structures would be recycled, while the wood poles would be scrapped or given to the landowner, should they wish to keep them. Preliminary engineering estimates for the new structures indicate that the foundations will range from 8 feet to 12 feet in diameter and would be drilled to a depth of between 25 and 42 feet below surface.

Figure 6-18 Sherburne County Region



6.7.1 Applicants' Proposed Route – Sherburne County Region

The applicants' proposed route consists mainly of upgrading two existing transmission lines: GRE's 230 kV MR Line and their 345 kV CRE-BS Line. The applicants' proposed route follows, and would upgrade, these two existing transmission lines entirely within the existing transmission line ROW, with the exception of approximately 1.5 miles of proposed new transmission line that would connect to the future Big Oaks Substation. The 1.5 miles of new transmission line would parallel an existing road. Potential impacts of the applicants' proposed route, which applies to both of the lines being upgraded in the Sherburne County region, are summarized in Table 6-139 and discussed in Chapters 6.7.1.1 through 6.7.1.6.

Table 6-139 Human and Environmental Impacts – Applicants' Proposed Route, Sherburne County Region

Resource	Element	Applicants' Proposed Route
Length (miles)		41.9
Human Settlement	Residences within 0-75 feet (count)	2
	Residences within 75-250 feet (count)	91
	Residences within 250-500 feet (count)	116
	Residences within 500–1,000 feet (count)	257
Transportation	Airports within 1 mile (count)	1
Land-Based Economies	Agricultural land in 150-ft ROW	457
Water Resources	Total wetlands in 150-foot ROW (acres)	190
	Forested wetlands in 150-ft ROW (acres)	7
Vegetation	Forested landcover in 150-foot ROW (acres)	68[1]
Wildlife	Grassland Bird Conservation Area in 150-foot ROW (acres)	455
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	38
	Native Plant Communities in 150-foot ROW (acres)	21
	Federal- or state-protected species documented in 150-foot ROW (count)	2
ROW Sharing and Paralleling	Transmission line (miles, percent)	39.8 (95)
	Roadway (miles, percent)	3.9 (9)
	Field, parcel, or section lines (miles, percent)	23.5 (56)
	Total ROW sharing and paralleling (miles, percent)	41.3 (99)
Estimated Cost	Total estimated cost (2022 dollars in millions)	$225.9

1 The NLCD indicates forested vegetation is in the ROW; however, the ROW is an existing transmission line ROW that has been cleared and is routinely maintained.

6.7.1.1 Human Settlements

As discussed in Chapter 5.3, potential human settlement impacts are assessed by looking at several human settlement elements: aesthetics, displacement, noise, property values, zoning and land-use compatibility, electronic interference, and cultural values. Proximity to homes, schools, and other human settlement features and the extent of ROW sharing with existing infrastructure are the primary indicators of potential impacts to human settlements. Impacts to human settlements are minimized by routes that are located aware from homes and that share ROW with existing infrastructure.

For some of the human settlement elements in the Sherburne County region, project impacts are anticipated to be minimal. For the Sherburne County region, aesthetics and displacement are the only human settlement elements for which impacts are anticipated to be non-minimal.

6.7.1.1.1 Aesthetics

Aesthetic impacts are assessed through a consideration of the existing viewshed, landscape, character, and setting of any given area, followed by an evaluation of how a proposed route alternative would change these aesthetic attributes (Chapter 5.3.1). Determining the relative scenic value or visual importance in any given area depends, in large part, on the values and expectations held by individuals and communities about the aesthetic resource in question.

Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure ROW. The proximity of residences to the applicants' proposed route is shown in Table 6-140. Compared with other regions of the project, the number of residences within 1,000 feet of the anticipated alignment is relatively high. This is due, in part, to the fact that residences have been constructed over time near the 230 kV MR line and the 345 kV CRE-BS Line.

Nearly all of the applicants' proposed route in the Sherburne County region would be located in existing transmission line ROW (Table 6-141). Following existing transmission ROW minimizes aesthetic impacts.

Table 6-140 Sherburne County Region Proximity of Residences to Applicants' Route

Residences, Distance from Anticipated Alignment	Applicants' Proposed Route
Residences within 0-75 feet	2
Residences within 75-250 feet	91
Residences within 250-500 feet	116
Residences within 500-1,000 feet	257
Total Residences within 1,000 feet	466

Table 6-141 Sherburne County Region ROW Sharing and Paralleling of Applicants' Route

Infrastructure	Applicants' Proposed Route miles (percent)
Follows Existing Railroad	1.0 (2)
Follows Existing Roads	3.9 (9)
Follows Existing Transmission Line	39.8 (95)
Total – Follows Transmission Line, Road, or Railroad	41.3 (99)
Follows Field, Parcel, or Section Lines	23.5 (56)
Total – ROW Paralleling and Sharing	41.3 (99)
Total Length	41.9

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line and therefore the sum may be greater than 100 percent.

6.7.1.1.2 Displacement

Residences or other buildings are typically not allowed within the transmission line ROW, due to electrical safety code and maintenance reasons. Any residences or other buildings located within a proposed ROW are generally removed or displaced.

There are no churches, childcare centers, or schools located within the applicants' proposed route ROW. However, there are two permanent residences and two non-residential buildings located within the applicants proposed route ROW.

The permanent residences located within the applicants' proposed route ROW may potentially be displaced as a result of the project; similarly, the project may or may not displace non-residential buildings. Though buildings are generally not allowed with the transmission line ROW, there are instances where the activities taking place in these buildings are compatible with the safe operation of the line (e.g., storage, animal production, etc.). For each of the buildings noted here, the applicants would need to conduct a site-specific analysis to determine if the building would need to be displaced.

6.7.1.2 Transportation

Potential transportation impacts are assessed by looking at various elements of transportation and public services as outlined in Chapter 5.4. In general, impacts to transportation services are anticipated to be minimal in this region.

6.7.1.2.1 Airports

One private airport is located within 1 mile of the applicants' proposed route. The Schroeder Airport is a private landing strip located in Becker Township, approximately 0.75-mi west of the applicants' proposed route. The Schroeder Airport is privately-owned and is not subject to public airport zoning ordinances. In addition, the applicants' proposed route in this region would consist of rebuilding two existing transmission lines; therefore, no new impacts to this airport are anticipated.

6.7.1.3 Land-Based Economies

As discussed in Chapter 5.8, impacts on land-based economies are assessed by considering four elements: agriculture, forestry, mining, and recreation and tourism. For the Sherburne County region, agriculture is the only element of land-based economies for which impacts are anticipated to be non-minimal. There are no active mining operations within ROW of the applicants' proposed route. There are very few recreation and tourism opportunities and these do not differ between the route alternatives. As a result, potential impacts to forestry, mining, and recreation and tourism are anticipated to be minimal.

6.7.1.3.1 Agriculture

Project impacts to agriculture within the Sherburne County region were evaluated through land use and soil types within the 150-foot ROW of the applicants' proposed route. Map Book 5C provides an overview of land cover types crossed by the applicants' proposed route. Approximately 457 acres of the applicants' proposed route ROW (61 percent of the 150-foot ROW in this region) consists of agricultural land. This land is comprised primarily of cultivated crops and hay/pasture lands.

According to the MDA Organic Farm Directory, no registered organic producers are within the 150-foot ROW (reference (105)). According to the Minnesota Apiary Registry, no apiaries are located within the

ROW (reference (106)). However, there are 4 acres of marginal agricultural lands enrolled in the USDA FSA CREP within the 150-foot ROW (reference (107)).

Potential construction and operation-related impacts to agricultural land are summarized in Chapter 5.8.1. Several measures could be implemented to avoid, minimize, or mitigate impacts to agricultural land, as described in Chapter 5.8.1.1.

6.7.1.3.1 Forestry

Forestry impacts in the Sherburne County region were primarily assessed by evaluating the designated forestry resources within the 150-foot ROW. The applicants' proposed route through the Sherburne County region consists almost entirely of existing transmission line ROW; therefore, no new impacts to forestry resources are anticipated. Nevertheless, the applicants' proposed route would cross approximately 10 acres of land within the SFIA program.

As shown in Table 6-17, the designated forestry resources consist of DNR state forests, Minnesota School Trust Land, Forest for the Future land, and SFIA land, which is a conservation program administered by the DNR that provides annual incentive payments to encourage private landowners to keep their wooded areas undeveloped (reference (109)). Because the applicants' proposed route follows existing transmission line ROW through the SFIA land, no impacts to this forestry resource are anticipated.

6.7.1.4 Archaeological and Historic Resources

Archaeological and historic resource impacts are assessed by determining the presence of these resources within the project route width (Chapter 5.1.1). Map Book 5F provides an overview of archaeological and historic architectural resources in the Sherburne County region.

There are 17 documented cultural resources within the route width (1,000 feet) of the applicants' proposed route in the Sherburne County region (Table 6-142). These include six archaeological sites and eleven historic architectural resources. However, this portion of the applicants' proposed route consists of rebuilding two existing transmission lines. As a result, no new impacts to cultural resources are anticipated, because no new ROW would be acquired, nor will new visual or other impacts be introduced as a result of the project. Impacts to cultural resources are therefore minimized in the Sherburne County region.

Table 6-142 Cultural Resources within the Route Width of the Applicants' Proposed Route, Sherburne County Region

Resource Number	Resource Type	NRHP Eligibility
21SH0081	Precontact artifact scatter	Not evaluated
21SH0082	Precontact lithic scatter	Not evaluated
21SH0084	Precontact lithic scatter	Not evaluated
21SH0086	Post contact artifact scatter, farmstead ruins	Not evaluated
21SH0090	Precontact lithic scatter	Not eligible
21SHbe	Precontact artifact scatter	Not evaluated
SH-BKC-00012	Herbert Maximilian Fox House	NRHP-listed
SH-CLT-00011	Fort Ripley Military Road: Clear Lake Twp. Segment	Not evaluated
XX-ROD-00034	Trunk Highway 25	Not eligible
XX-ROD-00035	Trunk Highway 10: Anoka to St. Cloud	Not eligible
XX-ROD-00037	Trunk Highway 10: Anoka to Little Falls Segment	Not eligible
XX-ROD-00040	Trunk Highway 10	Not eligible
XX-ROD-00113	Trunk Highway 25	Not eligible
XX-RRD-00001	St. Paul and Pacific Railroad Corridor	Eligible
XX-RRD-NPR022	St. Paul and Northern Pacific Railway Company/Northern Pacific Railway Company: Staples to St. Paul	Not eligible
XX-RRD-NPR024	St. Paul and Northern Pacific Railway Company/Northern Pacific Railway Company: Brainerd to St. Paul	Not eligible
XX-RRD-NPR026	St. Paul and Northern Pacific Railway Company/Northern Pacific Railway Company: Sauk Rapids to Minneapolis	Not eligible

6.7.1.5 Natural Environment

6.7.1.5.1 Water Resources

Potential project impacts on water resources are examined by evaluating locations and conditions of watercourses and waterbodies, floodplains, wetlands, and groundwater. Project proximity to water bodies, watercourses, floodplains, wetlands, and groundwater wells and the necessity of crossing these features are the primary indicators of potential water resource impacts. Impacts to two elements of water resources, floodplains and groundwater, are anticipated to be minimal in this region.

There are two elements of water resources for which impacts could be non-minimal: watercourses and waterbodies, and wetlands. This discussion focuses on those elements that are within the ROW or are crossed by the applicants' proposed route. The number of surface water and wetland crossings is an important consideration when evaluating routes, even though there may be no direct impacts associated with these crossings. The crossings are important because of the potential indirect impacts associated with them (i.e., clearing of vegetation, soil movement). The amount of forested wetland within the ROW is also an important consideration when evaluating routes. Since large-growing woody vegetation would be

cleared from the ROW, forested wetlands would be converted to other wetland types, resulting in permanent impacts.

6.7.1.5.1.1 Watercourses and Waterbodies

The work occurring within the Sherburne County region would be limited to upgrades and/or changes to two existing transmission lines. There would be no new watercourse or waterbodies crossings within this region.

6.7.1.5.1.2 Wetlands

The work occurring within the Sherburne County region would be limited to upgrades and/or changes to two existing transmission lines. It is anticipated that wetland impacts within this region can be avoided.

6.7.1.5.2 Vegetation

Vegetation impacts were evaluated by examining vegetative landcover within the 150-foot ROW (Chapter 5.10.4.1). Map Book 5C provides an overview of vegetative landcover in the Sherburne County region and Table 6-143 summarizes the landcover types within the ROW of the applicants' proposed route within this region. The dominant vegetative landcover in the ROW of the applicants' proposed route in this region consists of agricultural land, which represents approximately 61 percent of the ROW. Agricultural vegetation in the ROW of applicants' proposed route for this region is discussed in Chapter 6.7.1.2.

Table 6-143 Landcover Types in the 150-foot ROW of the Applicants' Proposed Route in the Sherburne County Region

Landcover Type	Acres in ROW	Percent of ROW[1]
Agricultural (cultivated crops and hay/pasture)	457	61
Herbaceous (upland and wetland)	146	19
Developed (low-high intensity; open space)	70	9
Forested (upland and wetland)	68[2]	9
Open water	8	1
Shrub/Scrub	3	<1

Source reference (110)
1 Totals may not sum to 100 percent due to rounding.
2 The NLCD indicates forested vegetation is in the ROW; however, the ROW is an existing transmission line ROW that has been cleared and is routinely maintained.

Although the NLCD indicates that forested vegetation is present in the ROW of the applicants' proposed route, it has been cleared to accommodate the existing transmission line ROW. Because the applicants' proposed route consists of rebuilding two existing transmission lines in the existing ROW, no new impacts to forested vegetation are anticipated. Vegetation in the existing ROW has already been cleared and is routinely maintained. As such, impacts to vegetation in the ROW is anticipated to be minimal.

Potential construction and operation-related impacts to vegetation are summarized in Chapter 5.10.4.1. Several measures could be implemented to avoid, minimize, or mitigate impacts to vegetation, as described in Chapter 5.10.4.1. Potential impacts to agricultural vegetation and wetlands are discussed Chapters 5.8.1 and 5.10.1.3, respectively.

6.7.1.5.3 Wildlife

Impacts to wildlife are primarily assessed by evaluating the presence of wildlife habitat, including areas that are preserved or managed for wildlife habitat, within the ROW. The applicants' proposed route in the Sherburne County region consists of rebuilding two existing transmission lines within the existing ROW. As such, the applicants' proposed route would occur in an area where wildlife habitat has been previously disturbed; thus, impacts to wildlife habitat are anticipated to be minimal. Additionally, potential new impacts associated with habitat fragmentation are anticipated to be minimal.

As shown on Map Book 5H, the entirety of the ROW for the applicants' proposed route in this region would traverse USFWS GBCA. However, it would traverse these GBCA in the existing transmission line ROW, thereby minimizing the potential for new impacts associated with habitat fragmentation and impacts to avian species.

Potential construction and operation-related impacts to wildlife are summarized in Chapter 5.10.5. Several measures could be implemented to avoid, minimize, or mitigate impacts to wildlife, as described in Chapter 5.10.5.

6.7.1.6 Rare and Unique Natural Resources

Impacts to rare and unique natural resources are primarily assessed by evaluating the presence of federal- and state-protected species within a 1-mile radius of the anticipated alignment and the presence of sensitive ecological resources within the 150-foot ROW (Chapter 5.10). Map Book 5I provides an overview of sensitive ecological resources within the Sherburne County region; in order to protect federally and state protected species from exploitation or destruction, documented locations of these species are not identified on any maps.

6.7.1.6.1 Protected Species

Using the NHIS database, it was determined that no federally protected species have been documented within 1 mile of the applicants' proposed route in the Sherburne County region. As summarized in Table 6-144, five state protected species have been documented within 1 mile of the applicants' proposed route in this region. In addition, several state special concern species have been documented within the ROW of the applicants' proposed route in this region (Appendix M).

Table 6-144 State Protected Species Documented in the Natural Heritage Information System Database – Applicants' Proposed Route in the Sherburne County Region

Scientific Name	Common Name	Type	State Status	Documented Records within ROW, Route Width, or 1 Mile
Lanius ludovicianus	Loggerhead shrike	Bird	Endangered	ROW
Aristida tuberculosa	Seaside three-awn	Vascular plant	Threatened	1 Mile
Emydoidea blandingii	Blanding's turtle	Turtle	Threatened	1 Mile
Hudsonia tomentosa	Beach heather	Vascular plant	Threatened	1 Mile
Minuartia dawsonesis	Rock sandwort	Vascular plant	Threatened	ROW

Two of the state protected species identified in Table 6-144 have been documented within the ROW of the applicants' proposed route; however, the ROW is routinely disturbed for maintenance activities associated with the existing transmission lines. Formal surveys for protected species have not been conducted for the project; as such, it is possible that these species or additional protected species could be present where suitable habitat is available within the ROW. Potential impacts to protected species could occur should they be present within or near the ROW. While more mobile species would leave the area for nearby comparable habitats, non-mobile organisms, such as vascular plants or nesting birds, could be directly impacted.

Potential construction and operation-related impacts to protected species are summarized in Chapter 5.11.1.3. Several measures could be implemented to avoid, minimize, or mitigate impacts to protected species, as described in Chapter 5.11.1.3. In addition, the applicants may be required to conduct field surveys for protected species in coordination with the USFWS and/or DNR prior to construction.

6.7.1.6.2 Sensitive Ecological Resources

The ROW of the applicants' proposed route in the Sherburne County region would traverse several sensitive ecological resources, including SBS and native plant communities (Table 6-145; Map Book 5I). As discussed above, this portion of the applicants' proposed route consists of rebuilding two existing transmission lines. Impacts to these sensitive ecological resources would be minimized because the rebuilds would occupy the existing ROW, which has been previously disturbed and is routinely maintained.

Table 6-145 Sensitive Ecological Resources in the 150-foot ROW of the Applicants' Proposed Route – Sherburne County Region

Sensitive Ecological Resource	Area within ROW of Applicants' Proposed Route
Sites of Biodiversity Significance	38 total acres; 10 acres ranked outstanding; 9 acres ranked high; 2 acres ranked moderate; 17 acres ranked below
Native Plant Communities	21 total acres; 3 acres have a conservation status of S1 or S2; conservation status of remaining acres is S3-S5

Potential construction and operation-related impacts to sensitive ecological resources are summarized in Chapter 5.11.2.15.11.1.3. Several measures could be implemented to avoid, minimize, or mitigate impacts to sensitive ecological resources, as described in Chapter 5.11.2.1. In addition, the applicants may be required to conduct field surveys in coordination with the USFWS and/or DNR for the potential presence of protected species within sensitive ecological resources that cannot be avoided.

7 Relative Merits of the Project as a Whole

The Commission is charged with locating transmission lines in a manner that is "compatible with environmental preservation and the efficient use of resources" and that minimizes "adverse human and environmental impact(s)" while ensuring electric power reliability (Minn. Statute 216E.02). Minn. Statute 216E.03, subdivision 7(b) identifies considerations that the Commission must consider when designating transmission lines routes.

Minn. Rule 7850.4100 lists 14 factors for the Commission to consider in its route permitting decisions, including impacts on human settlements, land-based economies, and the natural environment (see Factors Considered by the Commission for Transmission Line Route Permits sidebar). Through an analysis of the routing factors, this chapter presents the merits of the applicant's proposed route and other example, full route options.

Many of the project impacts relative to the applicable routing factors are anticipated to be avoided or minimized by the (1) route selection, (2) general and special conditions in the Commission's route permit, (3) prudent transmission structure placement and placement of the alignment within the permitted route, and (4) the requirements of "downstream" permits such as the construction stormwater permit.

The discussion here focuses on the first 12 routing factors (See Minn. Rule 7850.4100, factors A through L). Routing factors M and N— the unavoidable and irreversible impacts of the project—are discussed at the end of this chapter.

Routing factor G ("mitigate adverse environmental impacts") has several parts and speaks generally to environmental impacts. For purposes of discussion here, and with respect to routing factor G, it is assumed that all routing alternatives are equal with regard to maximizing energy efficiencies and accommodating expansion of transmission capacity. With respect to environmental impacts, the examination of such impacts suggested by routing factor G is included in the discussion of other routing factors and elements that more specifically address an environmental impact (e.g., effects on vegetation and wildlife, routing factor E).

Routing factor I, the use of existing large electric power generating plant sites, is not relevant to this project and is not discussed further.

Finally, routing factors H and J address similar issues, the use or paralleling of existing rights-of-way. Routing factor H relates to the use or paralleling of existing rights-of-way, but also includes items

Factors Considered by the Commission for Transmission Line Route Permits

To determine whether to issue a route permit for a high-voltage transmission line, the Commission shall consider the following factors of Minnesota Rules, part 7850.4100:

A. Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services.

B. Effects on public health and safety.

C. Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining.

D. Effects on archaeological and historic resources.

E. Effects on the natural environment, including effects on air and water quality resources and flora and fauna.

F. Effects on rare and unique natural resources.

G. Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity.

H. Use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries.

I. Use of existing large electric power generating plant sites.

J. Use of existing transportation, pipeline, and electrical transmission systems or rights-of-way.

K. Electrical system reliability.

L. Costs of constructing, operating, and maintaining the facility which are dependent on design and route.

M. Adverse human and natural environmental effects which cannot be avoided.

N. Irreversible and irretrievable commitments of resources.

that do not have a ROW, such as survey lines, natural division lines, and agricultural field boundaries. Routing factor J relates to the use of existing transportation, pipeline, and electrical transmission rights-of-way. Within this chapter, these factors are considered similarly—the use or paralleling of existing rights-of-way, where there is infrastructure that has a ROW. However, the discussion here emphasizes existing transmission line ROW usage as opposed to other infrastructure ROW.

7.1 Applicants' Proposed Routes and Example Full Route Options

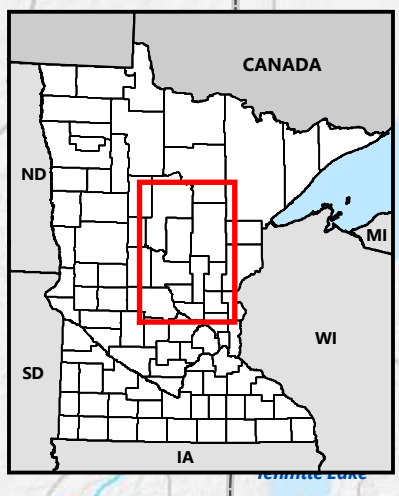
Four full route options (i.e., end-to-end routes from the Iron Range Substation to the Sherco and Big Oaks Substations) are discussed here. These full route options are:

- **The applicants' proposed route**. This is the route proposed by the applicants in their CN and route permit application.
- **The applicants' proposed route with modifications**. This route includes modifications proposed by the applicants in response to public comments and includes routing alternatives that would further consolidate the proposed new double-circuit 345 kV transmission line with existing transmission lines, particularly in the Cole Lake-Riverton Region. This route includes alignment alternatives AA3, AA9, and route alternative E1.
- **Example Route Option 1**. This route includes portions of the applicants' proposed route, including some modifications proposed by the applicants, and routing alternatives proposed during the EA scoping comment period. This route includes route alternatives B, E1, H1 and alignment alternatives AA3 and AA16 (Table 7-1; Map 7-1).
- **Example Route Option 2**. Similar to Route 1, this route includes portions of the applicants' proposed route, including some modifications proposed by the applicants, and routing alternatives proposed during the EA scoping comment period. This route includes route alternatives A2, B, C, E1, H1, J1 and alignment alternatives AA3 and AA16 (Table 7-1; Map 7-2).

These full route options are not meant to represent the only Northland Reliability Project routing possibilities. Rather, they are examples of route options that could be assembled for the project. They are meant to illustrate how various routing alternatives could be selected to build a full project route. Analyzing these four full route options against each other provides the opportunity to understand what impacts might look like if one of these full routes, or a similar route, were selected by the Commission for the project.

The full route options were compiled by selecting route alternatives or alignment alternatives within each region that could be feasibly connected to each another to create a full transmission line route between the existing Iron Range Substation, a new Cuyuna Series Compensation Substation, the existing Benton County Substation, the existing Sherco Substation, and the new Big Oaks Substation (Map Book 7A).

These full route options are simply examples for comparison; other full routes may be developed by combining route alternatives and alignment alternatives that could create a full transmission line route connecting the relevant features noted above. No option is meant to represent a "best case scenario" or to be "least impactful overall." Instead, the example routing options are meant to help the reader understand how the impacts of one routing option compares to another for the entirety of the line.



Iron Range Substation

Iron Range Substation Region (IRSR)

AA16

Hill City to Little Pine Region (HCLPR)

B

Cole Lake/Riverton Region (CLRR)

AA3

Cuyuna Series Compensation Station

E1

H1

Long Lake Region (LLR)

Morrison County Region (MCR)

Benton County Elk River Region (BCERR)

Benton County Substation

Sherburne County Region (SCR)

Sherco Substation

Mud Lake
Grand Rapids
Pokegama Lake
Leech Lake
Boy Lake
Itasca County
Saint Louis County
Cass County
Woman Lake
St. Louis River
Sandy Lake Reservoir
Upper/Lower Whitefish
Mississippi River
Aitkin County
Wadena County
Crow Wing County
Pelican Lake
Carlton County
Rice Lake
Crow Wing River
Gull Lake
North Long Lake
Brainerd
Mille Lacs Lake
Snake River
Todd County
Long Prairie River
Little Falls
Morrison County
Mille Lacs County
Kanabec County
Pine County
Benton County
Isanti County
Chisago County
Sauk River
Sauk Rapids
Waite Park
Saint Cloud
Cambridge
St. Croix River
Stearns County
Sherburne County
Wright County
Rum River
Anoka County
East Bethel
Meeker County
Crow River
Monticello
Elk River

Original Applicants' Proposed Route
Regions of Analysis
Existing Transmission Line
Benton County Substation
Iron Range Substation
Sherco Substation
Cuyuna Series Compensation Station

Example Route 1

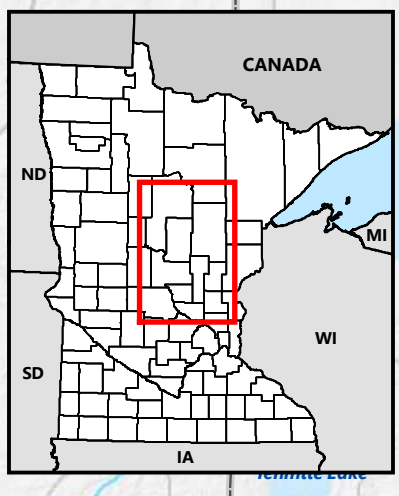
Applicants' Proposed Route
Route Alternative
Alignment Alternative

N

0 5 10 15
Miles

Map 7-1

EXAMPLE ROUTE 1
OVERVIEW MAP
Northland Reliability Project



Iron Range Substation
Iron Range Substation Region (IRSR)
AA16
A2
Hill City to Little Pine Region (HCLPR)
B
C
Cole Lake/Riverton Region (CLRR)
AA3
Cuyuna Series Compensation Station
E1
H1
Long Lake Region (LLR)
Morrison County Region (MCR)
Benton County Substation
J1
Benton County Elk River Region (BCERR)
Sherburne County Region (SCR)
Sherco Substation

Mud Lake
Grand Rapids
Pokegama Lake
Leech Lake
Boy Lake
Itasca County
Saint Louis County
Cass County
Woman Lake
St. Louis River
Sandy Lake Reservoir
Upper/Lower Whitefish
Mississippi River
Aitkin County
Wadena County
Crow Wing County
Pelican Lake
Carlton County
Rice Lake
Crow Wing River
Gull Lake
North Long Lake
Brainerd
Mille Lacs Lake
Snake River
Todd County
Long Prairie River
Little Falls
Morrison County
Mille Lacs County
Kanabec County
Pine County
Benton County
Isanti County
Chisago County
Cambridge
St. Croix River
Sauk River
Stearns County
Sherburne County
Wright County
Crow River
Meeker County
Monticello
Elk River
Rum River
Anoka County
East Bethel
Sartell

2 169 200 84 6 371 64 210 47 27 10 61 8

Original Applicants' Proposed Route
Regions of Analysis
Existing Transmission Line
Benton County Substation
Iron Range Substation
Sherco Substation
Cuyuna Series Compensation Station

Example Route 2
Applicants' Proposed Route
Route Alternative
Alignment Alternative

N

0 5 10 15
Miles

Map 7-2

EXAMPLE ROUTE 2
OVERVIEW MAP
Northland Reliability Project

Table 7-1 Example Full Route Option Features

Region and Route Alternative Choices	Example Route Option 1	Example Route Option 1 Features	Example Route Option 2	Example Route Option 2 Features
Iron Range Substation Region – A1, A2, A3, A4, and applicants' equivalent	Applicants' Equivalent	• Maximizes the paralleling of existing transmission line ROW; • Minimizes impacts to residences and non-residential structures; • Avoids impacts to cultural resources; and • Balances impacts to natural environment (not the highest or lowest for impacts to agriculture, wetlands, or forested land cover).	A2	• Route alternatives A1 and A2 are comparable options in that they both maximize use of paralleling existing transmission line and road rights-of-way and minimize impacts to the natural environment. However, route alternative A2 minimizes impacts to residences more than route alternative A1. • Route alternative A3 would place a residence between two transmission lines, within 200 feet of each line. • Route alternative A4 is the longest and while minimizing impacts to residences, it would have the most impact on the natural environment and does not make use of any existing transmission line ROW.
Iron Range Substation Region – AA15 and applicants' equivalent	Applicants' Equivalent	• These two routing alternatives are similar with respect to the routing factors. However, alignment alternative AA15 would require two perpendicular crossings of an existing transmission line, which raises constructability and reliability concerns and costs. In contrast. the applicants' equivalent would parallel an existing transmission line for its entire length.	Applicants' Equivalent	• These two routing alternatives are similar with respect to the routing factors. However, alignment alternative AA15 would require two perpendicular crossings of an existing transmission line, which raises constructability and reliability concerns. In contrast. the applicants' equivalent would parallel an existing transmission line for its entire length.

Region and Route Alternative Choices	Example Route Option 1	Example Route Option 1 Features	Example Route Option 2	Example Route Option 2 Features
Hill City to Little Pine Region – B and applicants' equivalent	B	• Maximizes paralleling existing transmission line ROW more than the applicants' equivalent; • Minimizes impacts to residences within 250 feet; • Is located within 1,300 feet of the runway of the Hill City/Quadna Mountain Airport; however, parallels an existing transmission line in this location; • Minimizes impacts to cultural resources; and • While route alternative B would impact more forested vegetation native plant communities and candidate old growth, the applicants' equivalent would impact more Sites of Biodiversity Significance and native plant communities, as well as traverse a Wildlife Management Area.	B	• Maximizes paralleling existing transmission line ROW more than the applicants' equivalent; • Minimizes impacts to residences within 250 feet; • Is located within 1,300 feet of the runway of the Hill City/Quadna Mountain Airport; however, parallels an existing transmission line in this location; • Minimizes impacts to cultural resources; and • While route alternative B would impact more forested vegetation native plant communities and candidate old growth, the applicants' equivalent would impact more Sites of Biodiversity Significance and native plant communities, as well as traverse a Wildlife Management Area.
Hill City to Little Pine Region – C and applicants' equivalent	Applicants' Equivalent	• Is 1.5 miles shorter and maximizes the paralleling of existing transmission line ROW; • Avoids residences and non-residential structures in the ROW; and • Minimizes impacts to forested vegetation but would impact slightly more wetlands, Sites of Biodiversity Significance, and native plant communities. It would also have a few more stream crossings; however, it would traverse all of these resources while paralleling an existing transmission line ROW.	C	• Minimizes impacts to wetlands, Sites of Biodiversity Significance, and native plant communities but would impact more forested vegetation; and • Minimizes stream crossings; however, the crossings that would occur, would be new crossings, as they would occur where an existing transmission line ROW is not currently present.
Hill City to Little Pine Region – AA1, AA2, and applicants' equivalent	Applicants' Equivalent	• These three routing alternatives are similar with respect to the routing factors. However, alignment alternatives AA1 and AA2 would require perpendicular crossings of an existing transmission line, which raises constructability and reliability concerns. In contrast. the applicants' equivalent would parallel an existing transmission line for its entire length.	Applicants' Equivalent	• These three routing alternatives are similar with respect to the routing factors. However, alignment alternatives AA1 and AA2 would require perpendicular crossings of an existing transmission line, which raises constructability and reliability concerns. In contrast. the applicants' equivalent would parallel an existing transmission line for its entire length.

Region and Route Alternative Choices	Example Route Option 1	Example Route Option 1 Features	Example Route Option 2	Example Route Option 2 Features
Hill City to Little Pine Region – AA16 and applicants' equivalent	AA16	• Minimizes impacts by reconfiguring an existing transmission line to use that line's ROW; and • Minimizes impacts to residences and the natural environment by constructing in an existing, previously disturbed ROW.	AA16	• Minimizes impacts by reconfiguring an existing transmission line to use that line's ROW; and • Minimizes impacts to residences and the natural environment by constructing in an existing, previously disturbed ROW.
Cole Lake-Riverton Region – AA3 and applicants' equivalent[1]	AA3	• Minimizes impacts by reconfiguring an existing transmission line to use that line's ROW; and • Minimizes impacts to residences and the natural environment by constructing in an existing, previously disturbed ROW.	AA3	• Minimizes impacts by reconfiguring an existing transmission line to use that line's ROW; and • Minimizes impacts to residences and the natural environment by constructing in an existing, previously disturbed ROW.
Cole Lake-Riverton Region – E1, E2, E3, #4, E5, and applicants' equivalent[2]	E1	• Maximizes the paralleling of existing transmission line ROW and is the only route alternative to parallel one for its entire length; • Minimizes impacts to residences and non-residential structures; and • Minimizes impacts to wetlands, forested vegetation, and Sites of Biodiversity Significance. It would traverse the edge of a Lake of Biological Significance but would do so while paralleling an existing transmission line ROW.	E1	• Maximizes the paralleling of existing transmission line ROW and is the only route alternative to parallel one for its entire length; • Minimizes impacts to residences and non-residential structures; and • Minimizes impacts to wetlands, forested vegetation, and Sites of Biodiversity Significance. It would traverse the edge of a Lake of Biological Significance but would do so while paralleling an existing transmission line ROW.
Cole Lake-Riverton Region – G and applicants' equivalent	Applicants' Equivalent	• Is almost 2 miles shorter than route alternative G; • Although it has two more residences within 250-500 feet, it does not have a non-residential structure in the ROW like route alternative G and • Minimizes impacts to agricultural and forested vegetation.	Applicants' Equivalent	• Minimizes length by being almost 2 miles shorter than route alternative G; • Although it has two more residences within 250-500 feet, it does not have a non-residential structure in the ROW like route alternative G; and • Minimizes impacts to agricultural and forested vegetation.
Long Lake Region – H1, H2, H3, H4, H5, H6, H7, and applicants' equivalent[3]	H1	• More paralleling of existing transmission line ROW than the other routing alternatives; and • Minimizes impacts to wetlands, forested vegetation, Sites of Biodiversity Significance, and Grassland Bird Conservation Areas.	H1	• More paralleling of existing transmission line ROW than the other routing alternatives; and • Minimizes impacts to wetlands, forested vegetation, Sites of Biodiversity Significance, and Grassland Bird Conservation Areas.

Region and Route Alternative Choices	Example Route Option 1	Example Route Option 1 Features	Example Route Option 2	Example Route Option 2 Features
Long Lake Region – K and applicants' equivalent	Applicants' Equivalent	• Minimizes impacts to residences and non-residential structures in the ROW and total residences within 1,000 feet; • Minimizes impacts to agricultural vegetation; and • Minimizes impacts to cultural resources.	Applicants' Equivalent	• Minimizes impacts to residences and non-residential structures in the ROW and total residences within 1,000 feet; • Minimizes impacts to agricultural vegetation; and • Minimizes impacts to cultural resources.
Long Lake Region – AA17 and applicants' equivalent	Applicants' Equivalent	• Maximizes the paralleling of existing transmission line ROW; and • Alignment alternative AA17 would require two perpendicular crossings of an existing transmission line, which raises constructability and reliability concerns.	Applicants' Equivalent	• Maximizes the paralleling of existing transmission line ROW; and • Alignment alternative AA17 would require two perpendicular crossings of an existing transmission line, which raises constructability and reliability concerns.
Benton County Elk River Region – J1, J2, J3, and applicants' equivalent	Applicants' Equivalent	• Maximizes the paralleling of existing transmission line ROW; • Minimizes impacts to residences; • Minimizes impacts to agricultural land; and • Minimizes impacts to Grassland Bird Conservation Area.	J1	• Avoids multiple crossings of the Elk River in the northern part of this region; and • Minimizes impacts to forested vegetation.

1 Because AA3 was selected here, route alternatives D3, AA4, AA6, and the applicants' equivalent are not viable options; these are alternatives to the applicants' proposed route in this area. The applicants' proposed route would be used just north of where AA3 ends.

2 Because E1 was selected here, route alternative F and alignment alternatives AA7, AA8, AA9, and AA10 are not viable options; these are alternatives to the applicants' proposed route in this area.

3 Because H1 was selected here, alignment alternatives AA12, AA13, and AA14 are not viable options; these are alternatives to the applicants' proposed route in this area.

7.2 Applicants' Proposed Routes and Example Full Route Option Impacts

Potential impacts of the applicants' proposed routes and full route options are summarized in Table 7-2 and described further in Chapters 7.2.1 through 7.2.5.

Table 7-2 Human and Environmental Impacts for the Applicants' Proposed Routes and Example Full Route Options

Resource	Element	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Length (miles)		182.3	180.5	177.6	179.6
Human Settlement	Residences within 0-75 feet (count)	3	3	2	3
	Residences within 75-250 feet (count)	102	111	109	117
	Residences within 250-500 feet (count)	164	172	194	209
	Residences within 500-1,000 feet (count)	380	377	385	396
Environmental Justice Concerns (EJC)	Communities of EJ concern crossed by the 150-ft ROW (count)	6	5	7	7
Land-Based Economies	Agricultural land in 150-ft ROW (acres)	1,260	1,302	1,298	1,325
Archaeology and Historic Architecture	Archaeological sites and historic architectural resources in 1,000-foot route width (count)	42	43	41	37
Water Resources	NHD stream crossings (count)	151	150	150	134
	PWI stream crossings (count)	82	79	79	59
	Impaired stream crossings (count)	46	46	46	28
	NHD lake crossings (count)	20	15	18	21
	Impaired lake crossings (count)	0	1	1	1
	PWI basin crossings (count)	9	14	16	15
	PWI wetland crossings (count)	10	7	7	6
	Total wetlands in 150-foot ROW (acres)	986	957	968	926
	Forested wetlands in 150-ft ROW (acres)	235	223	233	218
	Wetland crossings greater than 1,000 feet (count)	67	64	65	62

Resource	Element	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Vegetation	Forested landcover in 150-foot ROW (acres)	590	551	472	476
Wildlife	Wildlife Management Areas in 150-foot ROW (acres)	14	18	5	5
	Grassland Bird Conservation Areas in 150-foot ROW (acres)	1,241	1,241	1,241	1,252
	Shallow Wildlife Lake in 150-foot ROW (acres)	6	6	6	6
Rare and Unique Natural Resources	Sites of Biodiversity in 150-foot ROW (ranked moderate, high, or outstanding; acres)	954	914	743	735
	Native plant communities in 150-foot ROW (acres)	293	275	276	271
	High Conservation Value Forest in 150-foot ROW (acres)	124	124	33	33
	Lake of Biological Significance in 150-foot ROW (acres)	2	5	5	5
	Federal- or state-protected species documented in 150-foot ROW (count)	3	3	3	3
ROW Sharing and Paralleling	Transmission line (miles, percent)	159.3 (87)	166.7 (92)	167.8 (95)	160.0 (89)
	Roadway (miles, percent)	4.0 (2)	4.0 (2)	3.9 (2)	13.3 (7)
	Field, parcel, or section lines (miles, percent)	55.0 (30)	48.1 (27)	44.4 (25)	52.7 (29)
	Total ROW sharing and paralleling (miles, percent)	176.4 (97)	177.0 (98)	174.2 (98)	175.0 (98)
Estimated Cost	Total estimated cost (2022 dollars in millions)	$963.7	$980.4	$1,013 to $1,053	$1,035 to $1,075

7.2.1 Human Settlements

Potential impacts on human settlements are assessed through an evaluation of several elements (see Chapter 7, Factors Considered by the Commission for Transmission Line Route Permits sidebar). For some of the human settlement elements, project impacts are anticipated to be minimal and independent of the route selected and are therefore not analyzed or discussed here. Analysis of impacts to human settlements here focuses on those elements that vary with the route selected – aesthetics, displacement, and communities of EJ concern.

7.2.1.1 Aesthetics

Aesthetic impacts differ only slightly among the full route options; impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure and ROW. Proximity of residences to the applicants' proposed routes and full route options are shown in Table 7-3 and depicted graphically in Figure 7-1, while ROW paralleling and sharing are shown in Table 7-4 and depicted graphically in Figure 7-2.

Each of the four full routes would have similar aesthetic impacts based on the project's proximity to residences. The applicants' proposed route is near the fewest number of residences; example route option 2 is near the greatest number of residences (Table 7-3; Figure 7-1). Each of the full route options minimizes aesthetic impacts by paralleling and/or sharing existing ROW for between 97 and 98 percent of the route (Table 7-4; Figure 7-2). However, when considering the amount that each route would follow existing transmission lines, example route option 1 best minimizes aesthetic impacts with 95 percent of this route following existing transmission line ROW.

Table 7-3 Proximity of Residences to Applicants' Proposed Routes and Example Full Route Options

Residences, Distance from Anticipated Alignment	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Residences within 0-75 feet	3	3	2	3
Residences within 75-250 feet	102	111	109	117
Residences within 250-500 feet	164	172	194	209
Residences within 500-1,000 feet	380	377	385	396
Total Residences within 1,000 feet	649	662	690	725

Figure 7-1 Proximity of Residences to the Applicants' Proposed Routes and Example Full Route Options

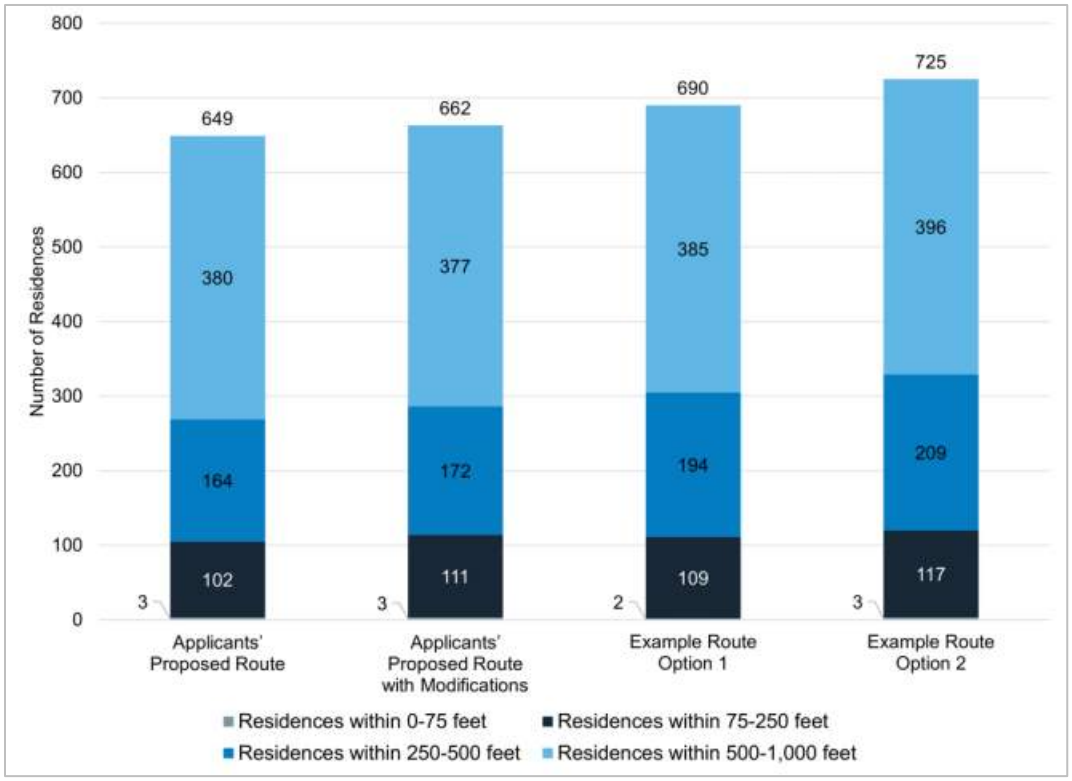
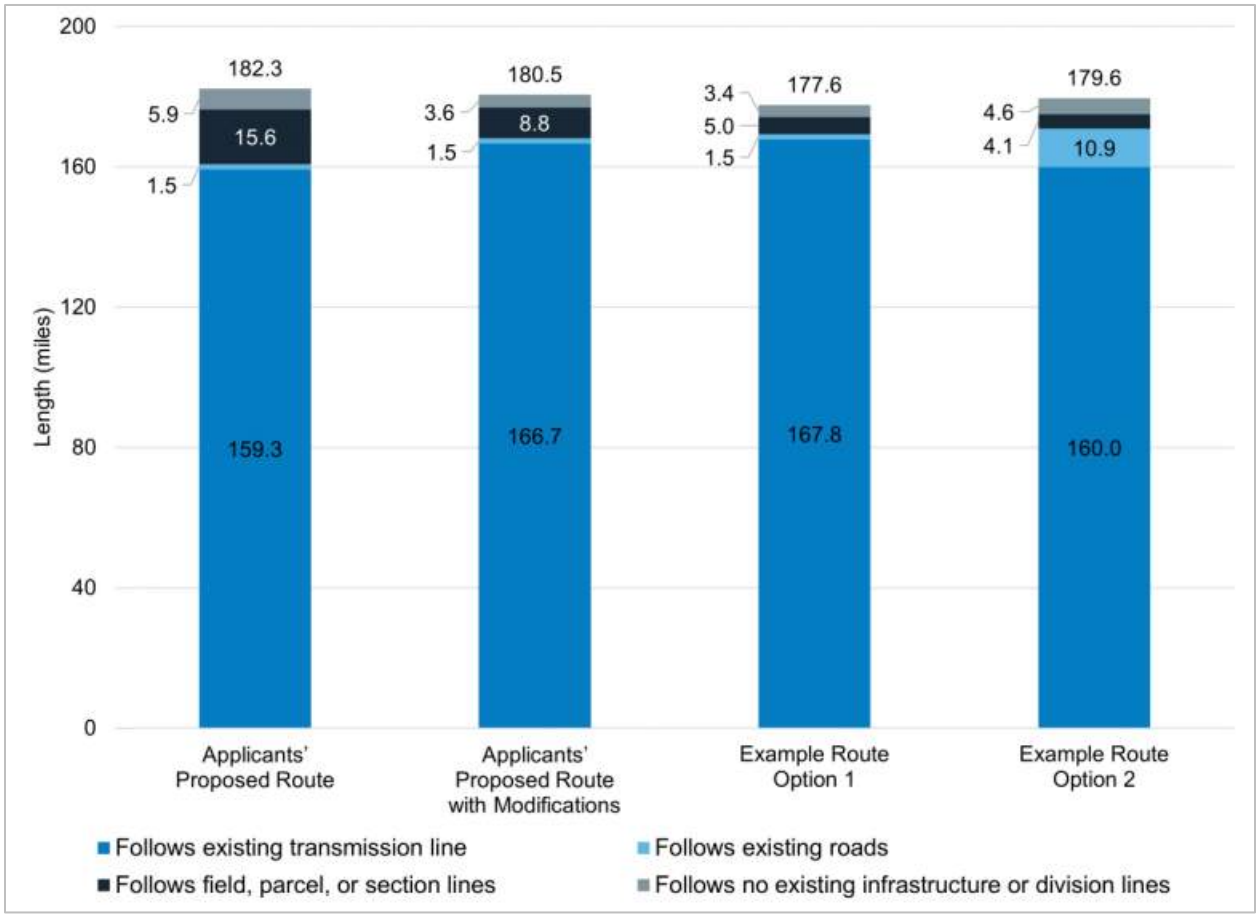


Table 7-4 ROW Paralleling and Sharing of Applicants' Proposed Routes and Example Full Route Options

Infrastructure	Applicants' Proposed Route miles (percent)	Applicants' Proposed Route with Modifications miles (percent)	Example Route Option 1 miles (percent)	Example Route Option 2 miles (percent)
Follows Existing Railroad	1.0 (1)	1.0 (1)	1.0 (1)	1.0 (1)
Follows Existing Roads	4.0 (2)	4.0 (2)	3.9 (2)	13.3 (7)
Follows Existing Transmission Line	159.3 (87)	166.7 (92)	167.8 (95)	160.0 (89)
Total – Follows Transmission Line, Road, or Railroad	160.8 (88)	168.2 (93)	169.2 (95)	170.9 (95)
Follows Field, Parcel, or Section Lines	55.0 (30.2)	48.1 (26.6)	44.4 (25)	52.7 (29)
Total – ROW Paralleling and Sharing	176.4 (97)	177.0 (98)	174.2 (98)	175.0 (98)
Total Length of Route Alternative	182.3	180.5	177.6	179.6

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line; therefore, the sum may be greater than 100 percent.

Figure 7-2 ROW Sharing and Paralleling - Applicants' Proposed Routes and Example Full Route Options



7.2.1.2 Displacement

Residences or other buildings are typically not allowed within the transmission line ROW for electrical safety code and maintenance reasons. Any residences or other buildings located within a proposed ROW are therefore generally removed or displaced.

The applicants' proposed route, proposed route with modifications, and example route option 2 may each result in the potential displacement of three residences, while example route option 1 may result in the potential displacement of two residences. In addition, each of these full routes could result in the displacement of several non-residential buildings located within the 150-foot ROW (Table 7-5).

Table 7-5 Proximity of Residences and Non-Residences to Applicants' Proposed Routes and Example Full Route Options

Residences and Non-Residences, Distance from Anticipated Alignment	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Residences within 0-75 feet	3	3	2	3
Non-Residences within 0-75 feet	14	13	11	14
Total Residences and Non-Residences within 0-75 feet	17	16	13	17

Residential and non-residential buildings within the 150-foot ROW may or may not be displaced as a result of the project. Though buildings are generally not allowed within the ROW of a transmission line, there are instances where the activities taking place in these buildings are compatible with the safe operation of the line. For each of the buildings in the ROW, the applicants would need to conduct a site-specific analysis to determine if the building would need to be removed or relocated.

7.2.1.3 Environmental Justice

As indicated in Chapter 5.3.9, utility infrastructure can adversely impact low-income, minority, or tribal populations (communities of environmental justice [EJ] concern). Each of the full route options analyzed in this chapter would cross several communities of EJC. The applicants' proposed route would cross six communities of EJC, the applicants' proposed route with modifications would cross five communities of EJC, and example route options 1 and 2 would each cross seven communities of EJC (Table 7-2).

However, no adverse or permanent impacts to the identified EJC are anticipated. While each of the full routes included in this analysis intersect environmental justice communities, they are not anticipated to experience disproportionately adverse impacts as a result of the project, particularly because the transmission line will parallel and/or share existing ROW for the majority of these route options (97 to 98 percent).

7.2.2 Land-Based Economies

Potential impacts to land-based economies are assessed through several elements. This Chapter addresses those elements of land-based economies that vary with the route selected – agricultural, forestry, mining, and recreation and tourism resources.

7.2.2.1 Agriculture

Impacts to agricultural land in the 150-foot ROW of the full route options would be relatively similar (Table 7-2). The applicants' proposed route has the least amount of agricultural land within the ROW, totaling 1,260 acres (38 percent) (Table 7-2). In contrast, route option 2 has the most agricultural land within the ROW, with 1,325 acres (41 percent), representing a difference of approximately 65 acres (Table 7-2).

7.2.2.2 Forestry

Impacts to designated forestry resources in the 150-foot ROW of the full route options would be relatively similar (Table 7-2). Forestry land within the ROWs of these options ranges between 472 acres (route option 1) to 590 acres (applicants' proposed route).

There are designated forestry resources in the form of DNR state forest, Minnesota School Trust Land, Forests for the Future land, and SFIA land within the ROW of the full route options (Table 7-6). The ROW of full route option 2 contains the fewest designated forestry resources (376 acres), while the applicants' proposed route with modifications contains the most (427 acres).

Table 7-6 Designated Forestry Resources Within the 150-foot ROW of Applicants' Proposed Routes and Example Full Route Options

Forestry Acreage	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Acres of DNR state forest within 150-foot ROW	258	264	206	188
Acres of Minnesota School Trust Land[1] within 150-foot ROW	137	144	123	104
Acres of Forests for the Future[2] land within 150-foot ROW	19	19	32	36
Acres of Sustainable Forest Incentive Act[3] land within 150-foot ROW	0	0	42	48
Total Acreage	414	427	403	376

In some cases, multiple state land classifications are located within the same section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.
Data Sources: references (3); (4)

1 Minnesota School Trust Lands are DNR-administered lands that are set aside to provide a continual source of funding for public education (reference (4).
2 Minnesota's Forests for the Future Program is a conservation program administered by the DNR to encourage the protection of privately-owned forest lands through conservation easements or land purchases (reference (5)).
3 Minnesota's Sustainable Forest Incentive Act is a conservation program administered by the DNR that provides annual incentive payments to encourage private landowners to keep their wooded areas undeveloped (reference (109)).

New transmission line construction through forested lands would be required for all full route options; however, route option 1 likely minimizes forestry impacts the most by having the least amount of forested lands in its ROW (Table 7-2). Route option 1 also shares the most ROW with existing roadway and transmission line infrastructure (97 percent) (Table 7-2, Table 7-4). In areas of ROW paralleling and sharing, impacts to forestry resource lands have already occurred. Placement of transmission infrastructure in these locations may increase areas of forestry impact but would not introduce new impacts to an otherwise undisturbed forested setting.

7.2.2.3 Mining

Potential effects on mining operations are likely to occur if the construction or operation of a transmission line prevents access to and recovery of resources. The construction of a transmission line could limit the ability to mine these resources, depending on proximity of the resources to the route selected for the project.

There are no mining resources in the vicinity of the applicants' proposed route or the applicants' proposed route with modifications; as such, these route alternatives best minimize potential impacts to mining resources. Route options 1 and 2 each have the same two aggregate mines located in their ROW, though both routes would follow an existing transmission line ROW through one of these aggregate mines, minimizing introduction of new impacts (see Chapter Mining6.3.4.2.3).

7.2.2.4 Recreation and Tourism

Recreation and tourism opportunities in the project area primarily consist of scenic byways, state forests, WMAs, off-road vehicle trails, snowmobile trails, and water trails. Each of the full route options contain recreation and tourism opportunities. Compared to full route options 1 and 2, the applicants' proposed route and applicants' proposed route with modifications have the following additional recreational resources in their rights-of-way: two scenic byways, two state forests, two WMAs, eight off-road vehicle trails, one snowmobile trail, and one water trail (Table 7-7).

Table 7-7 Recreational Resources Crossed by the 150-foot ROW of Applicants' Proposed Routes and Example Full Route Options

Route	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Scenic byways crossings (count)	4	4	2	2
State forest crossings (count)	6	6	4	4
WMA crossings (count)	2	2	0	0
Off-road vehicle trail crossings (count)	13	13	5	5
Snowmobile trail crossings (count)	8	8	7	7
Water trail crossings (count)	2	2	1	1

Full route options 1 and 2 as well as the applicants' proposed route with modifications would each cross through a portion of the Cuyuna Country State Recreation Area. However, full route options 1 and 2 would cross this recreation area within existing transmission line ROW in an area of double-circuiting. An additional 80 feet of ROW from within the Cuyuna Country State Recreation Area would be needed to accommodate the double-circuiting and placement of the route through this area. As a result, minimal impacts to the Cuyuna Country State Recreation Area are anticipated. The applicants' proposed route with modifications would cross this recreation area parallel to existing road ROW at the far eastern edge of the recreation area and outside of the area used for recreation (Photo 7-1).

Photo 7-1 View of Applicants' Proposed Route with Modifications in the Vicinity of the Cuyuna Country State Recreation Area

Photograph looking south, Cuyuna Country State Recreation Area is located on the right side of the photo

Because transmission line construction and operation generally has minimal permanent and temporary impacts to trails and introduction of new impacts would be minimized to the extent possible by ROW sharing and paralleling, recreation and tourism impacts as a result of the project are expected to be minimal. Overall, route options 1 and 2 likely best minimize impacts to recreation and tourism in the project area.

7.2.3 Archaeological and Historic Resources

Between 37 and 43 archaeological and historic resources are located within the 1,000-foot route width of the full route options (Table 7-2). These resources are further classified in Table 7-8. Most of these cultural resources have been previously determined not eligible for the NRHP and therefore no additional work related to these cultural resources would be required for the project to proceed, regardless of which route is selected. However, the project has the potential to adversely affect those cultural resources that have not been evaluated for the NRHP, or which are listed on or have been determined eligible for listing on the NRHP (i.e., significant cultural resources).

Table 7-8 Summary of Archaeological and Historic Architectural Resources within the 1,000-foot Route Width of Applicants' Proposed Route and Example Full Route Options

	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Count of NRHP-listed or -eligible Resources	5	5	6	6
Count of Unevaluated Cultural Resources	19	19	16	15
Count of Resources Previously Determined Not Eligible for NRHP	18	19	19	16

Although the overall counts of cultural resource types are similar among the full route options, both route options 1 and 2 are less impactful to archaeological and historic architectural resources. This is due to their use of existing infrastructure ROW in proximity to significant cultural resources.

Of the significant cultural resources located within the route width of the applicants' proposed route and the applicants' proposed route with modifications, three NRHP-listed/-eligible historic architectural resources (XX-RRD-NPR007/ XX-RRD-NPR021, and CW-XXX-00001) have the potential to be impacted by the project. The applicants' proposed route would cross each of these resources in a brand-new location, which may alter these resource's setting, feeling, appearance, and/or association. However, where route options 1 and 2 cross these resources, the crossing occurs where an existing transmission line is present. Due to paralleling an existing transmission line, route options 1 and 2 do not have the potential to introduce new impacts to the resources' setting, feeling, appearance, and/or association.

SH-BK-00012 (listed in the NRHP) and XX-RRD-00001 (eligible for the NRHP) would not be adversely affected by the project regardless of the route selected because these resources are located in an area that consists of double-circuiting on an existing transmission line. As a result, no new impacts to these cultural resources are anticipated because no new ROW would be acquired, nor would new visual or other impacts be introduced as a result of the project because the transmission line in proximity to these resources is existing.

Archaeological sites that are not evaluated or are listed in or eligible for the NRHP may also be impacted by the project if any of these sites are present within the footprint of ground disturbance. Ground disturbing activities have the potential to impact these resources if they cannot be avoided by the project. The primary means to minimize impacts to archaeological and historic architectural resources is prudent routing or structure placement (i.e., avoiding known archaeological and historic resources). If they cannot be avoided, impacts to these resources could be mitigated by measures developed in consultation with SHPO prior to construction.

7.2.4 Natural Environment

Potential impacts to the natural environment are assessed by looking at several specific elements. For some of the elements of the natural environment, impacts from the project are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter. This Chapter addresses those elements that do vary with the route selected – water resources, vegetation, and wildlife.

7.2.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This discussion here addresses watercourses and waterbodies, and wetlands.

Watercourses and Waterbodies

Each of the full route options would cross streams and waterbodies, as summarized in Table 7-2. Route option 2 minimizes stream crossings, including NHD streams, impaired streams, and PWI streams. The difference in stream crossings between route option 2 and the other three full route options stems from the J1 route alternative in the Benton County Elk River region (which is part of route option 2). The J1 route alternative is located in a new transmission line ROW west of the Elk River, while the other three full routes would use the applicants' equivalent to parallel an existing transmission line ROW while crossing the Elk River multiple times.

The applicants' equivalent in the Benton County Elk River region would cross the Elk River 26 times, as shown in the Map Book 5G; this count is relatively high due to the meandering nature of the Elk River. Waterbody crossings would be relatively comparable across each of the full route options. However, the applicants' proposed route with modifications would have fewer NHD lake crossings than the other three routes. The applicants' proposed route would have fewer PWI basin crossings but more PWI wetland crossings than the other three routes.

Wetlands

Wetlands within the rights-of-way of the full route options consist of emergent wetlands, forested wetlands, and shrub-dominated wetlands. The applicants' proposed route has the most acres of wetland (986 acres) and forested wetland (235 acres) within its 150-foot ROW, while route option 2 has the least acres of wetland (926 acres) and forested wetland (218 acres) (Table 7-2). Although wetlands would be spanned to the extent possible, each of the full route options would cross between 62 (route option 2) and 67 (applicants' proposed route) wetland areas wider than 1,000 feet, which may require one or more structures to be placed in a wetland (Table 7-2).

7.2.4.2 Vegetation

Each of the full route options would impact forested vegetation within their 150-foot ROW. Impacts to forested vegetation would be minimized with route option 1 (472 acres) and route option 2 (476 acres; Table 7-2). The applicants' proposed route would impact 590 acres of forested vegetation in its ROW, while the applicants' proposed route with modifications would impact 551 acres of forested vegetation in its ROW (Table 7-2). Each of the full route options would minimize impacts associated with forest fragmentation by following existing transmission line and/or road ROW for the majority of their length (Table 7-2).

7.2.4.3 Wildlife

Impacts to wildlife habitat would be relatively comparable for the full route options in that they would all cross WMAs, GBCA, and a DNR-identified shallow wildlife lake. The applicants' proposed route and the applicants' proposed route with modifications would cross the edge of the Birchdale and Moose Willow WMAs, while route options 1 and 2 would cross solely the edge of the Birchdale WMA. Route option 2 would cross slightly more acres of GBCA than the other routes (Table 7-2). Each of the full route options would minimize impacts associated with habitat fragmentation by following existing transmission line and/or road ROW for the majority of their length (Table 7-2).

7.2.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined there are no differences among the full route options with respect to documented federal- or state-protected species. Each of the full route options have one documented federally protected species (the northern long eared bat) and the same 15 state protected species documented within 1 mile of them; these are summarized in Appendix N. In addition, three of the 15 state protected species, including the loggerhead shrike, Blanding's turtle, and rock sandwort, have also been documented within the 150-foot ROW of each full route option. As discussed in Chapter 5.11.1.3, potential impacts to these species can be mitigated by incorporating species-specific BMPs.

Each of the full route options would intersect several DNR SBS, with route options 1 and 2 intersecting approximately 200 acres less than the applicants' proposed route and the applicants' proposed route with modifications (Table 7-2). Each of the full route options would intersect native plant communities, with the applicants' proposed route intersecting slightly more than the other routes (Table 7-2). Each of the full route options would also intersect High Conservation Value Forest, with routes options 1 and 2 intersecting approximately 90 fewer acres. All four full route options would intersect Lakes of Biological Significance while paralleling an existing transmission line ROW. The applicants' proposed route would traverse approximately two acres of one Lake of Biological Significance, while the other three routes would traverse approximately five acres of two Lakes of Biological Significance (Table 7-2; Map Book 5I).

7.3 Relative Merits Summary

The discussion here uses text and a color graphic to describe the relative merits of the full route options (Table 7-9). The color graphic and related notes for a specific routing factor or element are not meant to be indicative of the best route for the project, but are provided as a relative comparison to be evaluated together with all other routing factors. For example, routes that are "red" for a particular factor or element are not meant to indicate a fatal flaw with a specific full route option.

For routing factors where impacts are anticipated to vary with the full route options, the graphic represents the magnitude of anticipated difference between these anticipated impacts and compares them across the four full route options. For routing factors that express the state of Minnesota's interest in the efficient use of resources (e.g., the use and paralleling of existing rights-of-way), the graphic represents the consistency of the full route options with these interests and compares them to each other.

Table 7-9 Guide to Relative Merits of the Applicants' Proposed Routes and Example Full Route Options

Anticipated Impacts or Consistency with Routing Factor	Symbol
Minimal: Impacts are anticipated to be minimal with mitigation – OR – route option is very consistent with this routing factor.	
Moderate: Impacts are anticipated to be minimal to moderate with mitigation; special permit conditions may be required for mitigation – OR – route alternative is very consistent with the routing factor, but less so than other route alternatives. Indicates that this route option may not be the least impactful with respect to this routing factor.	
Significant: Impacts are anticipated to be moderate to significant and likely unable to be mitigated – OR – route alternative is not consistent with the routing factor or consistent only in part. Indicates that this route option has notably more impacts with respect to this routing factor than other route options.	

7.3.1 Routing Factors for Which Impacts Are Not Anticipated to Vary Among Applicants' Proposed Routes and Example Full Route Options

Potential impacts are anticipated to be minimal and not vary significantly among the full route options for the following routing factors and elements:

- Impacts on human settlements (factor A)—noise, property values, electronic interference, cultural values, zoning and land-use compatibility, and public services.
- Impacts on public health and safety (factor B)—EMF, implantable medical devices, stray voltage, induced voltage, and air quality.
- Impacts on rare and unique natural resources (factor F) – federal- and state-protected species.
- Impacts on electric system reliability (factor K).

7.3.2 Routing Factors for Which Impacts Are Anticipated to Vary among Applicants' Proposed Routes and Example Full Route Options

Potential impacts are anticipated to vary among the full route options for the following routing factors and elements:

- Impacts on human settlements (factor A)—aesthetics, displacement, and environmental justice communities.
- Impacts on land-based economies (factor C)—agriculture, forestry, mining, and recreation and tourism.
- Impacts on archaeological and historic resources (factor D).
- Impacts on the natural environment (factor E) - water resources, vegetation (flora), and wildlife (fauna).
- Impacts on rare and unique natural resources (factor F) - sensitive ecological resources.
- Use or paralleling of existing rights-of-way (factors H and J).
- Costs that are dependent on design and route (factor L).

Relative merits of the full route options for all routing factors / elements for which impacts are anticipated to vary among route options are shown and discussed in Table 7-10.

Table 7-10 Relative Merits of Applicants' Proposed Routes and Example Full Route Options

Routing Factor/Resource	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2	Summary
Human Settlement – Aesthetics					Each of the four full routes would have similar aesthetic impacts based on proximity to residences. The applicants' proposed route is near the fewest number of residences; example route option 2 is near the greatest number of residences. Route option 1 uses the most existing transmission line ROW (95 percent), while the applicants' proposed route with modifications is second with 92 percent. Route option 2 and the applicants' proposed route each use less than 90 percent of existing transmission line ROW (89 percent and 87 percent, respectively).
Human Settlement – Displacement					Route option 1 has the fewest residences and non-residences within the 150-foot ROW (2 residences and 11 non-residences). The other three full route options each have 3 residences and between 13 and 14 non-residences within the 150-foot ROW.
Human Settlement – Environmental Justice					The applicants' proposed route with modifications would only cross five communities of EJ concern, where the other route options would cross six to seven communities of EJ concern. However, since these full route examples mostly follow existing transmission line ROW, these communities of EJ concern should not be adversely or disproportionately affected by the project and differences are marginal.
Land-Based Economies – Agriculture					There is only a difference of approximately 65 acres of agricultural land between each of the full route options. Impacts would be similar regardless of the route selected.
Land-Based Economies – Forestry					Route option 1 minimizes forestry impacts by having the least amount of forested lands in its ROW and by sharing the most ROW with existing roadway and transmission line infrastructure (97 percent).

Routing Factor/Resource	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2	Summary
Land-Based Economies – Mining					Route options 1 and 2 have two aggregate mines within their rights-of-way; the applicants' proposed route and the applicants' proposed route with modifications do not. Impacts to the aggregate mines likely can be mitigated; thus, differences between the route options are marginal.
Land-Based Economies – Recreation and Tourism					The applicants' proposed route and applicants' proposed route with modifications have the following additional recreational resources in their rights-of-way compared to the route options 1 and 2: two scenic byways, two state forests, two WMAs, eight off-road vehicle trails, one snowmobile trail, and one water trail. Example route options 1 and 2 would each require new ROW within the boundaries of the Cuyuna Country State Recreation Area.
Archaeological and Historic Architectural Resources					The applicants' proposed route and the applicants' proposed route with modifications would both cross significant cultural resources in an area of new ROW, where route options 1 and 2 would cross these same resources using existing transmission line ROW. Otherwise, counts of cultural resources are similar across each full route option.
Natural Environment – Watercourses and Waterbodies					Route option 2 would have the least number of stream crossings. However, the difference in stream crossings between route option 2 and the other three route options stems from the J1 route alternative in the Benton County Elk River region (which is part of example route option 2) being located in a new transmission line ROW west of the Elk River. In contrast, the other three full route options would use the applicants' equivalent to parallel an existing transmission line ROW while crossing a meandering section of the Elk River multiple times. The applicants' proposed route would avoid crossing an impaired lake and would have the least number of PWI basin crossings but would have the most PWI wetland crossings.
Natural Environment – Wetlands					The ROW of route option 2 has the least acres of wetland, including forested wetland.

Routing Factor/Resource	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2	Summary
Natural Environment – Vegetation					Route options 1 and 2 would have less impact on forested vegetation.
Natural Environment – Wildlife					Route option 1 minimizes impacts to wildlife and associated habitat by avoiding the Moose Lake WMA.
Rare and Unique Natural Resources					Route options 1 and 2 minimize impacts to Sites of Biodiversity Significance and High Conservation Value Forests.
Use or Paralleling of Existing ROW					Total ROW paralleling and sharing is nearly equal across all route options. There is some variation in the paralleling of existing transmission line rights-of-way. Route option 1 uses the most existing transmission line ROW (95 percent), while the applicants' proposed route with modifications is second with 92 percent. Route option 2 and the applicants' proposed route each use less than 90 percent of existing transmission line rights-of-way (89 percent and 87 percent, respectively).
Costs Dependent on Design and Route (2022 dollars in millions)	$963	$980	$1,013 to $1,053	$1,035 to $1,075	The applicants' proposed route is the least expensive, while example route option 2 is the most expensive. Major factors affecting cost include double-circuiting long sections of transmission line in route options 1 and 2 as well as specialty structures that would be required near the Hill City/Quadna Mountain airport.

7.4 Unavoidable Impacts

Transmission lines are large infrastructure projects that can have adverse human and environmental impacts. Even with mitigation strategies, there are adverse project impacts that cannot be avoided. These impacts are anticipated to occur for all routing alternatives and to vary, if at all, as discussed above.

Aesthetic impacts cannot be avoided. The project would introduce new transmission line structures and conductors into project area viewsheds. These structures and conductors would be visible; therefore, they would have an adverse aesthetic impact. Temporary construction-related impacts also cannot be avoided. These include construction-related noise and dust generation and disruption of traffic near construction sites.

While the project would parallel existing transmission lines and other infrastructure to the extent practicable, impacts to agriculture cannot be completely avoided. The project requires the placement of concrete footings and the construction of transmission line structures in a project area that has sizeable areas of agricultural use. Potential impacts include loss of tillable acreage and constraints on the layout and management of field operations.

Finally, impacts to the natural environment cannot be avoided. Even if impacts can be limited to the transmission line's ROW, construction and operation of the transmission line would require tree removal and brush trimming, as well as clearing at structure sites. These are unavoidable impacts to vegetation. Unavoidable impacts to vegetation also include the removal or fragmentation of habitat and the creation of edge habitats. Transmission line conductors adversely affect avian species by creating opportunities for collisions with the conductors. These collisions could occur despite mitigation strategies such as the use of bird flight diverters.

7.5 Irreversible and Irretrievable Impacts

The commitment of a resource is irreversible when it is impossible or very difficult to redirect that resource for a different future use. An irretrievable commitment refers to the use or consumption of a resource such that it is not recoverable for later use by future generations. These types of commitments are anticipated to occur for all routing alternatives and not to vary significantly among alternatives.

The commitment of land for a transmission line ROW is likely an irreversible commitment. In general, lands in the rights-of-way for large infrastructure projects such as railroads, highways, and transmission lines remain committed to these projects for a relatively long period of time.

Even in instances where a ROW is abandoned, the land within the ROW is typically repurposed for a different infrastructure use, such as a rails-to-trails program, and is not returned to a previous land use. This said, transmission line rights-of-way can be returned to a previous use (e.g., row crop, pasture) by the removal of structures and structure foundations to a depth that supports this use, but this becomes more challenging in areas of ROW paralleling as it would rely on a commitment from more than one facility to return the land to previous use.

There are few commitments of resources associated with the project that are irretrievable. These commitments include the steel, concrete, and hydrocarbon resources committed to the project, though it is possible that the steel could be recycled at some point in the future. Labor and fiscal resources required for the project are also irretrievable commitments.

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