6.2.2.1 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 in Chapter 5.3, include cultural values, displacement, electronic interference, noise, property values, and zoning and land use.

6.2.2.1.1 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 alternative B is shown in Table 6-23, while ROW paralleling and sharing are shown in Table 6-24.

While the applicants' equivalent has fewer residences within 500 feet, both route alternative B and the applicants' equivalent would follow a similar amount of existing infrastructure ROW. Route alternative B would parallel an existing transmission line for the entirety of its alignment while the applicants' equivalent would parallel existing transmission line ROW for most (94 percent) of its alignment. Overall, the route alternatives would have similar aesthetic impacts to the area.

Table 6-23 Hill City to Little Pine Region Proximity of Residences to Route Alternative B

Residences, Distance from Anticipated Alignment	Route Alternative B	Applicants' Equivalent
Residences within 0-75 feet	0	0
Residences within 75-250 feet	1	3
Residences within 250-500 feet	14	2
Residences within 500-1,000 feet	14	18
Total Residences within 1,000 feet	29	23

Table 6-24 Hill City to Little Pine Region ROW Sharing and Paralleling of Route Alternative B

Infrastructure	Route Alternative B miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0.0. (0)	0.0. (0)
Follows Existing Roads	0.0. (0)	0.0. (0)
Follows Existing Transmission Line	26.4 (100)	25.4 (94)
Total – Follows Transmission Line, Road, or Railroad	26.4 (100)	25.4 (94)
Follows Field, Parcel, or Section Lines	0.0. (0)	0.0. (0)
Total – ROW Paralleling and Sharing	26.4 (100)	25.4 (94)
Total Length of Route Alternative	26.4	27.0

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.

6.2.2.1.2 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 and between the local, regional, and 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 long-term 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. Route alternative B intersects with Macville Township, Beulah Township, Little Pine Township, and the city limits of Hill City; all of which have been identified as communities with EJCs. No adverse or permanent impacts to the identified communities with EJCs are anticipated. While route alternative B does intersect communities with EJCs, these communities are not anticipated to experience disproportionately adverse impacts from the project, particularly because the project would parallel existing transmission line ROW in these communities.

6.2.2.2 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 and independent of the route selected.

6.2.2.2.1 Airports

One public airport is located within 1 mile of route alternative B. The northern end of the Hill City/Quadna Mountain Airport runway is approximately 1,300 feet southeast of route alternative B and is therefore located within safety zone C. However, in this area, route alternative B parallels an existing transmission line that is also located within safety zone A. Route alternative B would need to be constructed with specialty structures no more than 80 feet in height in the vicinity (0.5 to 1 mile) of the Hill City/Quadna Mountain Airport to meet the public airport clearance requirements. It is assumed that structures placed in

the vicinity of the airport would match the height of the structures located along the existing transmission line that is also adjacent to the airport.

6.2.2.3 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 active mining operations within the ROW's of either route alternative B or the applicants' equivalent. Therefore, potential project impacts to mining would be minimal and independent of the route selected.

6.2.2.3.1 Agriculture

Agricultural land impacts differ between the 150-foot ROW of route alternative B and the applicants' equivalent. Route alternative B has 7 acres of agricultural land in its ROW, while the applicants' equivalent has 29 acres of agricultural land in its ROW (Map Book 5C).

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 alternative or the applicants' equivalent.

6.2.2.3.2 Forestry

Forestry impacts within the Hill City to Little Pine region were primarily assessed by evaluating the designated forestry resources within the 150-foot ROW of each route alternative (Chapter 5.8.2). Approximately 376 acres of the route alternative B ROW consists of forested land while 349 acres of the applicants' equivalent ROW consists of forested land (reference (108)) comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands within this region (Map Book 5C).

As shown in Table 6-25, the designated forestry resources consist of DNR state forests, Minnesota School Trust Land, Forest for the Future land, and SFIA land.

Table 6-25 Designated Forestry Resources within the 150-foot ROW of Route Alternative B

Forestry Resource	Route Alternative B	Applicants' Equivalent
Acres of DNR state forest within 150-foot ROW	207	329
Acres of Minnesota School Trust Land[1] within 150-foot ROW	54	59
Acres of Forests for the Future[2] land within 150-foot ROW	13	0
Acres of Sustainable Forest Incentive Act[3] land within 150-foot ROW	22	0

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)).

Both route alternative B and the applicants' equivalent could impact designated forestry resources, including land within Hill River State Forest, within their respective 150-foot ROW; however, route alternative B encompasses fewer acres of forested lands within its ROW. Forestry resource impacts would include permanent tree removal from the ROW before construction.

6.2.2.3.3 Recreation and Tourism

Recreation and tourism activities within the Hill City to Little Pine region include recreational and camping opportunities on state managed lands, trails, and scenic byways. Recreation and tourism impact from the applicants' equivalent are expected to be minimal where it parallels existing ROWs.

Route alternative B crosses one state forest, three off-road vehicle use trails and, five snowmobile trails. The applicants' equivalent crosses one WMA, one state forest, nine off-road vehicle use trails, and five snowmobile trails (Map Book 5E). Recreation and tourism resource impacts for both route alternative B and the applicants' equivalent occur where the routes parallel existing transmission lines. Consequently, permanent impacts on these resources in these areas would be minimal.

Temporary impacts could include temporary trail closings during construction and temporary interruptions in recreational opportunities within Hill River State Forest and Moose Willow WMA (Chapter 5.8.4.1). Although route alternative B and the applicants' equivalent will have temporary impacts on recreation, they are expected to be minimal.

6.2.2.4 Archaeological and Historic Resources

Five previously documented historic architectural resources and archaeological sites are located within the 1,000-foot route width of route alternative B and seven are within the applicants' equivalent (Table 6-26). As shown on Map Book 5F, some of the same historic architectural resources are located within the route width for both route alternative B and the applicants' equivalent.

Table 6-26 Cultural Resources within the Route Width of Alternative B and the Applicants' Equivalent

Resource Number	Resource Type	NRHP Eligibility	Location
21AK0136	Post-contact artifact scatter, structural ruin	Not evaluated	applicants' equivalent
21AK0137	Precontact single artifact	Not evaluated	applicants' equivalent
AK-MCV-00011	Boyd's Ranch Inn	Not evaluated	applicants' equivalent
AK-UOG-00015	ca. 1982 residence	Not eligible	route alternative B
CA-UOG-00088	Soo Line ATV Trail	Not evaluated	route alternative B, applicants' equivalent
XX-ROD-00044	Current TH 169	Not eligible	route alternative B, applicants' equivalent
XX-ROD-00181	Trunk Highway 200 / TH 34, TH 81, TH 85, TH 92, TH 116	Not eligible	route alternative B, applicants' equivalent
XX-ROD-00182	Trunk Highway 31 / TH 200, TH 81, TH 85, TH 92, TH 116	Not eligible	route alternative B, applicants' equivalent

The applicants' equivalent route and route alternative B would have similar and minimal to no affect to resources CA-UOG-00088, XX-ROD-00044, XX-ROD-00181, XX-ROD-00182, which each represent linear resources crossed by existing transmission lines. Route alternative B has the potential to affect historic architectural resource AK-UOG-00015. However, a thick tree line appears to visually shield this resource from the route, and it has previously been determined ineligible for the NRHP. The applicants' equivalent route may affect resources 21AK0136, 21AK0137, AK-MCV-00011 as described and discussed in Chapter 6.2.1.3.

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. Analysis indicates that the applicants' equivalent route has the potential to impact more cultural resources than route alternative B.

6.2.2.5 Natural Environment

6.2.2.5.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project, as described in Chapter 6.2.1.4.1. This route alternative comparison discussion addresses watercourses and waterbodies, and wetlands. Map 6-3 through Map 6-6 shows the water resources along route alternative B.

6.2.2.5.1.1 Watercourses and Waterbodies

Table 6-27 identifies the number of watercourses and waterbodies crossed by route alternative B and the applicants' equivalent. The applicants' equivalent would cross more NHD streams and one more PWI stream than route alternative B. In addition, all of route alternative B and most of the applicants' equivalent would follow an existing transmission line ROW; due to this, neither would require new watercourse or waterbody crossings.

Table 6-27 Watercourses and Waterbodies Crossed by Route Alternative B and the Applicants' Equivalent

Resources	Route Alternative B	Applicants' Equivalent
Number of NHD streams crossings	11	14
Number of impaired streams crossings	3	3
Number PWI stream crossings	6	7
Number of NHD lake crossings	1	1
Number of impaired lake crossings	0	0
Number of PWI basin crossings	1	0
Number of PWI wetland crossings	0	0

6.2.2.5.1.2 Wetlands

Table 6-22 identifies the amount of wetlands present within the ROW for both route alternative B and the applicants' equivalent. Route alternative B would cross more acres of forested wetland than the applicants' equivalent. However, the applicants' equivalent would cross more acres of non-forested wetland. The route alternative B would also have 14 wetland crossings over 1,000 feet whereas the applicants' equivalent would have 12 wetland crossings over 1,000 feet. Crossings longer than 1,000 feet generally cannot be spanned and require placement of one or more poles in wetland area.

6.2.2.5.2 Vegetation

The ROW of both route alternative B and the applicants' equivalent would impact forested vegetation, with route alternative B impacting slightly more forested vegetation (376 acres) than the applicants' equivalent (349 acres). Both route alternatives would minimize impacts associated with forested fragmentation by paralleling an existing transmission line ROW, with route alternative B paralleling one for its entire length and the applicants' equivalent paralleling one for 94 percent of its length. Forested vegetation impacts from the two route alternatives would be relatively similar.

6.2.2.5.3 Wildlife

Wildlife habitat impacts would occur for both route alternative B and the applicants' equivalent because of forested habitat removal within each of the respective rights-of-way. Wildlife habitat impacts would be relatively similar for both route alternatives, with the applicants' equivalent impacting less forested habitat and route alternative B paralleling an existing transmission line ROW for slightly more of its length. The applicants' equivalent ROW would traverse the edge of the Moose Willow WMA, while route alternate B would avoid the WMA (Map 6-3 through Map 6-6). However, impacts to the WMA from the applicants' equivalent would be minimized by paralleling an existing transmission line ROW in this area. The potential impacts to wildlife and associated habitat from route alternative B and the applicants' equivalent would be relatively similar.

6.2.2.6 Rare and Unique Natural Resources

According to the NHIS database, one federal and three state protected species have been documented within 1 mile of route alternative B and the applicants' equivalent; however, none of these species have been documented within the ROW of either route alternative (Appendix N). Several state special concern species have been documented within 1 mile of route alternative B and the applicants' equivalent, two of which have been documented within the ROW of the applicants' equivalent; state special concern species are summarized in Appendix N. In general, habitat is comparable between route alternative B and the applicants' equivalent; as such, it is anticipated that potential impacts to protected species would be comparable.

The route alternative B and the applicants' equivalent rights-of-way would traverse several sensitive ecological resources (Map 6-3 through Map 6-6). The ROW of both route alternatives would intersect SBS ranked high and moderate, with the ROW of the applicants' equivalent intersecting the most SBS acreage (Table 6-28). The ROW of both route alternatives would intersect native plant communities, with alternative B intersecting slightly more acreage, including native plant communities that have a conservation status of S1 or S2 (Table 6-28). The ROW of both route alternatives would intersect areas designated as High Conservation Value Forest, with the applicants' equivalent intersecting significantly more acreage than route alternative B. However, the ROW of route alternative B would intersect two parts

of the High Conservation Value Forest that are designated candidate old growth stands, while the applicants' equivalent would not intersect any candidate old growth stands.

Table 6-28 Sensitive Ecological Resources in the ROW of Route Alternative B and the Applicants' Equivalent

Sensitive Ecological Resource	Area within ROW of Route Alternative B	Area within ROW of Applicants' Equivalent
Sites of Biodiversity Significance	199 total acres; 135 acres ranked high; 64 acres ranked moderate	308 total acres; 181 acres ranked high; 127 acres ranked moderate
Native Plant Communities	145 total acres; 10 acres have a conservation status of S1 or S2; conservation status of remaining acres is S3-S5	139 acres - conservation status S3-S5
High Conservation Value Forest	32 acres	123 acres
Candidate Old Growth Stand	9 acres	0 acres

As noted above, route alternative B would parallel an existing transmission line ROW for its entire length and the applicants' equivalent would parallel an existing transmission line ROW for 94 percent of its length. Except for a portion of one SBS ranked moderate, which the applicants' equivalent would traverse in a new ROW, both route alternatives would traverse sensitive ecological resources within or adjacent to areas that have been previously disturbed by transmission line rights-of-way, which would minimize impacts to these resources.

6.2.2.7 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.

6.2.2.8 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 6-22). Costs are similar between route alternative B ($146 million) and the applicants' equivalent ($149 million). Route alternative B may require additional engineering to develop the specialty structures needed to keep structure heights to less than 80 feet in proximity of the Hill City/Quadna Mountain Airport. Each circuit may need a separate structure, thereby increasing the overall ROW width in proximity of the airport.

6.2.3 Route Alternative C – Hill City to Little Pine Region

Route alternative C provides a different option to the applicants' equivalent in the southwestern part of the Hill City to Little Pine region. Route alternative C shifts west from the applicants' equivalent to reduce public water crossings. Route alternative C does not include any transmission line ROW sharing or paralleling, or double-circuiting. Potential impacts of route alternative C and the applicants' equivalent are summarized in Table 6-29 and shown on Map 6-7.

Table 6-29 Human and Environmental Impacts – Route Alternative C, Hill City to Little Pine Region

Resource	Element	Route Alternative C	Applicants' Equivalent
Length (miles)		4.6	3.0
Human Settlement	Residences within 0-75 feet (count)	1	0
	Residences within 75-250 feet (count)	0	0
	Residences within 250-500 feet (count)	1	0
	Residences within 500–1,000 feet (count)	2	0
Land-Based Economies	Agricultural land in 150-foot ROW (acres)	5	1
Water Resources	Total wetlands in 150-foot ROW (acres)	11	28
	Forested wetlands in 150-foot ROW (acres)	6	6
Vegetation	Forested landcover in 150-foot ROW (acres)	57	29
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	18	26
	Native Plant Communities in 150-foot ROW (acres)	13	18
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	0.0. (0)	3.0 (100)
	Roadway (miles, percent)	4.3 (93)	0.0. (0)
	Field, parcel, or section lines (miles, percent)	4.6 (100)	0.0. (0)
	Total ROW sharing and paralleling (miles, percent)	4.6 (100)	3.0 (100)
Reliability	Crossing of existing transmission lines (count)	2	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$31.8[1]	$16.7

1 Two specialty structures would be needed to cross an existing transmission line for an estimated additional cost of approximately $4 million. In addition, three heavy-angle structures would be needed for an additional cost of approximately $740,000 per structure ($24.9 million base cost).

Birchdale Lake
Birchdale WMA
T137N, R25W S5
T137N, R25W S4
T137N, R25W S3
Route Segment C begin here
C
Mud Brook
T137N, R25W S8
T137N, R25W S9
T137N, R25W S10
Ross Lake Township
Rosslake Twp 230 Rd
CR 106
C
Crow Wing County
Mud Lake
T137N, R25W S16
Miscellaneous
T137N, R25W S17
T137N, R25W S15
T-255
CSAH 36
C
T137N, R25W S20
36
Ross Creek
T137N, R25W S21
T137N, R25W S22
Route Segment C begin here
Ross Lake

Imagery Source: USDA-FSA-APFO NAIP, 2023

- Route Segment C
- Applicants' Route C Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Residence
- PWI Watercourse
- PWI Waterbody
- Shallow Wildlife Lake
- Native Plant Community
- Wildlife Management Area
- Other DNR Land

Wetlands
- Non-Forested Wetland
- Forested Wetland

Site of Biodiversity Significance
- High Significance

N

Feet
0 600 1,200

Map 6-7

ROUTE ALTERNATIVE C
Hill City to Little Pine Region
Northland Reliability Project

6.2.3.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. For some aspects of the project, impacts on human settlement are expected to be minimal and independent of the selected route. Therefore, these elements 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.

6.2.3.1.1 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 C is shown in Table 6-30, while ROW paralleling and sharing are shown in Table 6-31.

No residences are located within 1,000 feet of the applicants' equivalent, while four residences are located within 1,000 feet of route alternative C. The applicants' equivalent also follows slightly more infrastructure ROW than route alternative C. Thus, on whole, the applicants' equivalent best minimizes aesthetic impacts in this area of the project.

Table 6-30 Hill City to Little Pine Region Proximity of Residences to Route Alternative C

Residences, Distance from Anticipated Alignment	Route Alternative C	Applicants' Equivalent
Residences within 0-75 feet	1	0
Residences within 75-250 feet	0	0
Residences within 250-500 feet	1	0
Residences within 500-1,000 feet	2	0
Total Residences within 1,000 feet	4	0

Table 6-31 Hill City to Little Pine Region ROW Sharing and Paralleling of Route Alternative C

Infrastructure	Route Alternative C miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0.0. (0)	0.0. (0)
Follows Existing Roads	4.3 (93)	0 (0)
Follows Existing Transmission Line	0 (0)	3.0 (100)
Total – Follows Transmission Line, Road, or Railroad	4.3 (93)	3.0 (100)
Follows Field, Parcel, or Section Lines	4.6 (100)	0 (0)
Total – ROW Paralleling and Sharing	4.6 (100)	3.0 (100)
Total Length of Route Alternative	4.6	3.0

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.

6.2.3.1.2 Displacement

Residences or other buildings are typically not allowed within the transmission line ROW, for 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 of route alternative C or the applicants' equivalent. However, there is one permanent residence and two non-residential buildings (storage shed, agricultural outbuildings, etc.) located within the 150-foot ROW of the route alternative C.

The one residential building and the two non-residential buildings in route alternative C may or may not be displaced by the project. Though buildings are generally not allowed within 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., animal production). 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.

6.2.3.2 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 active mining operations within either the route alternative C or the applicants' equivalent rights-of-way. Therefore, potential project impacts to mining would be minimal and independent of the route selected.

6.2.3.2.1 Agriculture

Agricultural land impacts in the 150-foot ROW of both route alternative C and the applicants' equivalent differ. The route alternative C ROW would impact the most amount agricultural land (5 acres) while the applicants' equivalent ROW would impact the least agricultural land (less than 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 route alternative C or the applicants' equivalent.

6.2.3.2.2 Forestry

Forestry impacts within the Hill City to Little Pine region were primarily assessed by evaluating the designated forestry resources within the 150-foot ROW (Chapter 5.8.2). Approximately 57 acres of the route alternative C ROW consist of forested land, while 29 acres of the applicants' equivalent ROW consist of forested land (reference (108)) comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands within this region (Map Book 5C).

The only designated forestry resources in this area are Minnesota School Trust Lands. There are 18 acres of Minnesota School Trust Lands within the applicants' equivalent route ROW; there are no designated forestry resources within the route alternative C ROW.

Only the applicants' equivalent route would have potential impacts to designated forestry resources within the 150-foot ROW. Therefore, route alternative C would minimize impacts to designated forestry resources. Forestry resource impacts would include permanently removing trees from the ROW before construction.

6.2.3.2.3 Recreation and Tourism

Recreation and tourism activities within the Hill City to Little Pine region include outdoor recreation activities and camping opportunities on state managed lands, trails, and scenic byways. Since project transmission line construction and operation generally has minimal permanent and temporary impacts to trails, recreation and tourism in this region, overall impacts are expected to be minimal where the project parallels existing ROWs.

Route alternative C does not contain any recreational resources within its ROW but does border an off-road vehicle use trail for a portion of the route. The applicants' equivalent likewise does not have any recreational resources within its ROW. Route Alternative C would result in permanent and temporary impacts which would include increased noise from construction and reduced aesthetic value. Although permanent and temporary impacts would occur because of this route, they are expected to have minimal recreation impact.

6.2.3.3 Archaeological and Historic Resources

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

6.2.3.4 Natural Environment

6.2.3.4.1 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 6-7 shows the water resources along route alternative C.

6.2.3.4.1.1 Watercourses and Waterbodies

Table 6-32 identifies the number of watercourses and waterbodies crossed by route alternative C and the applicants' equivalent respectively. The applicants' equivalent would cross more NHD streams and PWI streams than route alternative C. Route alternative C would parallel an existing roadway for majority of the route length which would reduce the impact associated with new crossings.

Table 6-32 Waterbodies and Watercourses Crossed by Route Alternative C and Applicants' Equivalent

Resources	Route Alternative C	Applicants' Equivalent
Number of NHD streams crossings	2	5
Number of impaired streams crossings	0	0
Number PWI stream crossings	2	3
Number of NHD lake crossings	0	0
Number of impaired lake crossings	0	0
Number of PWI basin crossings	0	0

6.2.3.4.1.2 Wetlands

Table 6-29 identifies the acreage of wetlands located within the rights-of-way for both route alternative C and the applicants' equivalent, respectively. Route alternative C and the applicants' equivalent would cross nearly the same amount of forested wetlands; however, the applicants' equivalent would cross more non-forested wetlands. The route alternative C would not have any wetland crossing over 1,000 feet, and the applicants' equivalent would have three wetland crossings over 1,000 feet.

6.2.3.4.2 Vegetation

The ROW of both route alternative C and the applicants' equivalent would impact forested vegetation, with route alternative C impacting almost twice as much (57 acres) as the applicants' equivalent (29 acres). Both route alternatives would minimize impacts to forest fragmentation by paralleling existing rights-of-way; with the applicants' equivalent paralleling an existing transmission line ROW for its entire length and route alternative C paralleling an existing road corridor for approximately 93 percent of its length. The applicants' equivalent would minimize impacts to forested vegetation.

6.2.3.4.3 Wildlife

Wildlife habitat impacts would occur for route alternative C and the applicants' equivalent as a result of removal of forested habitat in the ROW; however, neither route alternative would traverse areas that are managed or preserved for wildlife. By impacting less forested vegetation and paralleling an existing transmission line ROW for its entire length, the applicants' equivalent would have less impact on wildlife habitat than route alternative C. Route alternative C would also minimize the potential habitat fragmentation impacts by paralleling an existing road corridor for approximately 93 percent of its length. Route alternative C would increase impact potential to avian species by establishing a new transmission line ROW. However, as discussed in Chapter 5.10.5.2, avian impacts can be minimized through use of bird flight diverters. The potential wildlife habitat impacts would be greater for route alternative C than the applicants' equivalent.

6.2.3.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined that no federal- or state-protected species have been documented within 1 mile of route alternative C or the applicants' equivalent. Two state special concern species have been documented within 1 mile of route alternative C, while no state special concern species have been documented within 1 mile of the applicants' equivalent; state special concern species are summarized in Appendix M. In general, habitat is comparable between route alternative C and the applicants' equivalent; as such, it is anticipated that potential protected species impacts would be comparable with the exception of avian species. While the applicants' equivalent parallels an existing transmission line ROW for its entire length, route alternative C parallels a road corridor for 93 percent of its length but does not parallel an existing transmission line ROW. As a result, route alternative C could pose an increased threat to federally or state protected avian species by establishing a new transmission line ROW. As discussed in Chapter 5.10.5.2, these impacts can be minimized through use of bird flight diverters.

The ROW of route alternative C and the applicants' equivalent would traverse several sensitive ecological resources (Map 6-7). The ROW of both route alternatives would intersect SBS ranked high and native plant communities, with the ROW of the applicants' equivalent intersecting slightly more acres of both (Table 6-33). The applicants' equivalent would parallel an existing transmission line through these

sensitive ecological resources, while route alternative C follows a road corridor for 93 percent of its length and may require establishing a new ROW through a portion of these resources.

Table 6-33 Sensitive Ecological Resources in the 150-foot ROW of Route Alternative C and the Applicants' Equivalent

Sensitive Ecological Resource	Area within ROW of Route Alternative C	Area within ROW of Applicants' Equivalent
Sites of Biodiversity Significance	18 acres - ranked high	26 acres - ranked high
Native Plant Communities	13 total acres; 0.5 acres have a conservation status of S1 or S2; conservation status of remaining acres is S3-S5	18 acres - conservation status S3-S5

6.2.3.6 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.

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

6.2.3.7 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 6-29). Route alternative C would require two specialty structures to cross an existing transmission line in two separate locations. It would also require three heavy-angle structures, which cost more than three times that of a tangent structure. As a result, route alternative C costs nearly twice as much (approximately $32 million) as the applicants' equivalent (approximately $17 million).

6.2.4 Alignment Alternatives AA1 and AA2 – Hill City to Little Pine Region

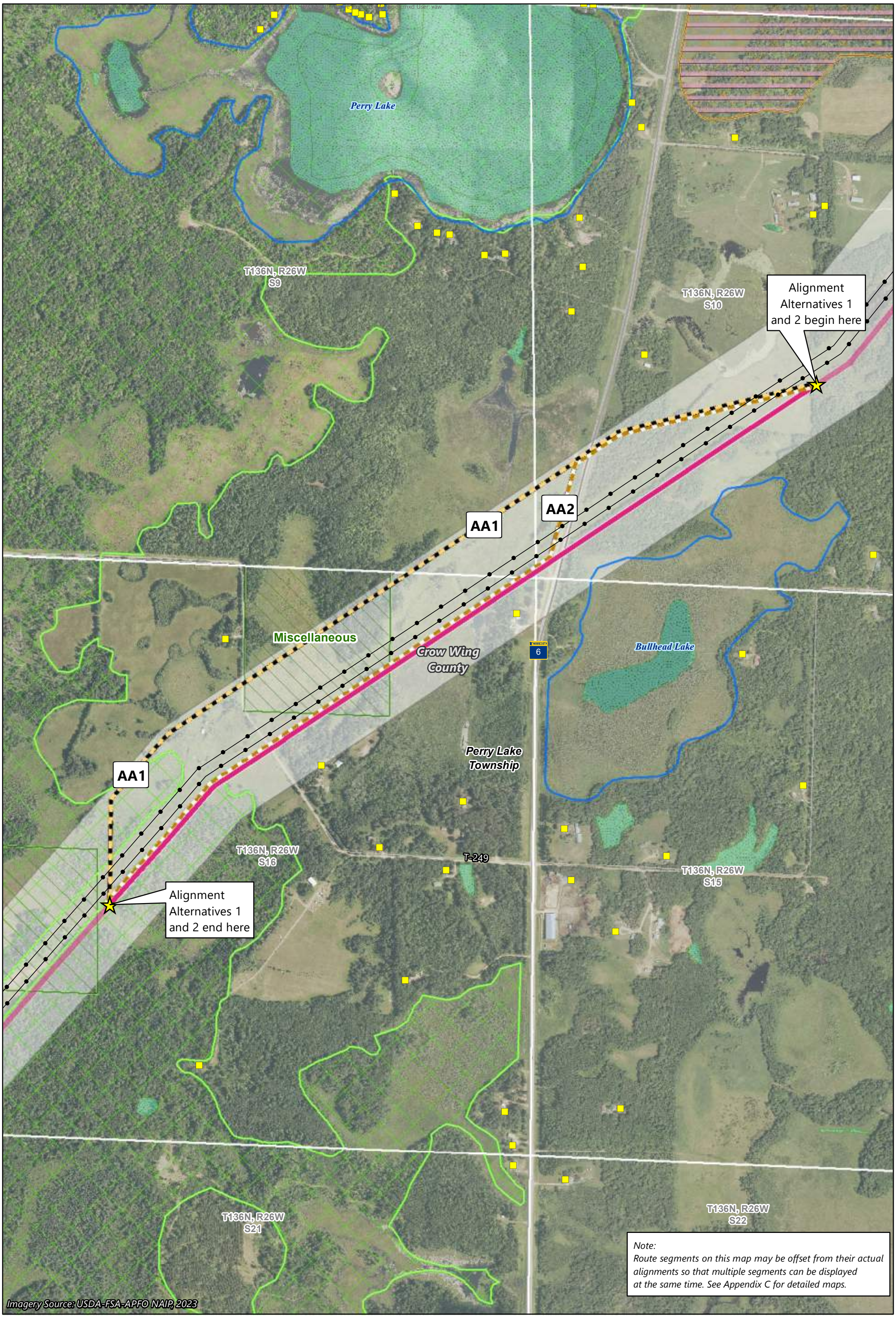
Alignment alternative AA1 and AA2 provide an alternative placement to the applicants' proposed alignment in the southwest part of the Hill City to Little Pine region. Both alignment alternatives are shifted west to avoid private property. These alignment alternatives do not include any transmission line ROW sharing, paralleling, or double-circuiting. Potential impacts of alignment alternative AA1, AA2, and the applicants' equivalent are summarized in Table 6-34 and shown on Map 6-8.

Table 6-34 Human and Environmental Impacts – Alignment Alternatives AA1 and AA2, Hill City to Little Pine Region

Resource	Element	Alignment Alternative AA1	Alignment Alternative AA2	Applicants' Equivalent
Length (miles)		1.6	1.6	1.5
Human Settlement	Residences within 0-75 feet (count)	0	0	0
	Residences within 75-250 feet (count)	0	1	1
	Residences within 250-500 feet (count)	1	1	1
	Residences within 500–1,000 feet (count)	2	1	0
Land-Based Economies	Agricultural land in 150-foot ROW (acres)	7	7	6
Water Resources	Total wetlands in 150-foot ROW (acres)	16	12	11
	Forested wetlands in 150-foot ROW (acres)	2	4	3
Vegetation	Forested landcover in 150-foot ROW (acres)	10	12	12
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	3	4	4
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	0 (0)	1 (61)	1.5 (100)
	Roadway (miles, percent)	0 (0)	0.2 (11)	0 (0)
	Field, parcel, or section lines (miles, percent)	0.2 (11)	0.2 (11)	0 (0)
	Total ROW sharing and paralleling (miles, percent)	0.2 (11)	1.2 (72)	1.5 (100)
Reliability	Crossing of existing transmission lines (count)	2	2	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$14.5[1]	$14.4[2]	$8.5

1 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 ($8.8 million base cost).

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 ($8.6 million base cost).



Alignment Alternative 1
Alignment Alternative 2
Applicants' AA1-2 Equivalent
Route Width
Route Alternative Width

Existing Transmission Line
Residence
PWI Waterbody
Native Plant Community
Other DNR Land

Wetlands
Non-Forested Wetland

Site of Biodiversity Significance
High Significance
Moderate Significance

Feet
0 400 800

Map 6-8

ALIGNMENT ALTERNATIVES AA1 AND AA2
Hill City to Little Pine Region
Northland Reliability Project

6.2.4.1 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, which are discussed solely in Chapter 5.3, include cultural values, displacement, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.2.4.1.1 Aesthetics

Aesthetic impacts differ among the routing alternatives. 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 AA1, AA2, and the applicants' equivalent are shown in Table 6-35, while ROW paralleling and sharing are shown in Table 6-36.

A similar number of residences are located within 1,000 feet of alignment alternatives AA1, AA2, and the applicants' equivalent. Alignment alternative AA1 does not parallel any existing infrastructure and, therefore, would have the greatest aesthetic impact. The applicants' equivalent would minimize aesthetic impacts more than the other alignment alternatives by paralleling more existing infrastructure ROW.

Table 6-35 Hill City to Little Pine Region Proximity of Residences to Alignment Alternatives AA1 and AA2

Residences, Distance from Anticipated Alignment	Alignment Alternative AA1	Alignment Alternative AA2	Applicants' Equivalent
Residences within 0-75 feet	0	0	0
Residences within 75-250 feet	0	1	1
Residences within 250-500 feet	1	1	1
Residences within 500-1,000 feet	2	1	0
Total Residences within 1,000 feet	3	3	2

Table 6-36 Hill City to Little Pine Region ROW Sharing and Paralleling of Alignment Alternatives AA1 and AA2

Infrastructure	Alignment Alternative AA1 miles (percent)	Alignment Alternative AA2 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0.2 (11)	0 (0)
Follows Existing Transmission Line	0 (0)	1 (61)	1.5 (100)
Total – Follows Transmission Line, Road, or Railroad	0 (0)	1.2 (72)	1.5 (100)
Follows Field, Parcel, or Section Lines	0.2 (11)	0.2 (11)	0 (0)
Total – ROW Paralleling and Sharing	0.2 (11)	1.2 (72)	1.5 (100)
Total Alignment of Route Alternative	1.6	1.6	1.5

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.

6.2.4.2 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 active mining operations or recreation and tourism opportunities within the rights-of-way of alignment alternative AA1 or AA2 or the applicants' equivalent. Therefore, potential project impacts to mining and recreation and tourism would be minimal and independent of the route selected.

6.2.4.2.1 Agriculture

Agricultural land impacts within the 150-foot ROW of alignment alternatives AA1 and AA2 and the applicants' equivalent are similar. The applicants' equivalent has the least amount of agricultural land in its ROW (6 acres). Alignment alternative AA1 and AA2 impact a similar amount of agricultural lands within their rights-of-way, totaling approximately 7 acres each.

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 alignment alternatives or the applicants' equivalent.

6.2.4.2.2 Forestry

Forestry impacts within the Hill City to Little Pine region were primarily assessed by evaluating the designated forestry resources within the 150-foot ROW (Chapter 5.8.2). Forested land comprises approximately 10 acres of the ROW of alignment alternative AA1, 12 acres of the ROW of alignment alternative AA2, and 12 acres of the ROW of the applicants' equivalent (reference (108)). The forested land is comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands within this region (Map Book 5C).

As shown in Table 6-37, designated forestry resources within the 150-foot ROW of the route alternatives only consist of Minnesota School Trust Land.

Table 6-37 Designated Forestry Resources within the 150-foot ROW of Alignment Alternatives AA1 and AA2

Forestry Resources	Alignment Alternative AA1	Alignment Alternative AA2	Applicants' Equivalent
Acres of DNR state forest within 150-foot ROW	0	0	0
Acres of Minnesota School Trust Land[1] within 150-foot ROW	6	3	3
Acres of Forest for the Future[2] land within 150-foot ROW	0	0	0

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)).

All of the routing alternatives would have potential impacts to designated forestry resources within the 150-foot ROW, although, alignment alternative AA2 and the applicants' equivalent would minimize impacts to forestry resources compared to alignment alternative AA1. Impacts to forestry resources would include permanently removing trees from the ROW before construction.

6.2.4.3 Archaeological and Historic Resources

One previously documented historic architectural resource is located within the 1,000-foot route width of alignment alternatives AA1, AA2, and the applicants' equivalent (Table 6-38; Map Book 5F).

Table 6-38 Cultural Resources within the Route Width of Alternative Alignment AA1, AA2, and the Applicants' Equivalent

Resource Number	Resource Type	NRHP Eligibility	Location
XX-ROD-00052	Trunk Highway 6	Not eligible	alternative alignment AA1, alternative alignment AA2, applicants' equivalent

The applicants' equivalent and alignment alternatives AA1 and AA2 would each cross historic architectural resource XX-ROD-00052 (Trunk Highway 6). The applicants' equivalent would cross this resource within an existing transmission line ROW; therefore, no changes in setting or affects to the resource are anticipated. Alignment alternative AA1 would cross resource XX-ROD-00052 in a new location, thereby introducing a new visual impact to the resource. Alignment alternative AA2 would parallel resource XX-ROD-00052, which would also introduce a new visual impact to the resource. However, as resource XX-ROD-00052 has been previously determined not eligible for the NRHP, impacts to this resource are anticipated to be minimal and independent of the route selected.

6.2.4.4 Natural Environment

6.2.4.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the project route selected. This routing alternative comparison discussion addresses watercourses and waterbodies, and wetlands. Map 6-8 shows the water resources along alternative alignment AA1, AA2 and the applicants' equivalent.

6.2.4.4.1.1 Watercourses and Waterbodies

Alignment alternative AA1, alignment alternative AA2, and the applicant's equivalent would not cross any watercourses or waterbodies.

6.2.4.4.1.2 Wetlands

Table 6-34 identifies the acreage of wetlands crossed by alternative alignment AA1, AA2, and the applicants' equivalent. Alternative alignment AA1 would cross more non-forested wetland than alternative alignment AA2 and applicants' equivalent. However, alternative alignment AA2 would cross more forested wetlands than alternative alignment AA1 and the applicants' equivalent. Alignment alternative AA1 would have two wetland crossings over 1,000 feet. Alternative alignment AA2 and the applicants' equivalent does not have any wetland crossings over 1,000 feet.

6.2.4.4.2 Vegetation

The ROW of alignment alternatives AA1, AA2, and the applicants' equivalent would all impact similar amounts of forested vegetation (10 to 12 acres). The applicants' equivalent would minimize impacts associated with forest fragmentation because it would parallel an existing transmission line ROW for its entire length.

6.2.4.4.3 Wildlife

Wildlife habitat impacts would occur for alignment alternatives AA1, AA2, and the applicants' equivalent as a result of removal of forested habitat in the ROW; however, neither alignment alternative or the applicants' equivalent would traverse areas that are managed or preserved for wildlife. Alignment alternatives AA1 and AA2 would fragment wildlife habitat and would also require establishing a small segment of new transmission line that would run perpendicular to the existing transmission line, thereby increasing the potential for avian species impacts. By paralleling an existing transmission line ROW for its entire length, the applicants' equivalent would have the least amount of impact on wildlife habitat.

6.2.4.5 Rare and Unique Natural Resources

From the NHIS database, no federal- or state-protected species or state special concern species have been documented within 1 mile of alignment alternatives AA1, AA2, or the applicants' equivalent. Both alignment alternatives AA1 and AA2 could pose an increased threat to federally or state protected avian species as a result of establishing a new transmission line rights-of-way and/or a new perpendicular transmission line alignment.

The ROW of alignment alternatives AA1, AA2, and the applicants' equivalent would all intersect an SBS ranked moderate (Map 6-8). Alignment alternative AA1 would impact approximately 3 acres of the SBS, while AA2 and the applicants' equivalent would intersect approximately 4 acres of SBS. Alignment

alternative AA2 and the applicants' equivalent would intersect the SBS while paralleling a previously disturbed transmission line ROW, while AA1 would require a new ROW through the SBS (Map 6-8).

6.2.4.6 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.

Alignment alternatives AA1 and AA2 would each require two transmission line crossings, thereby introducing an increased reliability concern for these two alignment alternatives. The applicants' equivalent would require no transmission line crossings.

6.2.4.7 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 6-34). Alignment alternatives AA1 and AA2 would each 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 $8 million) is less expensive than both alignment alternatives AA1 and AA2 (approximately $14 million).

6.2.5 Alignment Alternative AA16 – Hill City to Little Pine Region

Alignment alternative AA16 provides an alternative placement of the applicants' proposed alignment in the northeastern corner of the Hill City to Little Pine region. Alignment alternative AA16 would consist of double-circuiting two existing transmission lines to allow alignment alternative AA16 to use that existing ROW. Potential impacts of alignment alternative AA16 and the applicants' equivalent are summarized in Table 6-39 and shown on Map 6-9 and Map 6-10.

Table 6-39 Human and Environmental Impacts – Alignment Alternative AA16, Hill City to Little Pine Region

Resource	Element	Alignment Alternative AA16	Applicants' Equivalent
Length (miles)		11.0	12.7
Human Settlement	Residences within 0-75 feet (count)	0	0
	Residences within 75-250 feet (count)	1	4
	Residences within 250-500 feet (count)	8	5
	Residences within 500–1,000 feet (count)	14	17
Land-Based Economies	Agricultural land in 150-foot ROW (acres)	26	20
Water Resources	Total wetlands in 150-foot ROW (acres)	94	87
	Forested wetlands in 150-foot ROW (acres)	43	8
Vegetation	Forested landcover in 150-foot ROW (acres)	70[1]	151
Sensitive Ecological Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	195	227
	Native Plant Communities in 150-foot ROW (acres)	2	9
	High Conservation Value Forest in 150-foot ROW (acres)	5	5
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	11.0 (100)	12.7 (100)
	Roadway (miles, percent)	0 (0)	0 (0)
	Field, parcel, or section lines (miles, percent)	0 (0)	0 (0)
	Total ROW sharing and paralleling (miles, percent)	11.0 (100)	12.7 (100)
Reliability	Crossing of existing transmission lines (count)	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$106-$119[2]	$70.6

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.
2 Double-circuiting the existing transmission lines in order to place the proposed route within existing ROW would add between $45-$58 million to alignment alternative AA16 (base cost of $59.3 million)

McKinley Lake
T-4208
Alignment Alternative 16 begin here
Alignment Alternative 16 begin here
Split Hand Creek
Mississippi River
Bluebird Dr
AA16
Cardinal Dr
Alignment Alternative 16 end here
River Rd
Hal
Hale Lake
Crooked Lake
Blue Heron Dr
Wendigo Rd
Blackberry Township
T54 R25
T54 R24
Harris Township
Itasca County
Golden Anniversary State Forest
CR 427
Mississippi River
Cow Horn Lake
T54 R25
T53 R25
T54 R24
T53 R24
Happy Hollow Rd
AA16
Miscellaneous
Cow Horn Lake
Cowhorn
T-22
Little Cow Horn Lake
T-21
Wildwood Township
T53 R25
T53 R24
Splithand Township
T-1039
CR 439
This alternative follows an existing 230 kv line. The alternative combines (double-circuits) the existing 115 kV and 230 kV lines from where they converge southeast of Blackberry, MN to where they split south of Split Hand Lake. The alternative would use the existing 230 kV ROW.

Imagery Source: USDA-FSA-APFO NAIP, 2023

- Alignment Alternative 16
- Applicants' AA16 Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Residence
- PWI Watercourse
- PWI Waterbody
- Shallow Wildlife Lake
- Native Plant Community
- State Conservation Easement
- State Forest
- Other DNR Land

Lakes of Biological Significance
- High Significance
- Moderate Significance

Wetlands
- Non-Forested Wetland

Forest Inventory Old Growth
- Designated Old Growth

Site of Biodiversity Significance
- Outstanding Significance
- High Significance
- Moderate Significance

Feet
0 1,000 2,000

Map 6-9

ALIGNMENT ALTERNATIVE AA16 (PART 1)
Hill City to Little Pine Region
Northland Reliability Project

Alignment Alternative 16 begin here

Alignment Alternative 16 end here

This alternative follows an existing 230 kv line. The alternative combines (double-circuits) the existing 115 kV and 230 kV lines from where they converge southeast of Blackberry, MN to where they split south of Split Hand Lake. The alternative would use the existing 230 kV ROW.

Alignment Alternative 16 end here

AA16

Imagery Source: USDA-FSA-APFO NAIP, 2023

- Alignment Alternative 16
- Applicants' AA16 Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Residence
- PWI Watercourse
- PWI Waterbody
- Shallow Wildlife Lake
- Native Plant Community
- High Conservation Value Forest
- Forests of the Future Easement
- State Forest
- Other DNR Land

Lakes of Biological Significance

- Outstanding Significance
- Moderate Significance

Wetlands

- Non-Forested Wetland
- Forested Wetland

Forest Inventory Old Growth

- Candidate Old Growth

Site of Biodiversity Significance

- High Significance
- Moderate Significance

Feet
0 1,000 2,000

Map 6-10

ALIGNMENT ALTERNATIVE AA16 (PART 2)
Hill City to Little Pine Region
Northland Reliability Project

6.2.5.1 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, discussed exclusively in Chapter 5.3, include cultural values, electronic interference, noise, property values, and zoning and land use.

6.2.5.1.1 Aesthetics

Aesthetic impacts differ among the routing alternatives. 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 AA16 are shown in Table 6-40, while ROW paralleling and sharing are shown in Table 6-41.

Alignment alternative AA16 would consist of double-circuiting two existing transmission lines to allow the proposed route to use that existing ROW, while the applicants' equivalent would parallel existing transmission line ROW. The applicants' equivalent has slightly more homes in proximity than alignment alternative AA16. Alignment alternative AA16 and the applicants' equivalent both follow existing transmission lines for their entire length. Alignment alternative AA16 and the applicants' equivalent would have similar aesthetic impacts.

Table 6-40 Hill City to Little Pine Region Proximity of Residences to Alignment Alternative AA16

Residences, Distance from Anticipated Alignment	Alignment Alternative AA16	Applicants' Equivalent
Residences within 0-75 feet	0	0
Residences within 75-250 feet	1	4
Residences within 250-500 feet	8	5
Residences within 500-1,000 feet	14	17
Total Residences within 1,000 feet	23	26

Table 6-41 Hill City to Little Pine Region ROW Sharing and Paralleling of Alignment Alternative AA16

Infrastructure	Alignment Alternative AA16 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0 (0)
Follows Existing Transmission Line	11.0 (100)	12.7 (100)
Total – Follows Transmission Line, Road, or Railroad	11.0 (100)	12.7 (100)
Follows Field, Parcel, or Section Lines	0 (0)	0 (0)
Total – ROW Paralleling and Sharing	11.0 (100)	12.7 (100)
Total Length of Alignment Alternative	11.0	12.7

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.

6.2.5.1.2 Displacement

For electrical safety code and maintenance reasons, 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 of alignment alternative AA16. However, two non-residential buildings (storage shed, agricultural outbuildings, etc.) are located within the 150-foot ROW of the applicants' equivalent.

These non-residential buildings may or may not be displaced because of the applicants' equivalent. 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.

6.2.5.1.3 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 interaction 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 significant long-term 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 alternative AA16 intersects with Wildwood Township, which has been identified as a community with EJCs; however, no adverse or permanent impacts to this area are anticipated. While alignment alternative AA16 does intersect a community with EJCs, this community is not anticipated to experience disproportionately adverse impacts as a result of the project, particularly because the project would parallel an existing transmission line for its entire length near this community.

6.2.5.2 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 active mining operations within either of the alignment alternative AA16 or the applicants' equivalent rights-of-way. Therefore, potential project impacts to mining would be minimal and independent of the route selected.

6.2.5.2.1 Agriculture

Agricultural land impacts differ between alternative alignment AA16 and the applicants' equivalent. Alignment alternative AA16's ROW would impact no new agricultural land; though AA16 crosses agricultural land, it would be located within an existing transmission ROW. The applicants' equivalent would impact 20 acres of agricultural land within its 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 alignment alternative AA16 or the applicants' equivalent.

6.2.5.2.2 Forestry

Forestry impacts within the Hill City to Little Pine region were primarily assessed by evaluating the forestry resources within the 150-foot ROW (Chapter 5.8.2) of each route alternative. Forested land comprises approximately 70 acres of the ROW of alignment alternative AA16 and 151 acres of the ROW of the applicants' equivalent (reference (108)). The forested land is comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands within this region (Map Book 5C). However, it is important to note that while the NLCD indicates forested vegetation is in the alignment alternative AA16 ROW, this ROW consists of an existing transmission line ROW that has been cleared and is routinely maintained.

As shown in Table 6-42, the designated forestry resources within the 150-foot ROW of the alignment alternatives consist of DNR state forest land, Minnesota School Trust land, Forests for the Future program land, and SFIA land.

Table 6-42 Designated Forestry Resources within the 150-foot ROW of Alignment Alternative AA16

Forestry Resources	Alignment Alternative AA16	Applicants' Equivalent
Acres of DNR state forest within 150-foot ROW	82	98
Acres of Minnesota School Trust Land[1] within 150-foot ROW	5	5
Acres of Forests for the Future[2] land within 150-foot ROW	14	14
Acres of Sustainable Forest Incentive Act[3] land within 150-foot ROW	20	19

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)).

The applicants' equivalent would have significantly more impacts to forestry resources than alignment alternative AA16. Though both routing alternatives have designated forestry resources within their 150-foot rights-of-way based on GIS analysis, AA16 follows an existing transmission line ROW that has been cleared for forestry resources and is maintained as such.

6.2.5.2.3 Recreation and Tourism

Recreation and tourism activities within the Hill City to Little Pine region include outdoor recreational activities and camping opportunities on state managed lands, trails, and scenic byways. Since transmission line construction and operation generally has minimal permanent and temporary impacts to trails, project-related recreation and tourism impacts in this region are expected to be minimal where it parallels existing ROWs.

Alignment alternative AA16 and the applicants' equivalent both cross two scenic byways, two state forests, one off-road vehicle use trail, and one water trail. Alignment alternative would be collocated, while the applicants' equivalent parallels an existing transmission line ROW, thus, permanent impacts to resources in this area would be minimal. Temporary impacts from alignment alternative AA16 and the applicant's equivalent could include construction-related temporary trail closings as well as temporary interruptions in recreational opportunities within Golden Anniversary State Forest and Hill River State Forest. Although temporary impacts would occur because of project construction, they are expected to have a minimal long-term impact on recreation.

6.2.5.3 Archaeological and Historic Resources

There are no documented archaeological or historic architectural resources within the route width of alignment alternative AA16 or the applicants' equivalent. As a result, project impacts to cultural resources are anticipated to be minimal and independent of the route selected.

6.2.5.4 Natural Environment

6.2.5.4.1 Water Resources

Floodplain and groundwater impacts are anticipated to be minimal and independent of the project route selected. This routing alternative comparison discussion addresses watercourses, waterbodies, and wetlands. Map 6-9 and Map 6-10 show the water resources along alternative alignment AA16 and the applicants' equivalent.

6.2.5.4.1.1 Watercourses and Waterbodies

Table 6-43 identifies the number of watercourses and waterbodies crossed by alternative alignment AA16 and the applicants' equivalent. Alternative alignment AA16 would have two PWI basin crossings over 1,000 feet which would require structures placed within the waterbodies; the applicants' equivalent would present only one waterbody crossing over 1,000 feet. However, alternative alignment AA16 would reduce disturbance to watercourses and waterbodies by following an existing transmission line ROW.

Table 6-43 Watercourses and Waterbodies Crossed by the Alternative Alignment AA16 and the Applicants Equivalent

Resources	Alternative Alignment AA16	Applicants' Equivalent
Number of NHD stream crossings	5	5
Number of impaired stream crossings	1	1
Number PWI stream crossings	4	4
Number of NHD lake crossings	1	1
Number of impaired lake crossings	0	0
Number of PWI basin crossings	3	3

6.2.5.4.1.2 Wetlands

Table 6-39 identifies the wetland acreage crossed by alternative alignment AA16 and the applicants' equivalent. Alternative alignment AA16 would cross more non-forested and forested wetlands than the applicants' equivalent. Alignment alternative AA16 would have seven wetland crossings over 1,000 feet and the applicants' equivalent would have six wetland crossings over 1,000 feet.

6.2.5.4.2 Vegetation

The alignment alternative AA16 ROW would not impact forested vegetation because it would be follow an existing transmission line ROW (Map Book 5C). While the NLCD data indicates that forested vegetation is present in the ROW, it has all been cleared previously and maintained to low-stature vegetation for the existing transmission line. The applicants' equivalent ROW would impact approximately 151 acres of forested vegetation (Map Book 5C). No impacts associated with forested fragmentation would occur for alignment alternative AA16 or the applicants' equivalent. Because it would be located within an existing ROW, alignment alternative AA16 would best minimize forest vegetation impacts.

6.2.5.4.3 Wildlife

The alignment alternative AA16 ROW would not impact wildlife habitat because it would follow an existing transmission line ROW. The applicants' equivalent would require forest vegetation and associated wildlife habitat removal in its ROW. Neither alternative pass-through area that are managed or preserved for wildlife. Wildlife habitat fragmentation or increased impact potential to avian species would not occur for either alternative. Potential wildlife habitat impacts would be greater for the applicants' equivalent due to the loss of forested habitat.

6.2.5.5 Rare and Unique Natural Resources

Using the NHIS database, it was determined that no federal protected species have been documented within 1 mile of alignment alternative AA16 or the applicants' equivalent. Two state threatened vascular plant species have been documented within 1 mile of both alternatives (Appendix N). In addition, several state special concern species have been documented within 1 mile of each alternative (Appendix N). While no protected species have been documented within the ROW of either alignment alternative, AA16 consists of a routinely maintained/disturbed ROW, while the applicants' equivalent would require disturbance to and removal of potentially suitable habitat for protected species.

Alignment alternative AA16 ROW and the applicants' equivalent would intersect several sensitive ecological resources, including SBS ranked high, moderate, and below, native plant communities, and areas designated as High Conservation Value Forest (Table 6-44, Map 6-9 and Map 6-10). Alignment alternative AA16 would be co-located with the existing transmission line and as such, would traverse these resources within an existing ROW where disturbance to these resources has already occurred. While the applicants' equivalent would minimize sensitive ecological resource impacts by paralleling an existing transmission line ROW, impacts associated with vegetation clearing or structure placement would still occur.

Table 6-44 Sensitive Ecological Resources in the ROW of Alignment Alternative AA16 and the Applicants' Equivalent

Sensitive Ecological Resource	Area within ROW of AA16	Area within ROW of Applicants' Equivalent
Sites of Biodiversity Significance	195 total acres; 73 acres ranked high; 74 acres ranked moderate; 48 acres ranked below	227 total acres; 74 acres ranked high; 95 acres ranked moderate; 58 acres ranked below
Native Plant Communities	2 acres - conservation status S3-S5	9 acres - conservation status S3-S5
High Conservation Value Forest	5 acres	5 acres

6.2.5.6 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.

No transmission line crossings are required for these alignment alternatives.

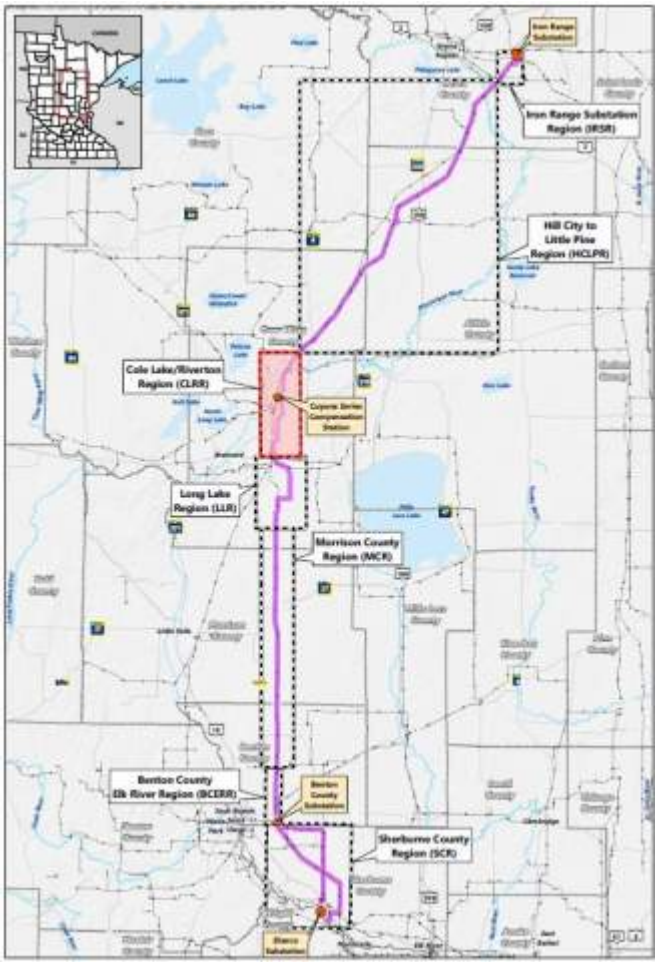
6.2.5.7 Cost

Routing alternative costs 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 6-39). Although the base cost of alignment alternative AA16 (approximately $60 million) is less than the applicants' equivalent (approximately $70 million), alignment alternative AA16 would require double-circuiting two existing lines in order to route the project within existing ROW of one of the lines to be double-circuited. New double-circuit structures and alignment would therefore add significant cost (approximately $45 million to $58 million) to alignment alternative AA16 (total cost between approximately $106 and $1119 million), making the applicants' equivalent the less expensive alternative.

6.3 Cole Lake-Riverton Region

The Cole Lake-Riverton region is located in Crow Wing County, just south of the Hill City to Little Pine region (Figure 6-5). In addition to the applicants' proposed route, the region has eight route alternatives (D3, E1, E2, E3, E4, E5, F, and G) and seven alignment alternatives (AA3, AA4, AA6, AA7, AA8, AA9, and AA10) (Map Book 3A). Chapter 6.3.1 summarizes the potential impacts resulting from construction and operation of the applicants' proposed route in the Cole Lake-Riverton region. Chapters 6.3.1 through 6.3.9 are dedicated to a comparison of potential project construction and operation impacts. Chapter 6.3.2 discusses route alternative D3, alignment alternatives AA4 and AA6, and the applicants' equivalent. Chapter 6.3.3 discusses alignment alternative AA3 and the applicants' equivalent. Chapter 6.3.4 discusses route alternatives E1, E2, E3, E4, E5, and the applicants' equivalent. Chapter 6.3.5 discusses route alternative F and the applicants' equivalent. Chapter 6.3.6 discusses route alternative G and the applicants' equivalent. Chapter 6.3.5 discusses route alternative F and the applicants' equivalent. Chapter 6.3.7 discusses alignment alternative AA7 and the applicants' equivalent. Chapter 6.3.8 discusses alignment alternative AA8, AA9, and the applicants' equivalent. Chapter 6.3.9 discusses alignment alternative AA10 and the applicants' equivalent.

Figure 6-5 Cole Lake-Riverton Region



6.3.1 Applicants' Proposed Route - Cole Lake-Riverton Region

Potential impacts of the applicants' proposed route in the Cole Lake-Riverton region are summarized in Table 6-45 and discussed in Chapters 6.3.1.1 through 6.3.1.5.

Table 6-45 Human and Environmental Impacts – Applicants' Proposed Route, Cole Lake-Riverton Region

Resource	Element	Applicants' Proposed Route
Length (miles)		17.7
Human Settlement	Residences within 0-75 feet (count)	1
	Residences within 75-250 feet (count)	2
	Residences within 250-500 feet (count)	13
	Residences within 500–1,000 feet (count)	33
Land-Based Economies	Agricultural land in 150-foot ROW (acres)	26
Water Resources	Total wetlands in 150-foot ROW (acres)	111
	Forested wetlands in 150-foot ROW (acres)	21
Vegetation	Forested landcover in 150-foot ROW (acres)	208
Wildlife	Shallow Wildlife Lake in 150-foot ROW (acres)	6
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	115
	Native Plant Communities in 150-foot ROW (acres)	18
	Lake of Biological Significance in 150-foot ROW (acres)	2
	Federal- or state-protected species documented in 150-foot ROW (count)	1
ROW Sharing and Paralleling	Transmission line (miles, percent)	8.8 (50)
	Roadway (miles, percent)	0 (0)
	Field, parcel, or section lines (miles, percent)	8.5 (48)
	Total ROW sharing and paralleling (miles, percent)	15.4 (87)
Estimated Cost	Total estimated cost (2022 dollars in millions)	$90.4

6.3.1.1 Human Settlements

As discussed in Chapter 5.3, potential human settlement are assessed by looking at several evaluative 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 potential human settlement impact indicators. Human settlement impacts are minimized by routes located away from homes and share a ROW with existing infrastructure.

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

6.3.1.1.1 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 routing 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.

Project aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure ROW. The proximity of residences is shown in Table 6-46. More than three quarters of the applicants' proposed route in the Cole Lake-Riverton region would parallel an existing transmission line ROW, as shown in Table 6-47.

The proposed Cuyuna Series Compensation Station has one residence within its siting area, and one residence immediately adjacent to the eastern border of the siting area (Map Book 5A). There are a number of residences to the south of the southern boundary, and several of them have a buffer of trees between the siting area and the compensation station. The siting area is located within a region containing several existing transmission lines, so project-related aesthetic impacts are expected to be limited.

Table 6-46 Cole Lake-Riverton Region Proximity of Residences to Applicants' Route

Residences, Distance from Anticipated Alignment	Applicants' Proposed Route
Residences within 0-75 feet	1
Residences within 75-250 feet	2
Residences within 250-500 feet	13
Residences within 500-1,000 feet	33
Total Residences within 1,000 feet	49

Table 6-47 Cole Lake-Riverton 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	8.8 (50)
Total – Follows Transmission Line, Road, or Railroad	8.8 (50)
Follows Field, Parcel, or Section Lines	8.5 (48)
Total – ROW Paralleling and Sharing	15.4 (87)
Total Length of Route Alternative	17.7

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.

6.3.1.1.2 Displacement

Residences or other buildings are typically not allowed within the ROW of a transmission line for 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' proposed route alternative. However, there is one permanent residence and one non-residential building (storage shed, agricultural outbuildings, etc.) located within the 150-foot ROW of the applicants' proposed alternative.

The one residential building located within the 150-foot ROW of the applicants' proposed route could be displaced because of the project; similarly, the non-residential building may or may not be displaced. 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., animal production). For each of the buildings noted here, the applicants would need to conduct a site-specific analysis to determine if the building would require displacement.

There are no churches, childcare centers, or schools located in the siting are for the applicants' proposed Cuyuna Series Compensation Station. There is one permanent residence and one non-residential building (storage shed, agricultural outbuildings, etc.) located within the siting area that could be displaced because of the project. They are in the southwestern corner of the siting area. The applicants would need to conduct a site-specific analysis, as these buildings may not need to be displaced because of the project.

6.3.1.1.3 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 at 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 long-term 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 the city limits of Trommald and Riverton, both of which have been identified as communities with EJCs. The proposed Cuyuna Series Compensation Station will be located in Irondale Township and is part of the same EJC as the city of Trommald. No adverse or permanent impacts to the identified communities with EJCs are anticipated. While the applicants' proposed route does intersect communities with EJCs, these communities are not anticipated to experience disproportionately adverse impacts as a result of the project.

6.3.1.2 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 land-based economy elements in the Cole Lake-Riverton region, project impacts are anticipated to be minimal. There are no active mining operations within applicants' proposed route ROW in this region. Thus, potential impacts to agriculture, forestry, and recreation and tourism are the only elements of land-based economies for which impacts are anticipated to be non-minimal.

Project impacts to agriculture within the Cole Lake-Riverton region were evaluated through land use and soil types within the 150-foot ROW of the applicants proposed route and proposed alternatives (Chapter 5.7.1). Map Book 5C provides an overview of land cover types crossed by the applicants' proposed route. Approximately 26 acres of the applicants' proposed route ROW (8 percent of the 150-foot ROW) consists of agricultural land comprised of cultivated crops and hay/pasture lands within this region (Table 6-45).

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 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.

6.3.1.2.1 Forestry

Forestry impacts within the Cole Lake-Riverton region were assessed through an evaluation of designated forestry resources within the 150-foot ROW (Chapter 5.8.2). Approximately 208 acres of the applicants' proposed route ROW consist of forested land (reference (108)) comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands within this region (Map Book 5C).

As shown in Table 6-4, the designated forestry resources consist of DNR state forests and Minnesota School Trust Land.

Table 6-48 Designated Forestry Resources within the 150-foot ROW of the Applicants' Proposed Route

Forestry Resources	Applicants' Proposed Route
Acres of DNR state forest within 150-foot ROW	82
Acres of Minnesota School Trust Land[1] within 150-foot ROW	24
Acres of Forests for the Future[2] land within 150-foot ROW	0

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)).

There are moderate potential impacts to designated forestry resources within the applicants' proposed route ROW. Vegetation clearing would include permanent tree removal from the ROW before construction.

These physical forestry resource impacts 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 clearing-related timber loss in the ROW.

6.3.1.2.2 Recreation and Tourism

Recreation and tourism activities within the Cole Lake-Riverton region include outdoor recreational activities and camping opportunities on state managed lands, 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.

The applicants' proposed route crosses a scenic byway, Crow Wing State Forest, a hiking trail, an off-road vehicle-use trail, a snowmobile trail, and a water trail (Map Book 5E). Most of the trail crossings in the applicants' proposed route occur in areas where the route parallels existing transmission lines, thus, permanent impacts to resources in this area would be minimal. Most of the applicants' proposed route that cross through Crow Wing State Forest parallels existing transmission lines, with the exception of a portion of the route north of River Road. This portion of the route could create permanent impacts including an increase in noise and a reduction in aesthetic value. Temporary impacts because of the applicants' proposed route could include construction-related trail closings and temporary interruptions in recreational opportunities within the Crow Wing State Forest (Chapter 5.8.4.1). Although temporary impacts in this region would occur because of this route, they are expected to have a minimal impact on recreation.

6.3.1.2.3 Cuyuna Series Compensation Station

For the Cuyuna Series Compensation Station Siting Area, recreation and tourism are the only land-based economy elements with non-minimal impacts. There are no agricultural lands, forestry resources, or

active mines within the siting area. As a result, there are no potential impacts to agriculture, forestry, or mining within the Cuyuna Series Compensation Station Siting Area.

The Cuyuna Series Compensation Station siting area features an off-road vehicle-use trail that traverses its western edge (Photo 6-1). Construction in the siting area would result in permanent impacts to recreation and tourism opportunities. Permanent siting area impacts would include trail fragmentation and possible trail relocation, an increase in noise and a reduction in aesthetic value (Chapter 5.7.4.1).

Photo 6-1 View of Off-Road Vehicle-Use Trail in the Cuyuna Series Compensation Station Siting Area

6.3.1.3 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 Cole Lake-Riverton region.

There are five historic architectural resources and one archaeological site within the route width (1,000 ft) of the applicants' proposed route in the Cole Lake-Riverton region (Table 6-49). As discussed in Chapter 5.9.3, impacts to these resources would consist of changes in the resource's setting due to a new transmission line placement in proximity to the resource.

Table 6-49 Cultural Resources within the Route Width of the Applicants' Proposed Route, Cole Lake-Riverton Region

Resource Number	Resource Type	NRHP Eligibility
21CWy	Rabbit River Mission (Precontact artifact scatter)	Not evaluated
CW-IRN-00001	Farmstead	Not evaluated
CW-XXX-00001	Cuyuna Iron Range Historic Mining Landscape District	Eligible
XX-ROD-00153	Trunk Highway 210	Not Eligible
XX-RRD-NPR007	RR ROW between LS&M/StP&D main line at Carlton, and ND State Line at Moorhead (Duplicate Recordation)	Eligible
XX-RRD-NPR021	RR ROW between LS&M/StP&D main line at Carlton, and ND State Line at Moorhead (Duplicate Recordation)	Eligible

As XX-ROD-00153 is not eligible for the NRHP and, therefore, cannot be adversely affected by the project, it is not discussed further. Of the remaining cultural resources located within the applicants' proposed route width, historic architectural resources XX-RRD-NPR007 / XX-RRD-NPR021, CW-XXX-00001, and CW-IRN-00001 are susceptible to impacts. The route applicants' proposed route width would cross each of these resources in a brand-new location, which may alter that resource's setting, feeling, appearance, and/or association. Archaeological site 21Cwy may also be impacted by the project if it is present within the ground disturbance footprint. Ground-disturbing activities and the changes in setting resulting from the project have the potential to impact these resources if they cannot be avoided.

6.3.1.3.1 Cuyuna Series Compensation Station

Two documented cultural resources are located within the Cuyuna Series Compensation Station Siting Area. These include archaeological sites 21CWx and 21CWy (Table 6-50). Ground-disturbing activities resulting from the Cuyuna Series Compensation Station construction have the potential to impact these resources if they cannot be avoided by the project.

Table 6-50 Cultural Resources within the Cuyuna Series Compensation Station Siting Area

Resource Number	Resource Type	NRHP Eligibility
21Cwx	Precontact Earthwork	Not evaluated
21CWy	Rabbit River Mission (Precontact artifact scatter)	Not evaluated

6.3.1.4 Natural Environment

6.3.1.4.1 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 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. Map Book 5G shows the water resources along applicants proposed route.

6.3.1.4.1.1 Watercourses and Waterbodies

According to the NHD, the applicants' proposed route would cross eight watercourses in the Cole Lake-Riverton region. Six of these watercourses are classified as public waters, two of which are also classified as impaired streams, the Mississippi River and an unnamed creek. The applicants proposed route would also cross three NHD waterbodies and two public water basins.

Within the Cuyuna Series Compensation Station siting area there is one stream, the Rabbit River, and one unnamed public water basin. The Rabbit River is located along the southeast corner of the siting area and is also classified as a public water. There are no impaired streams or lakes within the Cuyuna Series Compensation Station siting area.

It is anticipated that these watercourse and waterbodies are of such size that they could be spanned and avoided during the compensation station siting process. Since no structure placement is anticipated within waterbodies and watercourses, no direct impacts to these resources are expected. 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.

6.3.1.4.1.2 Wetlands

The applicants proposed route cross approximately 111 acres of NWI wetlands in the Cole Lake-Riverton region. The NWI wetlands consist mainly of shrub wetlands (57 acres), emergent wetlands (22 acres), and forested wetlands (21 acres). The remaining area consists of 11 acres of ponded, riverine, and lacustrine wetlands. There is one PWI wetland in the ROW of the applicants' proposed route in the Cole Lake-Riverton region.

The Cuyuna Series Compensation Station siting area contains approximately 38 acres of NWI wetlands. The NWI wetlands consist mainly of scrub shrub wetlands (14 acres), forested wetlands (11 acres), riverine wetlands (9 acres). The remaining area consists of 4 acres of emergent wetland and ponded wetland. The Cuyuna Series Compensation Station would be sited to avoid disturbance to wetlands.

Although wetlands would be spanned to the extent possible, the applicants' proposed route would cross nine wetland areas wider than 1,000 feet, which may require one or more structures to be placed in a wetland. Structures placement in a wetland would result in permanent impacts. Permanent impacts 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.

6.3.1.4.2 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 Cole Lake-Riverton region, and Table 6-51Table 6-5 summarizes the assessment region landcover types within the applicants' proposed route ROW and Cuyuna Series Compensation Station siting area. The dominant vegetative landcover in the applicants' proposed route in this region consists of forest, which represents approximately 65 percent of the ROW. Similarly, forest is the dominant vegetative landcover type in the Cuyuna Series Compensation Station siting area, representing approximately 84 percent of the landcover. Forest types include forested wetlands and upland deciduous, coniferous, and mixed forest communities.

Table 6-51 Landcover Types in the 150-foot ROW of the Applicants' Proposed Route in the Cole Lake-Riverton Region and Cuyuna Series Compensation Station Siting Area

Landcover Type	Acres in ROW	Percent of ROW[1]	Acres in Siting Area	Percent of Siting Area[1]
Forested (upland and wetland)	208	65	525	84
Herbaceous (upland and wetland)	67	21	64	10
Agricultural (cultivated crops and hay/pasture)	26	8	11	2
Shrub/Scrub	9	3	11	2
Developed (low-high intensity; open space)	8	3	13	2
Open Water	4	1	0	0
Barren Land	0	0	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 then maintained with low-growing vegetation to minimize potential transmission line interference. The applicants' proposed route does not parallel any existing road ROW and would parallel an existing transmission line ROW for approximately 50 percent of its length in the Cole Lake-Riverton region. As such, the applicants' proposed route would require the construction of transmission line ROW where existing ROW is not present, resulting in the fragmentation of forested areas. Transmission line ROWs traverse the Cuyuna Series Compensation Station siting area; however, areas of unfragmented forest are also present within the siting area. Forest area fragmentation could occur from Cuyuna Series Compensation Station construction, depending on where it is built within the siting area.

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.

6.3.1.4.3 Wildlife

Wildlife impacts are primarily assessed by evaluating the presence of wildlife habitat, including areas that are preserved or managed for that purpose, within the ROW (Chapter 5.10.5.1 and 5.10.5.2). The applicants' proposed route does not parallel any existing road ROW and would parallel an existing transmission line ROW for approximately 50 percent of its length in the Cole Lake-Riverton region. Transmission line ROWs traverse the Cuyuna Series Compensation Station siting area; however, unfragmented forest habitat areas exist. The construction of a new transmission line ROW, and the presence of the Cuyuna Series Compensation Station within the siting area, would result in wildlife habitat fragmentation. In addition, construction of a new transmission line ROW 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.

The applicants' proposed route would traverse the edge of Mud Lake, a DNR-identified shallow wildlife lake (Map Book 5H). However, potential wildlife impacts associated with the shallow lake would be minimized because the applicants' proposed route would parallel an existing transmission line ROW in this area. The applicants' proposed route ROW would not traverse any other areas that are preserved or managed for wildlife habitat.

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

6.3.1.5 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 Cole Lake-Riverton region. Please note that in order to protect federally and state protected species from exploitation or destruction, documented locations of these species are not identified on any maps.

6.3.1.5.1 Protected Species

According to the NHIS database, no federally protected species have been documented within 1 mile of the applicants' proposed route in the Cole Lake-Riverton region. As summarized in Table 6-52, seven state protected species have been documented within 1 mile of the applicants' proposed route in this region. In addition to the species listed in Table 6-52, several state special concern species have been documented within 1 mile of the applicants' proposed route in this region (Appendix N).

Table 6-52 Federal- or State-Protected Species Documented in the Natural Heritage Information System Database – Applicants' Proposed Route in the Cole Lake-Riverton Region

Scientific Name	Common Name	Type	State Status	Documented Records within ROW, Route Width, or 1 Mile
Botrychium ascendens	Upswept moonwort	Vascular plant	Endangered	1 Mile
Botrychium lineare	Slender moonwort	Vascular plant	Endangered	1 Mile
Botrychium spathulatum	Spatulate moonwort	Vascular plant	Endangered	1 Mile
Juglans cinerea	Butternut	Vascular plant	Endangered	1 Mile
Utricularia purpurea	Purple-flowered bladderwort	Vascular plant	Endangered	1 Mile
Botrychium oneidense	Blunt-lobed grapefern	Vascular plant	Threatened	1 Mile
Emydoidea blandingii	Blanding's turtle	Turtle	Threatened	ROW

As noted in Table 6-52, one state-protected species, the Blanding's turtle, has been documented within the applicants' proposed route ROW; this species was also documented in the northwest corner of the Cuyuna Series Compensation Station siting area. Formal protected species surveys 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 or the Cuyuna Series Compensation Station siting area. Potential protected species impacts 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 protected species impacts 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.

6.3.1.5.2 Sensitive Ecological Resources

The applicants' proposed route ROW in the Cole Lake-Riverton region would traverse several sensitive ecological resources, including SBS, native plant communities, and a Lake of Biodiversity Significance (Table 6-53; Map Book 5I). As shown on Map Book 5I, the applicants' proposed route ROW would parallel an existing transmission line ROW while traversing the edge of Mud Lake, a DNR Lake of Biodiversity Significance; as noted above, this lake is also a DNR-identified shallow wildlife lake. The applicants' proposed route ROW would also parallel an existing transmission line ROW through the SBS ranked moderate but would require a new transmission line ROW through the SBS ranked high and the native plant communities located within this SBS.

Impacts to protected species potentially associated with the Lake of Biological Significance and SBS ranked moderate would be minimized by paralleling existing transmission line ROWs. However, as shown on Map Book 5I, almost the entire Cuyuna Series Compensation Station siting area is located within the SBS ranked moderate. Creation of new ROWs through sensitive ecological resources could impact

protected species associated with habitats within them. This could occur as a result of habitat conversion or fragmentation or due to the placement of structures and other infrastructure within them.

Table 6-53 Sensitive Ecological Resources in the ROW of the Applicants' Proposed Route – Cole Lake-Riverton Region

Sensitive Ecological Resource	Area within ROW of Applicants' Proposed Route
Sites of Biodiversity Significance	115 total acres; 22 acres ranked high; 93 acres ranked moderate
Native Plant Communities	18 acres - conservation status S3-S5
Lake of Biological Significance	2 acres - ranked outstanding

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.

6.3.2 Route Alternative D3, Alignment Alternatives AA4 and AA6 - Cole Lake-Riverton Region

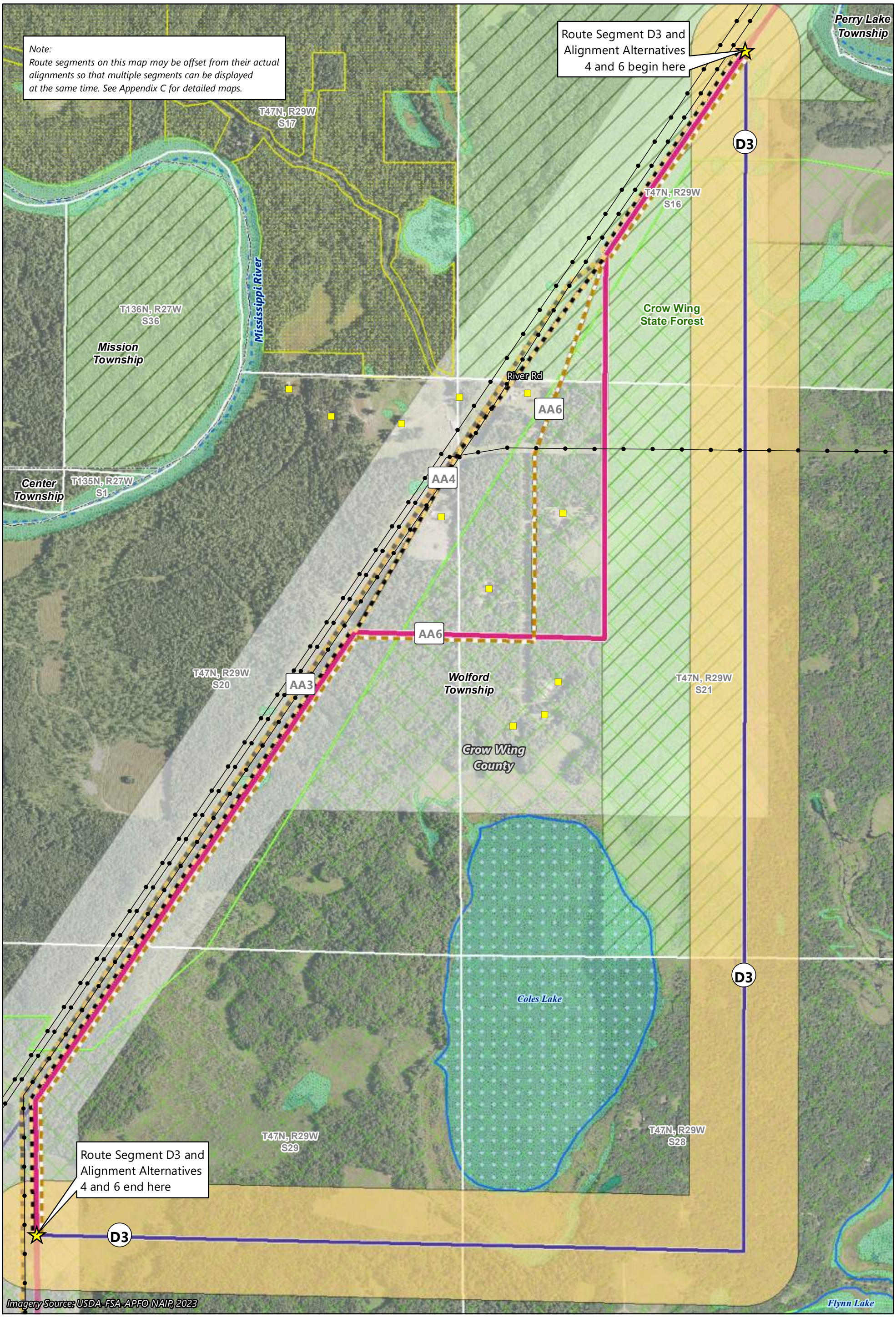
Route alternative D3 and alignment alternatives AA4 and AA6 provide different options to the applicants' proposed route in the northeastern part of the Cole Lake-Riverton region. Route alternative D3 is shifted east and south of the applicants' proposed route in an effort to reduce potential adverse aesthetic, land use, and property value impacts. Route alternative D3 does not include any ROW sharing, paralleling, or double-circuiting.

Alignment alternative AA4 is shifted west of the applicants' alignment and would entail double-circuiting two existing transmission lines, which would then allow placement of alignment alternative AA4 within existing transmission line ROW. Alignment alternative AA6 is shifted west of the applicants' alignment to reduce impacts to natural resources. Alignment alternative AA6 does not include any ROW sharing or paralleling, or double-circuiting. Potential impacts of the alternatives and the applicants' equivalent are summarized in Table 6-54 and shown on Map 6-11 and Map 6-12.

Table 6-54 Human and Environmental Impacts – Route Alternatives D3, AA4, and AA6, Cole Lake-Riverton Region

Resource	Element	Route Alternative D3	Alignment Alternative AA4	Alignment Alternative AA6	Applicants' Equivalent
Length (miles)		3.3	2.4	2.6	2.8
Human Settlement	Residences within 0-75 feet (count)	0	0	0	0
	Residences within 75-250 feet (count)	0	2	1	0
	Residences within 250-500 feet (count)	0	1	3	3
	Residences within 500–1,000 feet (count)	0	2	4	3
Land-Based Economies	Agricultural land in 150-ft ROW	<1	7	2	2
Water Resources	Total wetlands in 150-foot ROW (acres)	21	3	3	6
	Forested wetlands in 150-ft ROW (acres)	6	0	0	<1
Vegetation	Forested landcover in 150-foot ROW (acres)	49	28[1]	36	39
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	57	6	19	23
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	0 (0)	2.4 (100)	1.7 (63)	1.7 (60)
	Roadway (miles, percent)	0 (0)	0 (0)	0.4 (17)	0 (0)
	Field, parcel, or section lines (miles, percent)	3.3 (100)	0.2 (8)	0.7 (25)	0.9 (31)
	Total ROW sharing and paralleling (miles, percent)	3.3 (100)	2.4 (100)	2.1 (80)	2.3 (84)
Reliability	Crossing of existing transmission lines (count)	0	0	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$18.4	$55.6-$66.5[2]	$14.7	$15.3

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.
2 Cost is driven by the need to reconfigure three existing transmission lines with this alignment alternative (base cost of $13.5 million)



Alignment Alternative 4
Alignment Alternative 6
Route Segment D3
Applicants' Route D Equivalent
Route Width
Route Alternative Width

Existing Transmission Line
Residence
PWI Watercourse
PWI Waterbody
Shallow Wildlife Lake
State Conservation Easement

State Forest

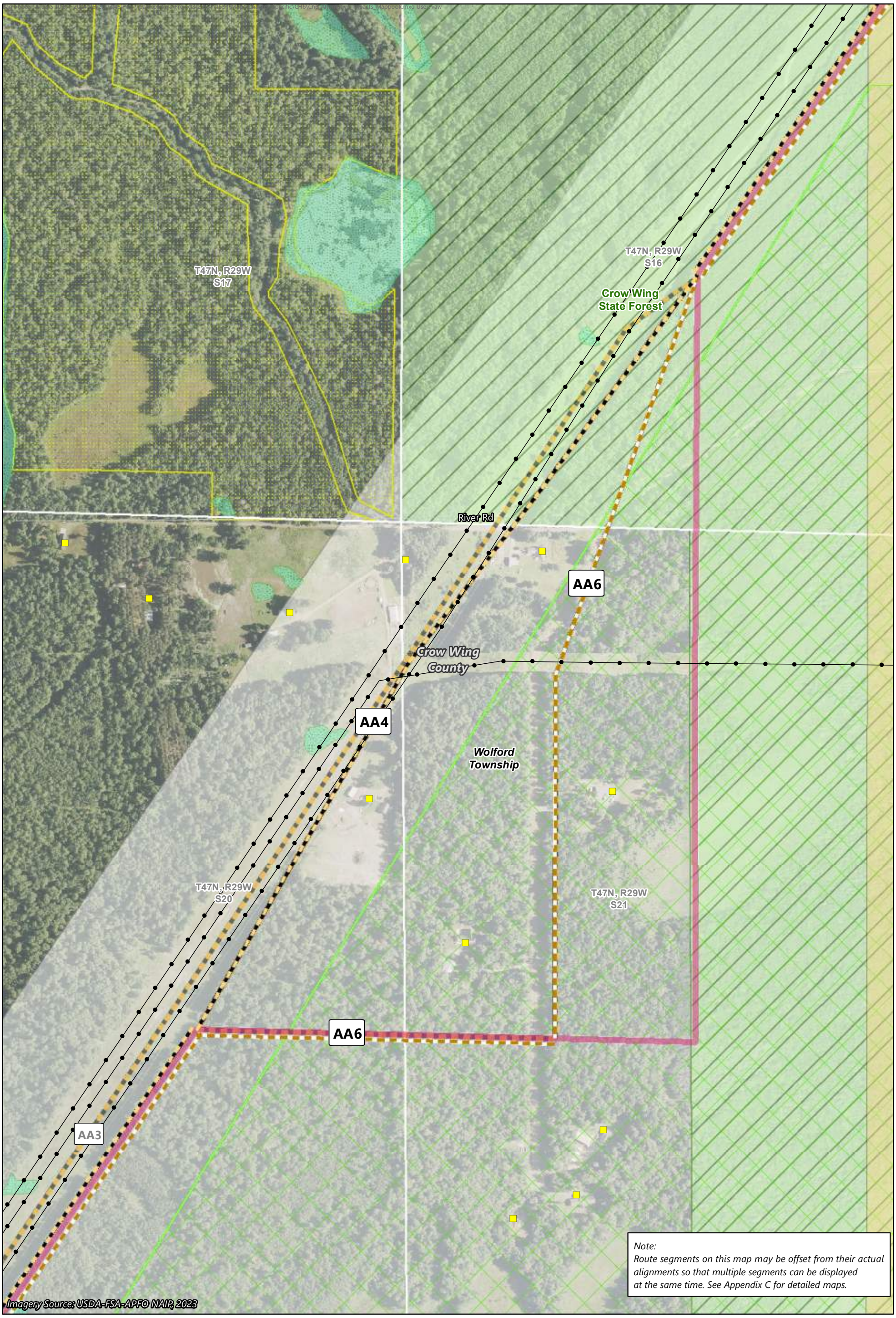
Wetlands
Non-Forested Wetland
Forested Wetland

Site of Biodiversity Significance
Moderate Significance

Feet
0 400 800

Map 6-11

ROUTE ALTERNATIVE D3
Cole Lake/Riverton Region
Northland Reliability Project



Alignment Alternative 4
Alignment Alternative 6
Route Width
Route Alternative Width
Existing Transmission Line
Residence
State Conservation Easement
State Forest

Wetlands
Non-Forested Wetland

Site of Biodiversity Significance
Moderate Significance

Feet
0 200 400

Map 6-12

ALIGNMENT ALTERNATIVES AA4 AND AA6
Cole Lake/Riverton Region
Northland Reliability Project

6.3.2.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements, discussed in Chapter 5.3. For some of the human settlement evaluation 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, socioeconomics and EJCs, and zoning and land use.

6.3.2.1.1 Aesthetics

Aesthetic impacts differ among the routing alternatives. 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 D3, AA4, AA6, and the applicants' equivalent are shown in Table 6-55, while ROW paralleling and sharing are shown in Table 6-56.

No residences are located within 1,000 feet of route alternative D3. Alignment alternative AA4 and the applicants' equivalent have a similar number of residences within 1,000 feet (5 and 6, respectively). Alignment alternative AA6 has 8 residences within 1,000 feet.

Route alternative D3 follows no existing infrastructure ROW, though it would follow field, parcel, and/or section lines for its entirety. Approximately 79 percent of route alternative AA6 would follow existing infrastructure ROW, compared to 60 percent of the applicants' equivalent. Alignment alternative AA4 would entail double-circuiting two existing transmission lines, which would then allow placement of alignment alternative AA4 within existing transmission line ROW, minimizing aesthetic impacts to a greater extent than the other routing alternatives.

Table 6-55 Cole Lake-Riverton Region Proximity of Residences to Route Alternative D3, AA4, and AA6

Residences, Distance from Anticipated Alignment	Route Alternative D3	Alignment Alternative AA4	Alignment Alternative AA6	Applicants' Equivalent
Residences within 0-75 feet	0	0	0	0
Residences within 75-250 feet	0	2	1	0
Residences within 250-500 feet	0	1	3	3
Residences within 500-1,000 feet	0	2	4	3
Total Residences within 1,000 feet	0	5	8	6

Table 6-56 Cole Lake-Riverton Region ROW Sharing and Paralleling of Route Alternative D3, AA4 and AA6

Infrastructure	Route Alternative D3 miles (percent)	Alignment Alternative AA4 miles (percent)	Alignment Alternative AA6 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0 (0)	0.4 (17)	0 (0)
Follows Existing Transmission Line	0 (0)	2.4 (100)	1.7 (63)	1.7 (60)
Total – Follows Transmission Line, Road, or Railroad	0 (0)	2.4 (100)	2.1 (79)	1.7 (60)
Follows Field, Parcel, or Section Lines	3.3 (100)	0.2 (8)	0.7 (25)	0.9 (31)
Total – ROW Paralleling and Sharing	3.3 (100)	2.4 (100)	2.1 (80)	2.3 (84)
Total Length of Route Alternative	3.3	2.4	2.6	2.8

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.

6.3.2.2 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 active mining operations within the ROW of either the route alternatives or the applicants' equivalent. Therefore, potential project impacts to mining would be minimal and independent of the route selected.

6.3.2.2.1 Agriculture

Agricultural land impacts differ between the 150-foot ROW of route alternative D3, alignment alternatives AA4 and AA6, and the applicants' equivalent. Alignment alternative AA4 would impact the least amount of agricultural land as it follows an existing transmission line ROW; the agricultural land in the ROW has already been impacted. Route alternative D3 would impact the least amount of new agricultural land within the ROW, affecting just 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 the route alternatives or the applicants' equivalent.

The entirety of alignment alternative AA4 parallels an existing transmission line where the agricultural areas have already been impacted. Nearly 80 percent of alignment alternative AA6 and just over 60 percent of the applicants' equivalent would share ROW with existing infrastructure; however, none of route alternative D3 parallel existing infrastructure.

6.3.2.2.2 Forestry

Forestry impacts within the Cole Lake-Riverton region were assessed by evaluating the designated forestry resources within the 150-foot ROW (Chapter 5.8.2). Forested land within each of the proposed route or alignment rights-of-way includes 49 acres of the route alternative D3 ROW; 28 acres of the alignment alternative AA4 ROW; 36 acres of the alignment alternative AA6 ROW; and 39 acres of the

applicants' equivalent ROW (reference (108)). However, it is important to note that while the NLCD indicates forested vegetation is in the alignment alternative AA4 ROW, this ROW consists of an existing transmission line ROW that has been cleared and is routinely maintained. The forested land in this region is comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands (Map Book 5C). Route alternative D3, alignment alternatives AA4 and AA6, and the applicants' equivalent all cross through Crow Wing State Forest.

As shown in Table 6-57, the designated forestry resources within the route alternative rights-of-way consist of DNR state forest land and Minnesota School Trust Land. There is no Forests for the Future land within the ROW of any of the route alternatives.

Table 6-57 Designated Forestry Resources within the 150-foot ROW of Route Alternative D3 and Alignment Alternatives AA4, and AA6 Route

	Route Alternative D3	Alignment Alternative AA4	Alignment Alternative AA6	Applicants' Equivalent
Acres of DNR state forest within 150-foot ROW	61	45	48	50
Acres of Minnesota School Trust Land[1] within 150-foot ROW	18	13	12	18

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).

Alignment alternative AA4 would have significantly fewer impacts on forestry resources than other routing alternatives. This is because AA4 follows an existing transmission line ROW that has been cleared of trees and is maintained in this condition.

6.3.2.2.3 Recreation and Tourism

Recreation and tourism activities 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.

The route alternatives and applicants' equivalent route traverses Crow Wing State Forest and have minimal trail crossings (Map Book 5E). Trail crossings among the route alternatives occur in areas where the alternatives parallel existing transmission lines; thus, permanent impacts to resources in this area would be minimal. Both alignment alternative AA4 and AA6 parallel existing transmission lines, reducing introduction of permanent impacts to recreational opportunities in Crow Wing State Forest. By comparison, route alternative D4 does not parallel an existing transmission line where it crosses Crow Wing State Forest, which could result in new permanent impacts including an increase in noise and a reduction in aesthetic value. The applicants' equivalent in this area also has route portions which do not parallel an existing transmission line, which could result in new permanent impacts, but would be less impactful than route alternative D4 due to less state forest land crossed. Temporary impacts as a result of all route alternatives and applicants' equivalent could include trail closings during construction and temporary interruptions in recreational opportunities within the Crow Wing State Forest (Chapter 5.8.4.1).

Although temporary impacts would occur, they are expected to have a minimal long-term impact on recreation.

6.3.2.3 Archaeological and Historic Resources

There are no documented archaeological or historic architectural resources within the route width of route alternatives D3, AA4, AA6, or the applicants' equivalent. As a result, impacts to cultural resources are anticipated to be minimal and independent of the route selected.

6.3.2.4 Natural Environment

6.3.2.4.1 Water Resources

Floodplains and groundwater impacts are anticipated to be minimal and independent of the project route selected. This route alternative comparison discussion addresses watercourses, waterbodies, and wetlands. Map 6-11 shows the water resources along route alternative D3, alternative alignments AA4 and AA6, and the applicants' equivalent.

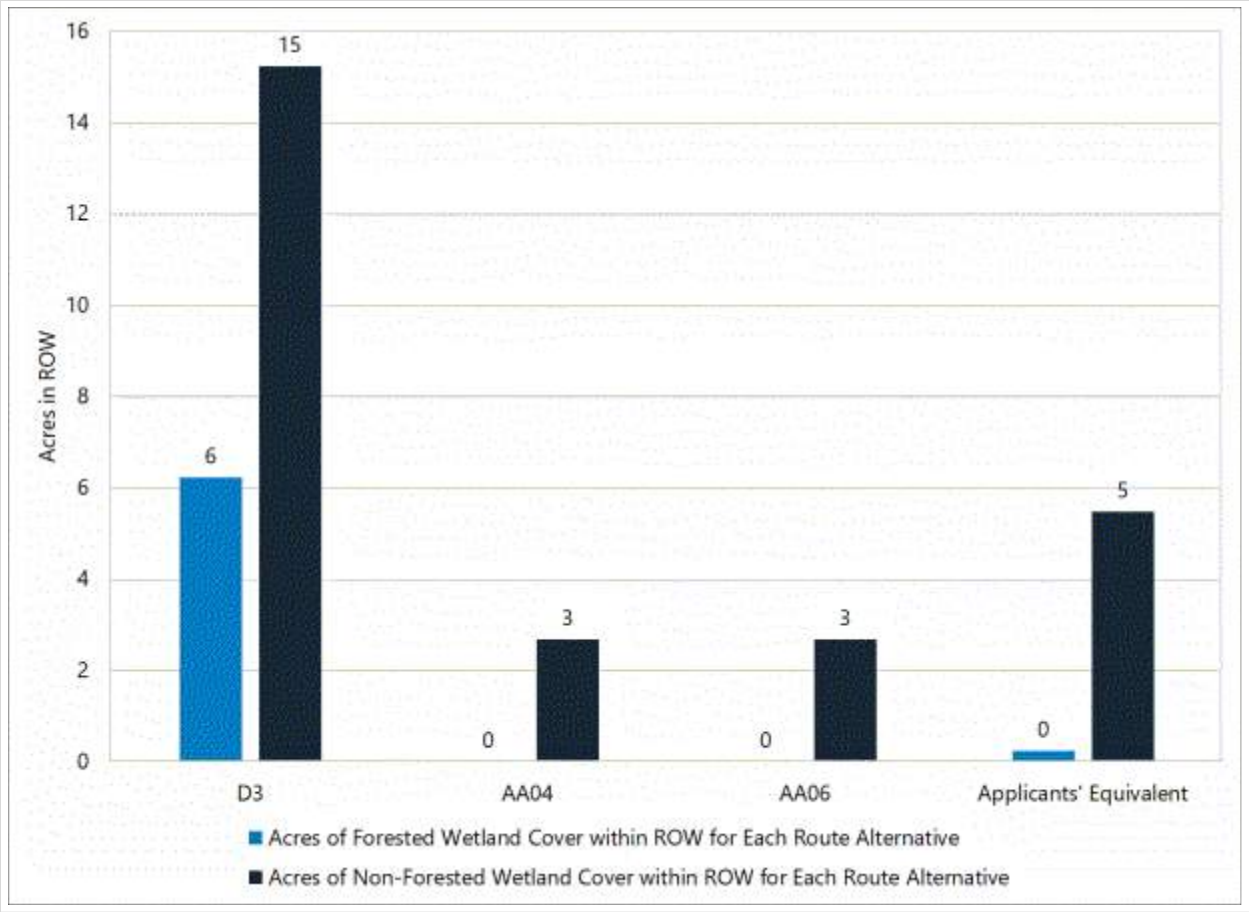
6.3.2.4.1.1 Watercourses and Waterbodies

Route alternative D3 and alignment alternatives AA4 and AA6 and the applicants' equivalent would not cross any watercourses or waterbodies. There would be no direct or indirect impacts to watercourses or waterbodies.

6.3.2.4.1.2 Wetlands

Figure 6-6 identifies the wetland acreage crossed by route alternative D3, alignment alternative AA4, alignment alternative AA6, and the applicants' equivalent. Route alternative D3 would cross more forested and non-forested wetland than alignment alternative AA4, alignment alternative AA6, and the applicants' equivalent. Route alternative D3 would also have two wetland crossings over 1,000 feet in length, which cannot be spanned. Alignment AA4, alignment alternative AA6 and the applicants' equivalent would not have any crossing over 1,000 feet.

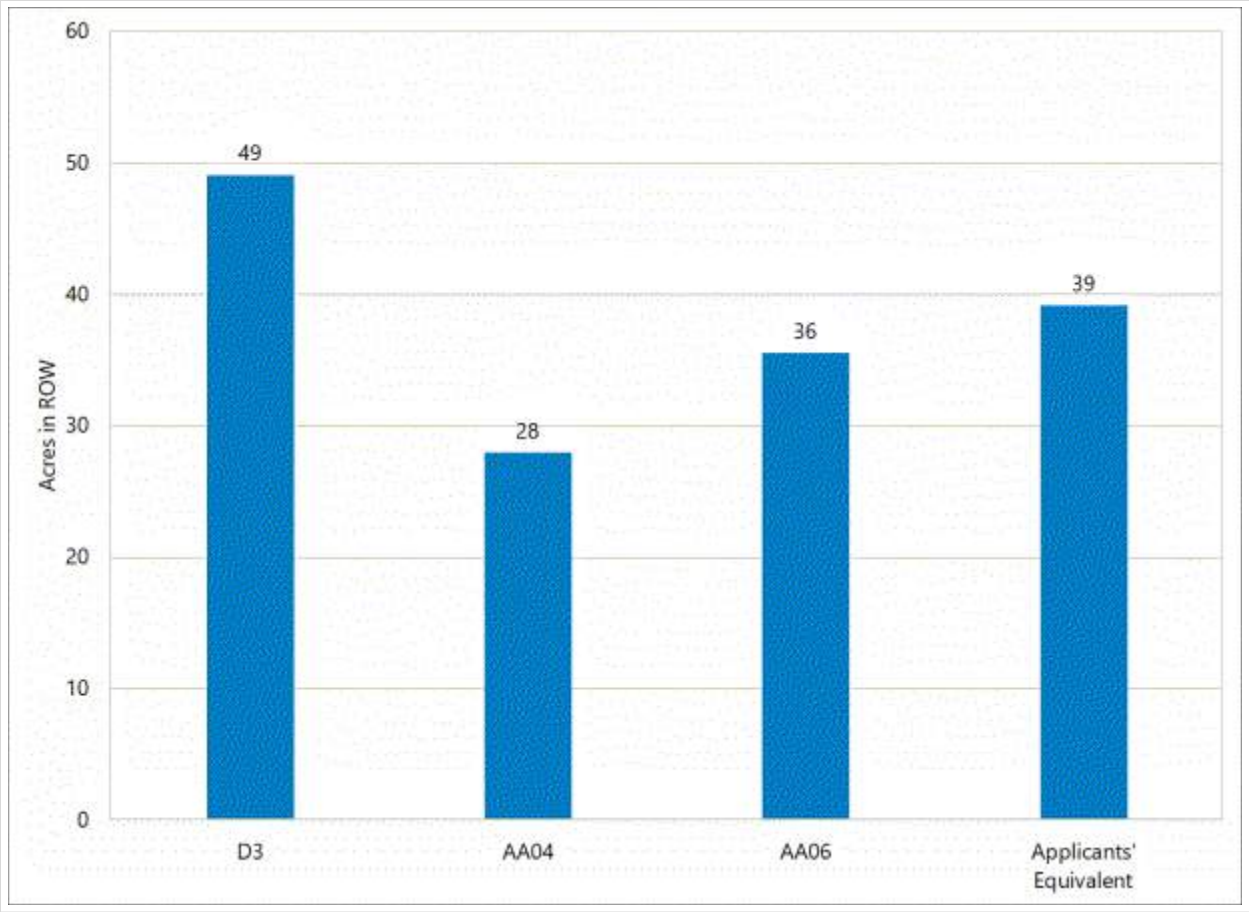
Figure 6-6 Acres of Wetlands Crossed by Route Alternative D3, Alignment Alternatives AA4 and AA6, and the Applicants' Equivalent



6.3.2.4.2 Vegetation

Forested vegetation impacts in the route alternative D3, alignment alternatives AA4 and AA6, and the applicants' equivalent rights-of-way would vary, with route alternative D3 having the most impact on forested vegetation and alignment alternative AA4 impacting the least amount of forested vegetation (Figure 6-7). Alignment alternative AA4 follows an existing transmission line ROW for its entire length, thereby minimizing impacts associated with forest fragmentation. Alignment alternative AA6 and the applicants' equivalent would minimize impacts associated with forest fragmentation by paralleling existing transmission line and/or road rights-of-way for 80 percent and 60 percent of their lengths, respectively. Route alternative D3 would result in the most forest fragmentation, as it is the longest route alternative and does not parallel an existing transmission line or road corridor for any of its length (Map Book 5C).

Figure 6-7 Forested Vegetation in the 150-foot ROW of Route Alternative D3, Alignment Alternatives AA4 and AA6, and the Applicants' Equivalent



6.3.2.4.3 Wildlife

Wildlife habitat impacts would occur for route alternative D3, alignment alternatives AA4 and AA6, and the applicants' equivalent; however, none of these alternatives would traverse areas that are publicly managed or preserved for wildlife. Alignment alternative AA4 would have the least amount of impact on habitat fragmentation or impacts to avian species because it follows an existing transmission line ROW for its entire length. Alignment alternative AA6 and the applicants' equivalent would minimize habitat fragmentation by paralleling existing transmission line and/or road rights-of-way for 80 and 60 percent of their lengths, respectively. Route alternative D3 would result in the most habitat fragmentation because it is the longest and does not parallel any existing rights-of-way. Route alternative D3 would have the most wildlife habitat impacts, while alignment alternative AA4 would have the least amount of wildlife habitat impacts.

6.3.2.5 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 alternative D3, alignment alternatives AA4 and AA6, or the applicants' equivalent. Two state protected species have been documented within 1 mile of all four route alternatives, neither of which have been documented within the ROW or route width of these alternatives (Appendix N). Two

state special concern species have been documented within 1 mile of all four route alternatives (Appendix N).

The route alternative D3, alignment alternatives AA4 and AA6, and the applicants' equivalent rights-of-way would all intersect a DNR SBS ranked moderate, with the route alternative D3 ROW intersecting the most SBS acres (Table 6-58). As shown on Map 6-13, not only would route alternative D3 traverse the most SBS acres, but it would also require the construction of a new transmission line ROW through it, including transmission line structure placement. Alignment alternatives AA6 and the applicants' equivalent would also require new transmission line ROW and structure placement within the SBS, but less than route alternative D3. Alignment alternative AA4 would follow an existing transmission line ROW through the SBS, thereby minimizing new impacts to the SBS.

6.3.2.6 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 routing alternatives.

6.3.2.7 Cost

Costs of the routing 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 6-54). The costs of all routing alternatives, except AA4 are similar. Route alternative D is relatively more expensive due to its length. Alignment alternative AA4, is approximately three to four times more expensive than other routing alternatives due to the double-circuiting of existing lines to make room for along existing transmission line ROW.

6.3.3 Alignment Alternative AA3 – Cole Lake-Riverton Region

Alignment alternative AA3 provides an alternative placement of the applicants' proposed alignment in the northern half of the Cole Lake-Riverton region (Map 6-13). Alignment alternative AA3 would entail double-circuiting two existing transmission lines, which would then allow placement of alignment alternative AA3 within existing transmission line ROW. Potential impacts of alignment alternative AA3 and the applicants' equivalent are summarized in Table 6-58 and shown on Map 6-13.

Table 6-58 Human and Environmental Impacts – Alignment Alternative AA3, Cole Lake-Riverton Region

Resource	Element	Alignment Alternative AA3	Applicants' Equivalent
Length (miles)		4.9	5.1
Human Settlement	Residences within 0-75 feet (count)	0	0
	Residences within 75-250 feet (count)	3	0
	Residences within 250-500 feet (count)	1	4
	Residences within 500–1,000 feet (count)	3	4
Land-Based Economies	Agricultural land in 150-ft ROW	22	3
Water Resources	Total wetlands in 150-foot ROW (acres)	7	13
	Forested wetlands in 150-ft ROW (acres)	<1	2
Vegetation	Forested landcover in 150-foot ROW (acres)	44[1]	79
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	58	75
	Federal-or state-protected species documented in 150-foot ROW (count)	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	4.9 (100)	4.0 (79)
	Roadway (miles, percent)	0 (0)	0 (0)
	Field, parcel, or section lines (miles, percent)	2.0 (41)	2.6 (51)
	Total ROW sharing and paralleling (miles, percent)	4.9 (100)	4.7 (92)
Reliability	Crossing of existing transmission lines (count)	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$55.9-$66.9[2]	$28.5

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.
2 Cost is driven by the need to reconfigure three existing transmission lines with this alignment alternative (base cost of $26.9 million)

Alignment Alternative 3 begins here

This alternative follows existing 230 kV, 115 kV, and 69 kV lines. The alternative combines (double-circuits) the existing 230 kv and 115 kv lines in this area to allow AA3 to use an existing ROW.

Alignment Alternative 3 ends here

Upper Mission
Upper Mission Lake
Upper Mission Lk State Aquatic Management Area (Crow Wing)
Mission Township
Perry Lake Township
Crow Wing State Forest
Center Township
Wolford Township
Crow Wing County
Miller Lake
Black Bear
Black Bear Lake
Trommald
Flynn Lake
Hunter Lake
Menomin Lake
Coles Lake
Miscellaneous
Irondale Township
Pascoe Lake
Little Menomin Lake
June Lake
Cuyuna Country
Ironton
Portage Lake
Little Rabbit
Rabbit River
Black Hoof
Mississippi River

CSAH 19
CSAH 11
CSAH 30
CSAH 34
River Rd
Miller Lake Rd
1st Ave W
STATE PARK RD 31
STATE PARK RD 22
STATE PARK RD 21
T-905
T-308
T-309
T-310

T47 R29
T136 R27
T136 R26
T135 R27
T47 R30
T46 R30
T47 R30
T46 R29
T46 R30
T46 R29

AA3
AA4
AA6
AA6
AA7
D3
D3
E4
E4
E5
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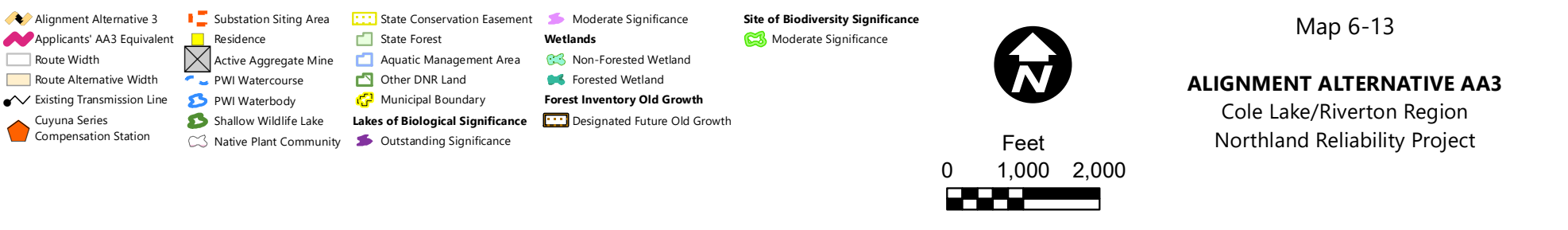


Imagery Source: USDA-FSA-APFO NAIP, 2023

Feet
0 1,000 2,000

Map 6-13

ALIGNMENT ALTERNATIVE AA3
Cole Lake/Riverton Region
Northland Reliability Project

6.3.3.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements, described in Chapter 5.3. For some of the human settlement evaluation 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.

6.3.3.1.1 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 AA3 is shown in Table 6-59, while ROW paralleling and sharing are shown in Table 6-60.

Route alternative AA3 and the applicants' equivalent would have a similar number of residences nearby, but alignment alternative AA3 would entail double-circuiting two existing transmission lines, which would then allow placement of alignment alternative AA3 within existing transmission line ROW. As a result, alignment alternative AA3 minimizes aesthetic impacts to a greater extent than the applicants' equivalent.

Table 6-59 Cole Lake-Riverton Region Proximity of Residences to Alignment Alternative AA3

Residences, Distance from Anticipated Alignment	Alignment Alternative AA3	Applicants' Equivalent
Residences within 0-75 feet	0	0
Residences within 75-250 feet	3	0
Residences within 250-500 feet	1	4
Residences within 500-1,000 feet	3	4
Total Residences within 1,000 feet	7	8

Table 6-60 Cole Lake-Riverton Region ROW Sharing and Paralleling of Alignment Alternative AA3

Infrastructure	Alignment Alternative AA3 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0 (0)
Follows Existing Transmission Line	4.9 (100)	4.0 (79)
Total – Follows Transmission Line, Road, or Railroad	4.9 (100)	4.0 (79)
Follows Field, Parcel, or Section Lines	2.0 (41)	2.6 (51)
Total – ROW Paralleling and Sharing	4.9 (100)	4.7 (92)
Total Length of Route Alternative	4.9	5.1

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.

6.3.3.1.2 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 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 significant long-term 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 alternative AA3 intersects with the city limits of Trommald, which has been identified as an EJC. No adverse or permanent impacts to the identified EJC are anticipated. While alignment alternative AA3 does intersect an EJC, this community is not anticipated to experience disproportionately adverse impacts as a result of the project.

6.3.3.2 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 active mining operations within the ROW of alignment alternative AA3 or the ROW of the applicants' equivalent. Therefore, potential project impacts to mining would be minimal and independent of the route selected.

6.3.3.2.1 Agriculture

Agricultural land impacts differ between the 150-foot ROW of alternative alignment AA3 and the applicants' equivalent. Alternative alignment AA3 ROW follows an existing transmission line ROW; thus, there will be no new impacts to agricultural lands for AA3. Accordingly, AA3 best minimizes agricultural impacts.

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 ROW of alternative alignment AA3 or the applicants' equivalent.

6.3.3.2.2 Forestry

Impacts to forestry within the Cole Lake-Riverton region were assessed through an evaluation of the designated forestry resources within the 150-foot ROW (Chapter 5.8.2). Forested land comprises approximately 44 acres of the ROW of route alternative AA3 and 79 acres of the ROW of the applicants' equivalent (reference (108)). The forested land is comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands within this region (Map Book 5C). However, it is important to note that while the NLCD indicates forested vegetation is in the alignment alternative AA3 ROW, this ROW consists of an existing transmission line ROW that has been cleared and is routinely maintained. Alignment alternative AA3 and the applicants' equivalent both cross Crow Wing State Forest.

As shown in Table 6-61, the designated forestry resources within the 150-foot ROW of the alignment alternative consist of DNR state forest land and Minnesota School Trust Land. There are no Forests for the Future lands within the ROW of alignment alternative AA3 or the applicants' equivalent.

Table 6-61 Designated Forestry Resources within the 150-foot ROW of Alignment Alternative AA3

Forestry Resources	Alignment Alternative AA3	Applicants' Equivalent
Acres of DNR State Forest within 150-foot ROW	1	69
Acres of Minnesota School Trust Land[1] within 150-foot ROW	5	11

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).

As alignment alternative AA3 follows an existing transmission line ROW, it would have significantly fewer impacts to forestry resources.

6.3.3.2.3 Recreation and Tourism

Recreation and tourism activities within the Cole Lake-Riverton region include outdoor recreational activities and camping opportunities on state managed lands, 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 alternative AA3 and applicants' equivalent route traverse Crow Wing State Forest and have minimal trail crossings (Map Book 5C). Trail crossings among the route alternatives occur in areas where the alternative parallels existing transmission lines; thus, permanent impacts to resources in this area would be minimal. Alignment alternative AA3 follows an existing transmission line ROW, reducing permanent impacts to recreational opportunities in Crow Wing State Forest. In comparison, the applicants' equivalent in this area includes a portion of the route which does not parallel an existing

transmission line, which could result in permanent impacts to recreation and tourism by altering aesthetics and noise in the vicinity. Temporary impacts as a result of all of alignment alternative AA3 and applicants' equivalent could include trail closings during construction and temporary interruptions in recreational opportunities within the Crow Wing State Forest (Chapter 5.8.4.1). Although temporary impacts would occur, they are expected to have a minimal impact on recreation.

6.3.3.3 Archaeological and Historic Resources

There are no documented archaeological or historic architectural resources within the route width of alignment alternative AA3 and the applicants' equivalent. As a result, impacts to cultural resources are anticipated to be minimal and independent of the route selected.

6.3.3.4 Natural Environment

6.3.3.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This route alternative comparison discussion addresses watercourses and waterbodies and wetlands. Map 6-13 shows the water resources along alignment alternative AA3.

6.3.3.4.1.1 Watercourses and Waterbodies

There are no watercourses or waterbodies crossed by alignment alternative AA3 or the applicants' equivalent.

6.3.3.4.1.2 Wetlands

Table 6-58 identifies the acreage of wetlands crossed by alternative alignment AA3 and the applicants' equivalent. The applicants' equivalent would cross more forested and non-forested wetland than alignment alternative AA3. Alignment alternative AA3 and the applicants' equivalent would not have any wetland crossing over 1,000 feet; as such, wetlands are anticipated to be spanned.

6.3.3.4.2 Vegetation

Alignment alternative AA3 would impact significantly less forested vegetation than the applicants' equivalent. Alignment alternatives AA3 follows an existing transmission line ROW that has already been cleared of forested vegetation and is maintained in this condition. The applicants' equivalent parallels an existing transmission line ROW for approximately 79 percent of its length and would fragment a densely forested area where it does not parallel this ROW (Map Book 5C).

6.3.3.4.3 Wildlife

Alignment alternative AA3 would have less impact on wildlife habitat because it follows an existing transmission line ROW for its entire length. The applicants' equivalent would not only permanently remove more forested habitat, but it would also fragment habitat by establishing a new transmission line ROW for approximately 21 percent of its length.

6.3.3.5 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 AA3 or the applicants' equivalent. Four state-protected species have been documented within 1 mile of alignment alternative AA3 and the applicants' equivalent, none of which

have been documented within the ROW of either alternative (Appendix N). Several state special concern species have been documented within 1 mile of alignment alternative AA3 and the applicants' equivalent (Appendix N).

The ROW of alignment alternative AA3 and the applicants' equivalent would all intersect a DNR SBS ranked moderate, with the ROW of AA3 intersecting 58 acres and the applicants' equivalent intersecting 75 acres. As shown on Map 6-13, alignment alternative AA3 would follows an existing transmission line ROW through the SBS, while the applicants' equivalent would require the construction of a new transmission line ROW through a portion of the SBS, including the placement of several transmission line structures within it.

6.3.3.6 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.

6.3.3.7 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 6-58). Alignment alternative AA03, would cost between approximately $55 million and $66 million due to the need to double-circuit existing transmission lines. By comparison, the applicants' equivalent would cost approximately $28 million, making it the less expensive option between these two route alternatives.

6.3.4 Route Alternatives E1 through E5 - Cole Lake-Riverton Region

Route alternatives E1 through E5 provide different options to the applicants' equivalent in the central part of the Cole Lake-Riverton region. Route alternative E1 is shifted from the applicants' equivalent to avoid impacts to the Cuyuna County State Recreation Area by double-circuiting two existing transmission lines, which would then allow placement of route alternative E1 within existing transmission line ROW. Route alternative E2 is shifted from the applicants' equivalent to avoid impacts to public water accesses by using land owned by the applicants. Route alternative E2 would share existing transmission line ROW for a portion of its length (approximately 2.6 miles). Route alternative E3 is shifted from the applicants' equivalent to avoid private property and is, for the most part, a shorter version of route alternative E1. Route alternatives E4 and E5 are shifted from the applicants' equivalent to avoid impacts to Hay Lake. Route alternative E4 would share existing transmission line ROW for approximately 8 of its 11 miles. Route alternative E5 was proposed as a shorter alternative to route alternative E4. It would share existing transmission line ROW for approximately 6 of its 8 miles. Potential impacts of the routing alternatives and the applicants' equivalent are summarized in Table 6-62 and shown on Map 6-14 and Map 6-15.

Table 6-62 Human and Environmental Impacts – Route Alternatives E1 through E5, Cole Lake-Riverton Region

Resource	Element	Route Alternative E1	Route Alternative E2	Route Alternative E3	Route Alternative E4	Route Alternative E5	Applicants' Equivalent
Length (miles)		10.2	10.7	11.1	11.2	11.4	11.0
Human Settlement	Residences within 0-75 feet (count)	0	0	2	3	3	1
	Residences within 75-250 feet (count)	8	7	8	8	8	2
	Residences within 250-500 feet (count)	21	11	16	13	10	10
	Residences within 500–1,000 feet (count)	23	26	31	20	17	25
Land-Based Economies	Agricultural land in 150-ft ROW	33	6	20	12	13	9
Water Resources	Total wetlands in 150-foot ROW (acres)	53	71	52	63	54	76
	Forested wetlands in 150-ft ROW (acres)	3	10	5	8	7	13
Vegetation	Forested landcover in 150-foot ROW (acres)	88[1]	131	127[1]	127	137	136
Wildlife	Wildlife Management Area in 150-foot ROW (acres)	4	4	1	4	4	0
	Shallow Wildlife Lake in 150-foot ROW (acres)	0	0	0.2	0	0	0

Resource	Element	Route Alternative E1	Route Alternative E2	Route Alternative E3	Route Alternative E4	Route Alternative E5	Applicants' Equivalent
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	61	63	83	62	63	84
	Native Plant Communities in 150-foot ROW (acres)	0	0	18	0	0	18
	Lake of Biological Significance in 150-foot ROW (acres)	3	0	3	0	0	0
	Federal- or state-protected species documented in 150-foot ROW (count)	1	1	1	1	1	1
ROW Sharing and Paralleling	Transmission line (miles, percent)	10.2 (100)	5.9 (55)	7.5 (68)	10.0 (89)	9.4 (83)	3.2 (29)
	Roadway (miles, percent)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Field, parcel, or section lines (miles, percent)	1.9 (19)	4.0 (37)	4.6 (41)	0 (0)	1.9 (17)	7.9 (71)
	Total ROW sharing and paralleling (miles, percent)	10.2 (100)	7.9 (74)	10.1 (92)	10.0 (89)	9.4 (83)	9.2 (83)
Reliability	Crossing of existing transmission lines (count)	0	0	0	6	6	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$118.7-$145.7[2]	$59.3	$118.5-$145.5[3]	$75.7[4]	$76.6[5]	$61.1[6]

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.
2 Cost is driven by the need to reconfigure and remove up to thirteen existing transmission lines, underground three distribution lines, and retire and relocate one substation with this route alternative (base cost of $56.7 million)
3 Cost is driven by the need to reconfigure and remove up to thirteen existing transmission lines, underground three distribution lines, and retire and relocate one substation with this route alternative (base cost of $61.5 million). In addition, this route alternative may require residential displacement. There is no way to estimate the displacement cost at this time.
4 This route would require crossing six existing lines. Two heavy-angle structures would also be needed for an additional cost of approximately $740,000 per structure ($62.2 million base cost). In addition, this route alternative may require residential displacement. There is no way to estimate the displacement cost at this time.
5 This route would require crossing six existing lines. Two heavy-angle structures would also be needed for an additional cost of approximately $740,000 per structure ($63.1 million base cost). In addition, this route alternative may require residential displacement. There is no way to estimate the displacement cost at this time.
6 This route alternative may require residential displacement. There is no way to estimate the displacement cost at this time.

Route Segments E1 - E5 begin here

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.

Route alternative E1 follows existing 230 kV and 115 kV lines. This alternative would combine (double-circuit) these lines in this area to allow E1 to use an existing ROW.

Riverton Substation

Imagery Source: USDA-FSA-APFO NAIP, 2023

- Route Segment E1
- Route Segment E2
- Route Segment E3
- Route Segment E4
- Route Segment E5
- Applicants' Route E Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Riverton Substation
- Cuyuna Series Compensation Station
- Substation Siting Area
- Residence
- Active Aggregate Mine
- PWI Watercourse
- PWI Waterbody
- Shallow Wildlife Lake
- Native Plant Community
- State Conservation Easement
- Wildlife Management Area
- State Forest
- Other DNR Land
- Municipal Boundary

Lakes of Biological Significance
- Outstanding Significance
- Moderate Significance

Wetlands
- Non-Forested Wetland
- Forested Wetland

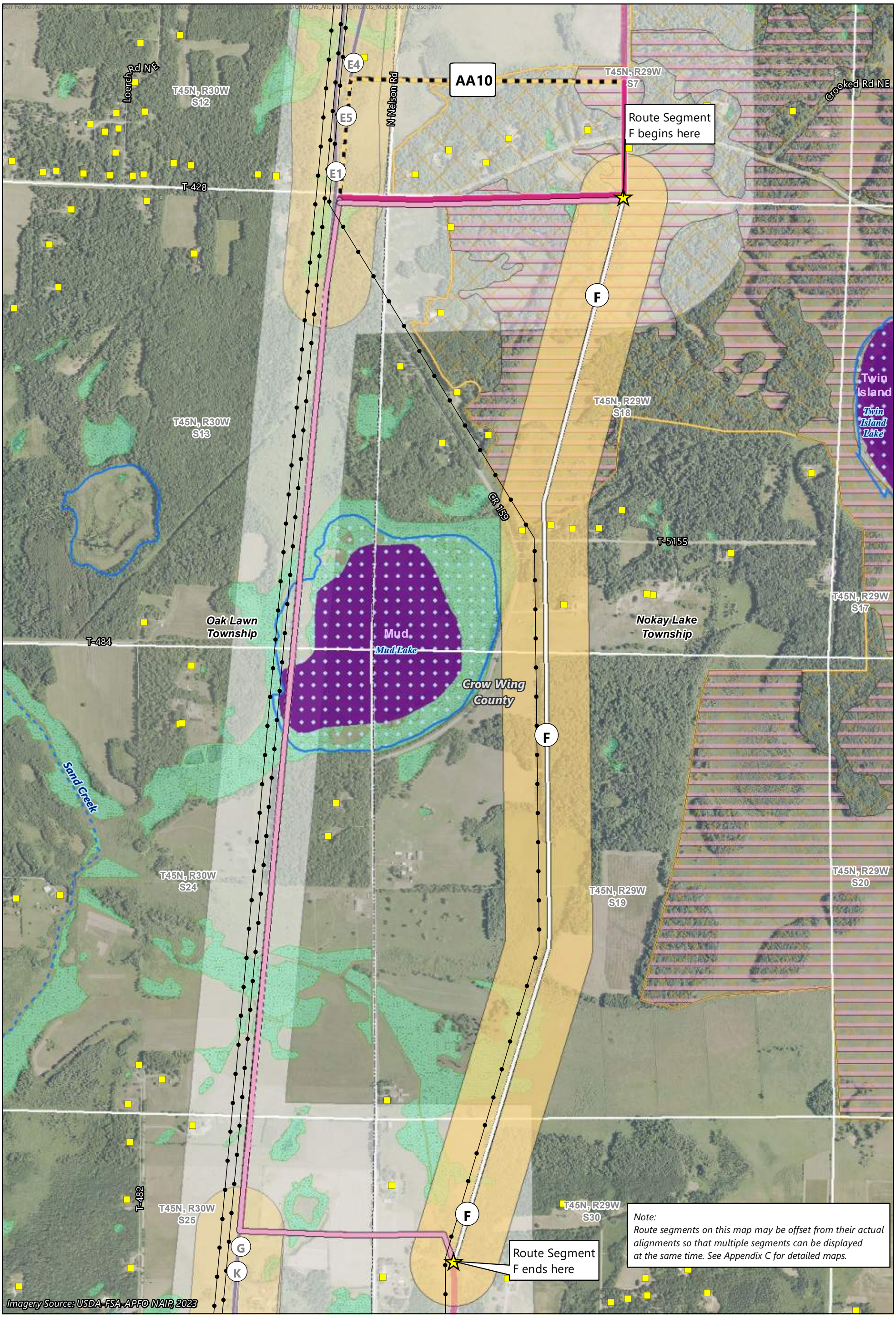
Forest Inventory Old Growth
- Designated Old Growth
- Designated Future Old Growth
- Candidate Old Growth

Site of Biodiversity Significance
- High Significance
- Moderate Significance

Feet
0 1,000 2,000

Map 6-14

ROUTE ALTERNATIVES E1 - E5 (PART 1)
Cole Lake/Riverton Region
Northland Reliability Project



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.

- Route Segment F
- Applicants' Route F Equivalent
- Alignment Alternative 10
- Applicants' AA10 Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Residence
- PWI Watercourse
- PWI Waterbody
- Shallow Wildlife Lake
- Native Plant Community

Lakes of Biological Significance
- Outstanding Significance

Wetlands
- Non-Forested Wetland

Site of Biodiversity Significance
- High Significance

Feet
0 500 1,000

Map 6-16

ROUTE ALTERNATIVE F AND ALIGNMENT ALTERNATIVE AA10
Cole Lake/Riverton Region
Northland Reliability Project

6.3.4.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements, described in Chapter 5.3. 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, and zoning and land use.

6.3.4.1.1 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 route alternatives E1 through E5 are shown in Table 6-63, while ROW paralleling and sharing are shown in Table 6-64.

There are 57 residences located within 1,000 feet of route alternative E3, 52 residences within 1,000 feet of route alternative E1, 44 residences each within 1,000 feet of route alternatives E2 and E4, and 38 residences each within 1,000 feet of route alternative E5 and the applicants' equivalent. Thus, for proximity to residences, route alternative E5 and the applicant's equivalent best minimize aesthetic impacts.

Route alternatives E1 and E3 involve double-circuiting two existing transmission lines, which would then allow placement of these route alternatives within existing transmission line ROW. Route alternative E1 follows the existing transmission line ROW for the entirety of its length. Thus, based on ROW sharing and paralleling, route alternative E1 best minimizes aesthetic impacts.

Table 6-63 Cole Lake-Riverton Region Proximity of Residences to Route Alternatives E1 through E5

Residences, Distance from Anticipated Alignment	Route Alternative E1	Route Alternative E2	Route Alternative E3	Route Alternative E4	Route Alternative E5	Applicants' Equivalent
Residences within 0-75 feet	0	0	2	3	3	1
Residences within 75-250 feet	8	7	8	8	8	2
Residences within 250-500 feet	21	11	16	13	10	10
Residences within 500-1,000 feet	23	26	31	20	17	25
Total Residences within 1,000 feet	52	44	57	44	38	38

Table 6-64 Cole Lake-Riverton Region ROW Sharing and Paralleling of Route Alternatives E1 through E5

Infrastructure	E1 miles (percent)	E2 miles (percent)	E3 miles (percent)	E4 miles (percent)	E5 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Follows Existing Transmission Line	10.2 (100)	5.9 (55)	7.5 (68)	10.0 (89)	9.4 (83)	3.2 (29)
Total – Follows Transmission Line, Road, or Railroad	10.2 (100)	5.9 (55)	7.5 (68)	10.0 (89)	9.4 (83)	3.2 (29)
Follows Field, Parcel, or Section Lines	1.9 (19)	4.0 (37)	4.6 (41)	0 (0)	1.9 (17)	7.9 (71)
Total – ROW Paralleling and Sharing	10.2 (100)	7.9 (74)	10.1 (92)	10.0 (89)	9.4 (83)	9.2 (83)
Total Length of Routing Alternative	10.2	10.7	11.1	11.2	11.4	11.0

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.

6.3.4.1.2 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 any of the route alternatives described in this Chapter. However, route alternatives E3, E4, E5, and the applicants' equivalent all have permanent residential buildings located within their 150-foot ROW. All route alternatives except E1 have non-residential buildings (storage shed, agricultural outbuildings, etc.) located within their rights-of-way (Table 6-65).

Table 6-65 Residential and Non-Residential Buildings within Route Alternative ROW

	Route Alternative E1	Route Alternative E2	Route Alternative E3	Route Alternative E4	Route Alternative E5	Applicants' Equivalent
Number of Residential Buildings	0	0	2	3	3	1
Number of Non-Residential Buildings	0	5	2	5	5	1

All residential buildings located with the ROW of route alternatives E3, E4, E5, and the applicants' equivalent could potentially be displaced. Similarly, the non-residential buildings in the ROW of these route alternatives 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.

6.3.4.1.3 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 significant long-term 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. Route alternatives E1, E2, E3, and E5 intersect with the city limits of Trommald; route alternatives E1, E2, and E3 intersect with the city limits of Riverton. Trommald and Riverton both have been identified as communities with EJCs. No adverse or permanent impacts to the identified communities with EJC are anticipated. While these routing alternatives do intersect EJCs, these communities are not anticipated to experience disproportionately adverse impacts as a result of the project.

6.3.4.2 Land-Based Economies

Potential project impacts to land-based economies are assessed through an evaluation of several elements, summarized in Chapter 6.1.1. Potential impacts to recreation and tourism are assessed by looking at various elements of these opportunities as outlined in Chapter 5.8.4.

6.3.4.2.1 Agriculture

Agricultural impacts differ between the 150-foot ROW route alternatives E1 through E5 and the applicants' equivalent. Route alternative E2 includes the least amount (6 acres) of agricultural land in the ROW. Route alternative E1 has the most amount (33 acres) of agricultural land in the ROW. However, route alternatives E1 and E3 follow existing transmission line ROW for all or part of their length. Thus, these alternatives introduce no new agricultural impacts in these areas. Accordingly, they best minimize agricultural impacts.

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 ROW of the route alternatives or the applicants' equivalent.

6.3.4.2.2 Forestry

Impacts to forestry within the Cole Lake-Riverton region were primarily assessed by evaluating the designated forestry resources within the 150-foot ROW (Chapter 5.8.2) of each route alternative. Forested land comprises approximately 88 acres of the ROW of route alternative E1, the least among routing alternatives in this area Route alternative E5 contains the greatest amount of forestry resources with 137 acres (reference (108)). The forested land is comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands within this region (Map Book 5C). Route alternative E4 and the applicants' equivalent both cross Crow Wing State Forest. However, it is important to note that while the NLCD indicates forested vegetation is in the route alternative E1 and E3 ROW, this ROW consists of an existing transmission line ROW that has been cleared and is routinely maintained.

As shown in Table 6-66, the designated forestry resources within the ROW of the route alternatives consist of DNR state forest land and Minnesota School Trust Land. There is no Forests for the Future land within the ROW of the route alternatives or the applicants' equivalent.

Table 6-66 Designated Forestry Resources within the 150-foot ROW of Route Alternatives E1 Through E5

Forestry Resources	Route Alternative E1	Route Alternative E2	Route Alternative E3	Route Alternative E4	Route Alternative E5	Applicants' Equivalent
Acres of DNR state forest within 150-foot ROW	32	32	32	35	32	32
Acres of Minnesota School Trust Land[1] within 150-foot ROW	15	11	6	14	15	2

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).

Because route alternatives E1 and E3 follow existing transmission line ROW for all or part of their length, they best minimize impacts to forestry resources. The existing ROW has already been cleared of forested vegetation and is maintained in this condition. Thus, route alternatives E1 and E3 minimize new forestry impacts.

6.3.4.2.3 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.

Based on aerial imagery review, there are two active aggregate mines, unnamed mine 1 and unnamed mine 2, within the 150-foot ROW of route alternatives E1, E3, E4, and E5 in the Cole Lake-Riverton Region (Map Book 5D). The 150-foot ROW of route alternative E3 passes along the eastern edge of unnamed mine 1, while the 150-foot ROW for route alternative E5 borders the west side of this mine. The 150-foot ROW for route alternatives E1, E3, E4, and E5 all pass through unnamed mine 2. There is an existing transmission line ROW that passes through this area, which would reduce impacts from E1 due to ROW following. As discussed in Chapter 5.8.3, construction of a transmission line could impact 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 route alternatives and applicants' equivalent pass through the eastern edge of unnamed mine 1, which may result in fewer impacts. While impacts to unnamed mine 2 from route alternative E1 would be minimal due to co-location, route alternatives E3, E4, and E5 may be more impactful since a new ROW through the aggregate mine would be required.

6.3.4.2.4 Recreation and Tourism

Route alternatives E1 and E3 would cross through the northwest corner of a portion of the Cuyuna Country State Recreation Area; however, these alternatives would cross the state recreation area within

existing transmission line ROW. 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, only minor impacts to the Cuyuna Country State Recreation Area are anticipated. Route alternatives E2, E4, E5, and the applicants' equivalent would not cross the Cuyuna Country State Recreation Area.

6.3.4.3 Archaeological and Historic Resources

Six previously documented cultural resources are located within the 1,000-foot route width of route alternatives E1, E3, and E5. Five previously documented cultural resources are located in the route width of route alternatives E2, E4, and the applicants' equivalent (Table 6-67), as shown on Map Book 5F.

Table 6-67 Cultural Resources within the Route Width of Route Alternatives E1 through E5 and the Applicants' Equivalent

Resource Number	Resource Type	NRHP Eligibility	Location
21CW0176	Rowe Mine Concentration Plant and Railroad Grade	Eligible	route alternative E1, route alternative E3
21CW0184	Precontact lithic scatter	Not evaluated	route alternative E4 route alternative E5
21CWy	Rabbit River Mission (Precontact artifact scatter)	Not evaluated	route alternative E1, route alternative E2, route alternative E3, route alternative E5, applicants' equivalent
CW-XXX-00001	Cuyuna Iron Range Historic Mining Landscape District	Eligible	route alternative E1, route alternative E2, route alternative E3, route alternative E4 route alternative E5, applicants' equivalent
XX-ROD-00153	Trunk Highway 210	Not Eligible	route alternative E1, route alternative E2, route alternative E3, route alternative E4 route alternative E5, applicants' equivalent
XX-RRD-NPR007	RR ROW between LS&M/StP&D main line at Carlton, and ND State Line at Moorhead (Duplicate Recordation)	Eligible	route alternative E1, route alternative E2, route alternative E3, route alternative E4 route alternative E5, applicants' equivalent
XX-RRD-NPR021	RR ROW between LS&M/StP&D main line at Carlton, and ND State Line at Moorhead (Duplicate Recordation)	Eligible	route alternative E1, route alternative E2, route alternative E3, route alternative E4 route alternative E5, 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. Several of the cultural resources located within the 1,000-foot route width of the E alternatives are eligible for the NRHP. Resource CW-XXX-00001 consists of the Cuyuna Iron Range Historic Mining landscape. The route width of all six route alternatives cross a portion of this resource where an existing transmission line is present. Due to paralleling an existing transmission line, the route alternatives do not have the potential to alter that resource's setting, feeling, appearance, and/or association. The same is true for historic architectural resource XX-RRD-NPR007/ XX-RRD-NPR021. Each of the six route alternatives cross this resource within an existing transmission line ROW; therefore, the route alternatives do not have the potential to alter that resource's setting, feeling, appearance, and/or association.

Archaeological sites 21CW0176, 21CW0184, and 21CWy may also 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 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 alternatives E1 and E3 have the most potential to impact a significant cultural resource – NRHP-eligible archaeological site 21CW0176.

6.3.4.4 Natural Environment

6.3.4.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This route alternative comparison discussion addresses watercourses and waterbodies and wetlands. Map 6-14 and Map 6-15 shows the water resources along the route alternatives E1 through E5 and the applicants' equivalent.

6.3.4.4.1.1 Watercourses and Waterbodies

Table 6-68 identifies watercourses and waterbodies crossed by route alternative E1 through E5 and the applicants' equivalent. Route alternative E1 would minimize impacts associated with new water crossings by utilizing the existing transmission line ROW. Route alternative E2 is the only route that would cross Hay Lake, which would require the placement of transmission structures within the lake. Route alternative E3 would cross less watercourses and waterbodies then the other route alternatives. Route alternative E4 and E5 would avoid impacts to Hay Lake; however, they would both cross the Mississippi River at two separate locations.

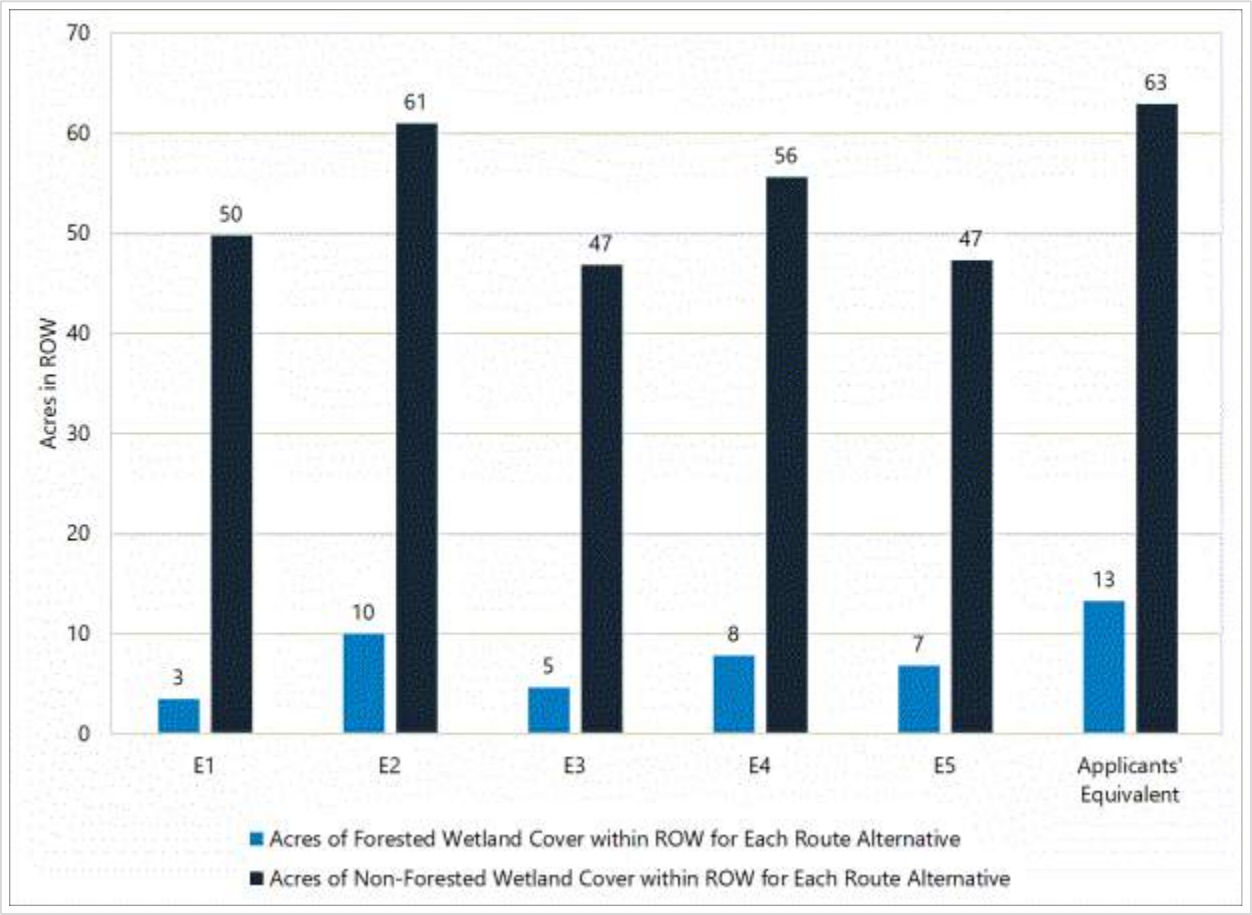
Table 6-68 Watercourses and Waterbodies Crossed by Route Alternatives E1 Through E5

Resources	Route Alternative E1	Route Alternative E2	Route Alternative E3	Route Alternative E4	Route Alternative E5	Applicants' Equivalent
Number of NHD stream crossings	5	7	4	6	5	6
Number of impaired stream crossings	0	0	0	2	2	0
Number PWI stream crossings	2	5	2	3	3	5
Number of NHD lake crossings	1	6	1	3	1	1
Number of impaired lake crossings	1	0	1	0	0	0
Number of PWI basin crossings	1	3	1	1	0	3

6.3.4.4.1.2 Wetlands

Figure 6-8 identifies the acreage of wetlands crossed by route alternatives E1 through E5 and the applicants' equivalent. The applicants' equivalent would cross more forested and non-forested wetland than route alternative E1 through E5. Route alternative E1 would cross the least amount of forested wetlands, and route alternatives E3 and E5 would cross the least amount of non-forested wetlands. The applicants' equivalent would have seven wetland crossings over 1,000 feet, and route alternatives E1, E3, and E5 would have five wetland crossings over 1,000 feet. Crossing over 1,000 feet in length would require placing one or more transmission structures in wetlands.

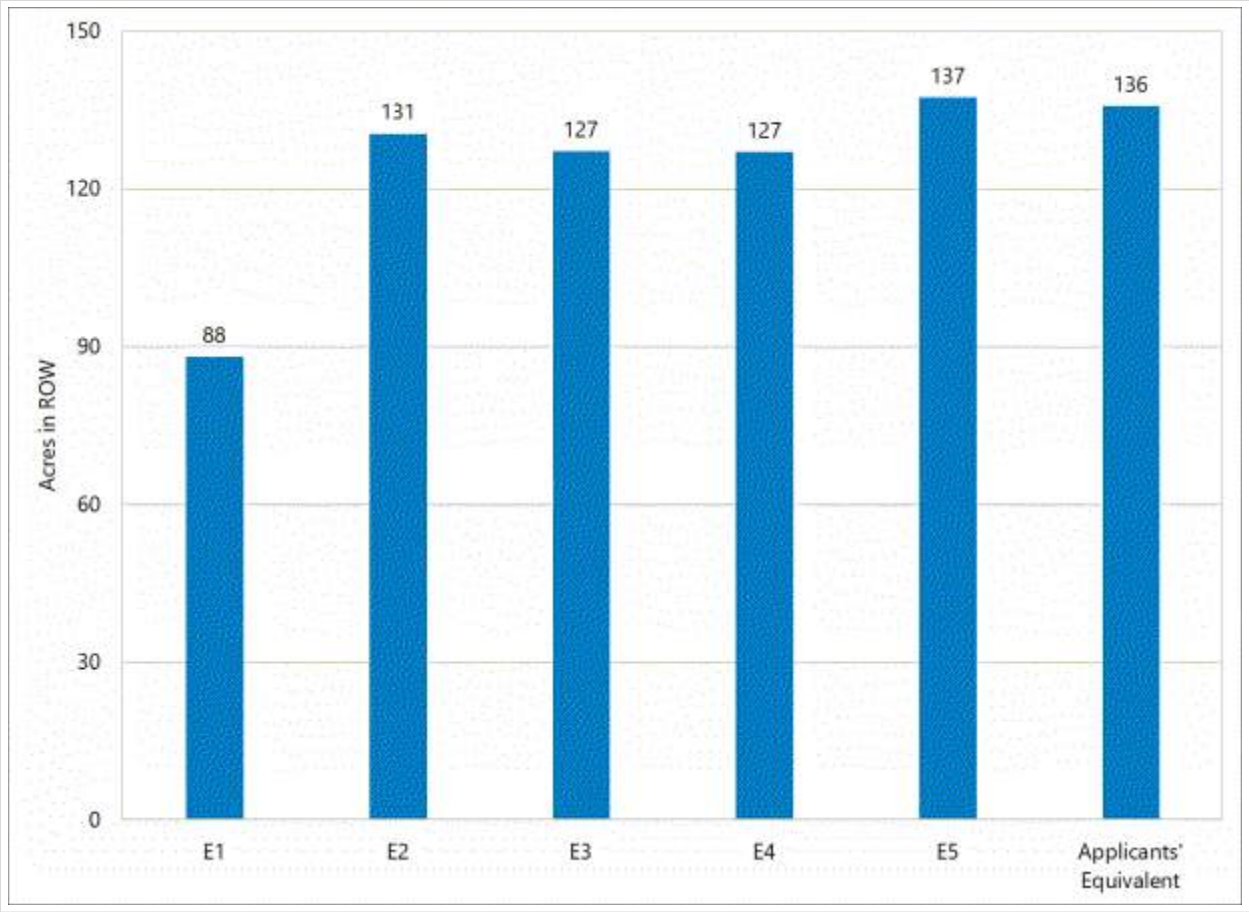
Figure 6-8 Acres of Wetlands Crossed by Route Alternatives E1 Through E5



6.3.4.4.2 Vegetation

Route alternative E1 would have less impact on forested vegetation in the ROW compared to route alternatives E2 through E5 and the applicants' equivalent, all of which would impact similar amounts of forested vegetation (Figure 6-9). Because route alternative E1 follows an existing transmission line ROW, no new impacts to forested vegetation would occur along this alternative. In addition, because route alternative E1 would be co-located with an existing transmission line for its entire length, it would minimize impacts associated with forest fragmentation. The applicants' equivalent would result in the most forest fragmentation because it only parallels an existing transmission line ROW for approximately 29 percent of its length, while route alternatives E2 through E5 would parallel existing transmission lines for over half of their lengths.

Figure 6-9 Forested Vegetation in the 150-foot ROW of Route Alternatives E1 though E5 and the Applicants' Equivalent



6.3.4.4.3 Wildlife

Impacts to wildlife habitat would occur for route alternatives E1 though E5 and the applicants' equivalent. However, route alternative E1 would minimize impacts associated with habitat fragmentation by following existing transmission line ROW for its entire length, while the applicants' equivalent would result in the most habitat fragmentation by paralleling the least amount of transmission line ROW. As such, the potential for impacts to avian species could be highest with the applicants' equivalent and lowest for route alternative E1. However, as discussed in Chapter 5.10.5.2, avian impacts can be minimized through use of bird flight diverters.

All route alternatives except the applicants' equivalent would traverse the Loerch WMA; however, they would do so while paralleling an existing transmission line ROW, thereby minimizing impacts (Map 6-14 and Map 6-15). The ROW of route alternative E3 would traverse the edge of Spruce Lake, a DNR-identified shallow wildlife lake (Map 6-14 and Map 6-15). However, potential impacts to wildlife associated with the shallow lake would be minimized because route alternative E3 would parallel existing transmission line ROW in this area.

6.3.4.5 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 E1 through E5 or the applicants' equivalent. Between four and six state protected species have been documented within 1 mile of all route alternatives and the applicants' equivalent. One of these species, the state threatened Blanding's turtle, has been documented within the ROW of all route alternatives and the applicants' equivalent (Appendix N). Several state special concern species have been documented within 1 mile of all route alternatives and the applicants' equivalent (Appendix N).

The ROW of route alternatives E1 through E5 and the applicants' equivalent would intersect DNR SBS, with the ROW of route alternative E3 and the applicants' equivalent having the greatest impact (Table 6-3). As shown on Map 6-14 and Map 6-15, the ROW for all route alternatives would traverse the SBS ranked moderate by paralleling an existing transmission line ROW, thereby minimizing impacts to this resource. However, the ROW of route alternative E3 and the applicants' equivalent would require the establishment of a new transmission line ROW through an SBS ranked high and the native plant communities mapped within them (Table 6-69; Map 6-14 and Map 6-15). The ROW of route alternatives E1 and E3 would traverse Little Rabbit Lake, a DNR Lake of Biodiversity Significance (Map 6-14 and Map 6-15). However, potential impacts to wildlife associated with this Lake of Biodiversity Significance would be minimized because both route alternatives would follow existing transmission line ROW in this area.

Table 6-69 Acres of Sensitive Ecological Resources in 150-foot ROW for Route Alternatives E1 through E5 and the Applicants' Equivalent

Sensitive Ecological Resource	Route Alternative E1	Route Alternative E2	Route Alternative E3	Route Alternative E4	Route Alternative E5	Applicants' Equivalent
Sites of Biodiversity Significance	61 acres ranked moderate	63 acres ranked moderate	83 total acres; 21 acres ranked high; 62 acres ranked moderate	62 acres ranked moderate	63 acres ranked moderate	84 total acres; 22 acres ranked high; 62 acres ranked moderate
Native Plant Communities	0 acres	0 acres	18 acres - conservation status S3-S5	0 acres	0 acres	18 acres - conservation status S3-S5
Lake of Biological Significance	3 acres - ranked moderate	0 acres	3 acres - ranked moderate	0 acres	0 acres	0 acres

6.3.4.6 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.

Route alternatives E4 and E5 would each require six transmission line crossings, thereby introducing increased reliability concerns for these two route alternatives. Route alternatives E1, E2, E3, and the applicants' equivalent would require no transmission line crossings.

6.3.4.7 Cost

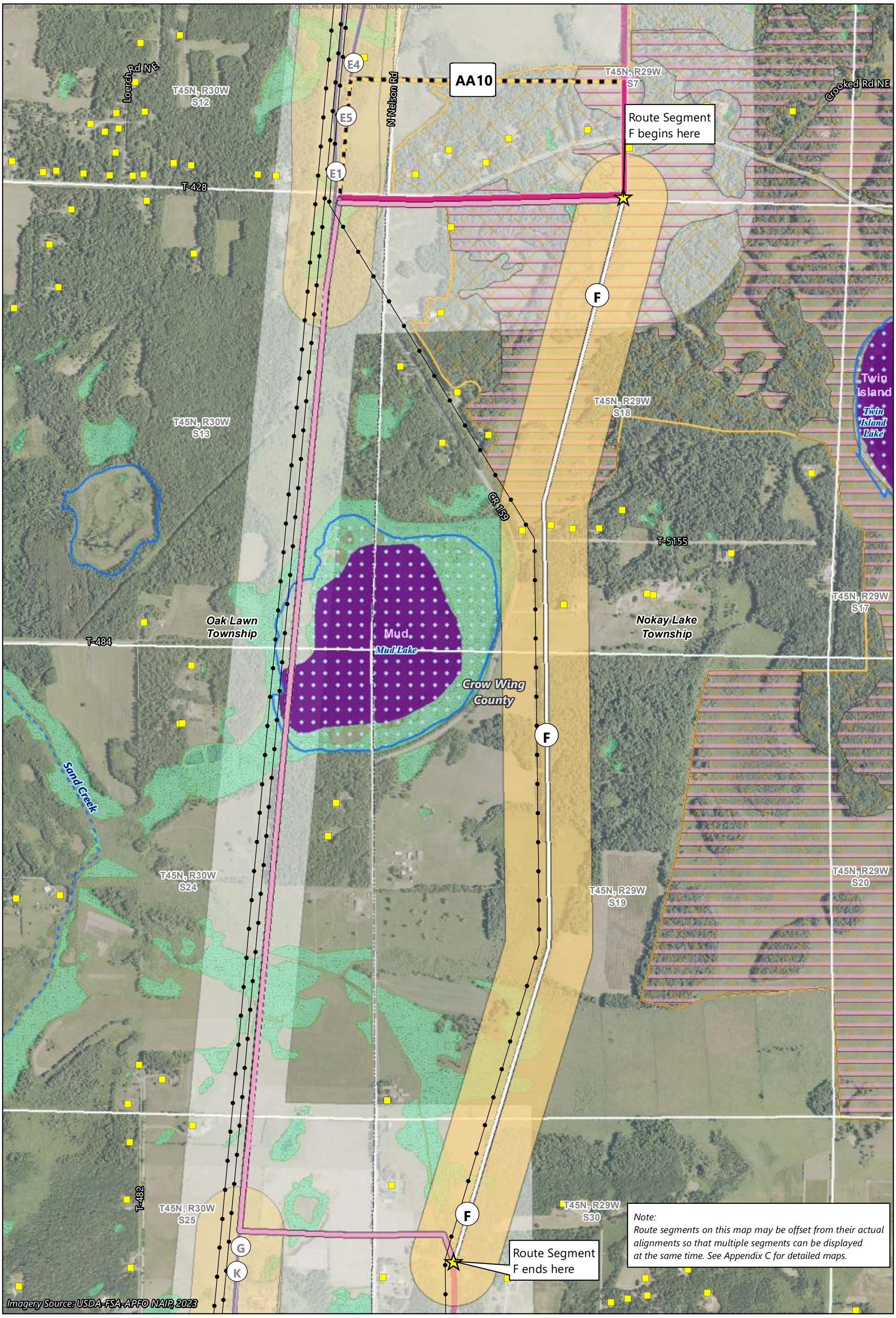
Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-62). Route alternatives E1 through E5 plus the applicants' equivalent vary in cost between approximately $59 million and $145 million. Route alternatives E1 and E3 are the most expensive (approximately $118-$145 million); this is driven by the need to reconfigure and remove up to thirteen existing transmission lines, underground three distribution lines, and retire and relocate one substation with these two route alternatives. Route alternatives E2, E4, E5, and the applicants' equivalent are similar in length and cost, with route alternative E2 being the least expensive of these six route alternatives.

6.3.5 Route Alternative F - Cole Lake-Riverton Region

Route alternative F provides a different option to the applicants' equivalent in the southern part of the Cole Lake-Riverton region. Route alternative F shifts east of the applicants' equivalent in an effort to reduce impacts to natural resources. Route alternative F would parallel existing transmission line ROW for approximately 1.5 of its 2.4 miles. Potential impacts of route alternative F and the applicants' equivalent are summarized in Table 6-70 and shown on Map 6-16.

Table 6-70 Human and Environmental Impacts – Route Alternative F, Cole Lake-Riverton Region

Resource	Element	Route Alternative F	Applicants' Equivalent
Length (miles)		2.4	3.4
Human Settlement	Residences within 0-75 feet (count)	0	0
	Residences within 75-250 feet (count)	3	0
	Residences within 250-500 feet (count)	1	4
	Residences within 500–1,000 feet (count)	9	14
Land-Based Economies	Agricultural land in 150-ft ROW	13	20
Water Resources	Total wetlands in 150-foot ROW (acres)	23	4
	Forested wetlands in 150-ft ROW (acres)	1	<1
Vegetation	Forested landcover in 150-foot ROW (acres)	14	19
Wildlife	Shallow Wildlife Lake in 150-foot ROW (acres)	0	6
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	13	7
	Native Plant Communities in 150-foot ROW (acres)	13	5
	Lake of Biological Significance in 150-foot ROW (acres)	0	2
	Federal- or state-protected species documented in 150-foot ROW (count)	0	1
ROW Sharing and Paralleling	Transmission line (miles, percent)	1.6 (67)	2.3 (69)
	Roadway (miles, percent)	0 (0)	0 (0)
	Field, parcel, or section lines (miles, percent)	0.1 (4)	1.1 (31)
	Total ROW sharing and paralleling (miles, percent)	1.7 (71)	3.4 (100)
Reliability	Crossing of existing transmission lines (count)	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$13.1	$18.7



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.

- Route Segment F
- Applicants' Route F Equivalent
- Alignment Alternative 10
- Applicants' AA10 Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Residence
- PWI Watercourse
- PWI Waterbody
- Shallow Wildlife Lake
- Native Plant Community

Lakes of Biological Significance
- Outstanding Significance

Wetlands
- Non-Forested Wetland

Site of Biodiversity Significance
- High Significance

Feet
0 500 1,000

Map 6-16

ROUTE ALTERNATIVE F AND ALIGNMENT ALTERNATIVE AA10
Cole Lake/Riverton Region
Northland Reliability Project

6.3.5.1 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, which are discussed exclusively in Chapter 5.3, include cultural values, displacement, electronic interference, noise, property values, socioeconomics and environmental justice concern, and zoning and land use.

6.3.5.1.1 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 route alternative F is shown in Table 6-71, while ROW paralleling and sharing are shown in Table 6-72.

Route alternative F has more homes within 250 feet compared to the applicants' equivalent; however, the applicants' equivalent has more total residences within 1,000 feet than route alternative F. Route alternative F and the applicants' equivalent parallel almost the same amount of existing infrastructure ROW (67 percent and 69 percent, respectively). Thus, aesthetic impacts for these routing alternatives are anticipated to be similar.

Table 6-71 Cole Lake-Riverton Region Proximity of Residences to Route Alternative F

Residences, Distance from Anticipated Alignment	Route Alternative F	Applicants' Equivalent
Residences within 0-75 feet	0	0
Residences within 75-250 feet	3	0
Residences within 250-500 feet	1	4
Residences within 500-1,000 feet	9	14
Total Residences within 1,000 feet	13	18

Table 6-72 Cole Lake-Riverton Region ROW Sharing and Paralleling of Route Alternative F

Infrastructure	Route Alternative F miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)
Follows Existing Roads	0 (0)	0 (0)
Follows Existing Transmission Line	1.6 (67)	2.3 (69)
Total – Follows Transmission Line, Road, or Railroad	1.6 (67)	2.3 (69)
Follows Field, Parcel, or Section Lines	0.1 (4)	1.1 (31)
Total – ROW Paralleling and Sharing	1.7 (71)	3.4 (100)
Total Length of Route Alternative	2.4	3.4

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.

6.3.5.2 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 active mining operations or designated forestry resources within the rights-of-ways for route alternative F or the applicants' equivalent. Additionally, there are few recreation and tourism opportunities, and these opportunities do not differ between route alternative F 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.

6.3.5.2.1 Agriculture

Impacts to agricultural land in the 150-foot ROW of route alternative F and the applicants' equivalent differ. Route alternative F contains the least amount of agricultural land, with 13 acres in its ROW; the applicant's equivalent contains 20 acres of agricultural land in its 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 ROW of the route alternative F or the applicants' equivalent.

6.3.5.3 Archaeological and Historic Resources

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

6.3.5.4 Natural Environment

6.3.5.4.1 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 6-16 shows the water resources along route alternative F and the applicants' equivalent.

6.3.5.4.1.1 Watercourses and Waterbodies

Table 6-73 identifies the watercourses and waterbodies crossed by route alternative F and the applicants' equivalent. Route alternative F would reduce impacts to waterbodies by avoiding a PWI basin that would be crossed by the applicants' equivalent. This would prevent structures being placed within the PWI wetland as the crossing would be too long to span.

Table 6-73 Watercourses and Waterbodies Crossed by Route Alternative F

Resources	Route Alternative F	Applicants' Equivalent
Number of NHD stream crossings	1	2
Number of impaired stream crossings	0	2
Number PWI stream crossings	1	1
Number of NHD lake crossings	0	0
Number of impaired lake crossings	0	0
Number of PWI basin crossings	0	1

6.3.5.4.1.2 Wetlands

Table 6-62 identifies the acreage of wetlands crossed by route alternative F and the applicants' equivalent. The applicants' equivalent would cross more non-forested wetlands than route alternative F. However, route alternative F would cross more forested wetlands. Both route alternative F and applicants' equivalent would have one wetland crossing over 1,000 feet, which would require placement of one or more transmission structures in wetland.

6.3.5.4.2 Vegetation

The ROW of both route alternative F and the applicants' equivalent would impact forested vegetation, with route alternative F impacting approximately 14 acres and the applicants' equivalent impacting approximately 19 acres. Both route alternatives minimize impacts to forested fragmentation by paralleling existing rights-of-way for approximately 67 to 68 percent of their lengths. As such, the impacts to forested vegetation would be comparable for route alternative F and the applicants' equivalent.

6.3.5.4.3 Wildlife

Impacts to wildlife habitat would occur for route alternative F and the applicants' equivalent as a result of removal of a similar amount of forested habitat in the ROW and fragmenting habitat through the establishment of new transmission line rights-of-way for a similar portion of their lengths. The ROW of route alternative F would not traverse any areas that are preserved or managed for wildlife habitat. The applicants' equivalent would traverse the edge of Mud Lake, a DNR-identified shallow wildlife lake (Map 6-16). However, potential impacts to wildlife associated with the shallow lake would be minimized because the applicants' equivalent would parallel an existing transmission line ROW in this area. The potential impacts to wildlife habitat would be similar for route alternative F and the applicants' equivalent.

6.3.5.5 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 alternative F or the applicants' equivalent. One state threatened species, the Blanding's turtle, has been documented within the ROW of the applicants' equivalent and within 1 mile of route alternative F Appendix N. No state special concern species have been documented within 1 mile of route alternative F or the applicants' equivalent. In general, habitat is comparable between route alternative F and the applicants' equivalent; as such, it is anticipated that potential impacts to protected species would be comparable.

The ROW of route alternative F and the applicants' equivalent would traverse several sensitive ecological resources. The ROW of both route alternatives would intersect SBS ranked high and native plant communities, with the ROW of route alternative F intersecting slightly more acres of both (Table 6-74, Map 6-16). As shown on Map 6-16, the ROW of the applicants' equivalent would traverse the edge of Mud Lake, a DNR Lake of Biodiversity Significance. This lake is also a DNR-identified shallow wildlife lake and as noted above, impacts to any protected species associated with this lake would be minimized by paralleling an existing transmission line ROW in this area.

Table 6-74 Sensitive Ecological Resources in the ROW of Route Alternative F and the Applicants' Equivalent

Sensitive Ecological Resource	Area within ROW of Route Alternative F	Area within ROW of Applicants' Equivalent
Sites of Biodiversity Significance	13 acres ranked high	7 acres ranked high
Native Plant Communities	13 acres - conservation status S3-S5	5 acres - conservation status S3-S5
Lake of Biological Significance	0 acres	2 acres - ranked outstanding

6.3.5.6 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.

No transmission line crossings are required for these route alternatives.

6.3.5.7 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 6-70). There is a difference of approximately $5 million between the route alternative F (approximately $13 million) and the applicants' equivalent (approximately $18 million). Route alternative F is the least expensive of these two route alternatives.

6.3.6 Route Alternative G - Cole Lake-Riverton Region

Route alternative G provides a different option to the applicants' equivalent in the southern part of the Cole Lake-Riverton region and northern part of the Long Lake region. Route alternative G shifts southwest of the applicants' equivalent in an effort to reduce impacts to residential areas. Route alternative G would parallel existing transmission line ROW for approximately half of its length. Potential impacts of route alternative G and the applicants' equivalent are summarized in Table 6-75 and shown on Map 6-17.

Table 6-75 Human and Environmental Impacts –Route Alternative G, Cole Lake-Riverton Region

Resource	Element	Route Alternative G	Applicants' Equivalent
Length (miles)		3.5	1.8
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	3
	Residences within 500–1,000 feet (count)	2	5
Land-Based Economies	Agricultural land in 150-ft ROW	38	7
Water Resources	Total wetlands in 150-foot ROW (acres)	14	25
	Forested wetlands in 150-ft ROW (acres)	1	<1
Vegetation	Forested landcover in 150-foot ROW (acres)	13	3
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)	1.7 (50)	1.3 (75)
	Roadway (miles, percent)	1.0 (28)	0 (0)
	Field, parcel, or section lines (miles, percent)	1.8 (50)	0.4 (25)
	Total ROW sharing and paralleling (miles, percent)	3.5 (100)	1.8 (100)
Reliability	Crossing of existing transmission lines (count)	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$20.2[1]	$9.8

1 One heavy-angle structure would be needed for an additional cost of approximately $740,000 ($19.4 million base cost).

Sand Creek

T45N, R30W S24

T45N, R29W S19

Route Segment G begins here

CR 159

F

G

K

T-482

T45N, R30W S25

18

T45N, R29W S30

Oak Lawn Township

Nokay Lake Township

Burgwald Rd SE

T-486

Crow Wing County

Route Segment G ends here

T45N, R30W S36

23

CSAH 23

T45N, R29W S31

G

T-480

K

T44N, R30W S1

Long Lake Township

T44N, R29W S6

Maple Grove Township

Imagery Source: USDA-FSA-APFO NAIP, 2023

- Route Segment G
- Applicants' Route G Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Residence
- PWI Watercourse
- Native Plant Community

Wetlands

- Non-Forested Wetland

Site of Biodiversity Significance

- High Significance
- Moderate Significance

N

Feet

0 500 1,000

Map 6-17

ROUTE ALTERNATIVE G

Cole Lake/Riverton Region

Northland Reliability Project

6.3.6.1 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, which are discussed exclusively in Chapter 5.3, include cultural values, electronic interference, noise, property values, socioeconomics and environmental justice concerns, and zoning and land use.

6.3.6.1.1 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 G is shown in Table 6-76, while ROW paralleling and sharing are shown in Table 6-77.

The applicants' equivalent has more homes within 500 feet and within 1,000 feet compared to route alternative G and, therefore, may be more impactful to aesthetics of nearby residences. Route alternative G may also minimize aesthetic impacts more than the applicants' equivalent by paralleling slightly more existing infrastructure ROW than the applicants' equivalent.

Table 6-76 Cole Lake-Riverton Region Proximity of Residences to Route Alternative G

Residences, Distance from Anticipated Alignment	Route Alternative G	Applicants' Equivalent
Residences within 0-75 feet	0	0
Residences within 75-250 feet	0	0
Residences within 250-500 feet	1	3
Residences within 500-1,000 feet	2	5
Total Residences within 1,000 feet	3	8

Table 6-77 Cole Lake-Riverton Region ROW Sharing and Paralleling of Route Alternative G

Infrastructure	Route Alternative G miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)
Follows Existing Roads	1.0 (28)	0 (0)
Follows Existing Transmission Line	1.7 (50)	1.3 (75)
Total – Follows Transmission Line, Road, or Railroad	2.7 (78)	1.3 (75)
Follows Field, Parcel, or Section Lines	1.8 (50)	0.4 (25)
Total – ROW Paralleling and Sharing	3.5 (100)	1.8 (100)
Total Length of Route Alternative	3.5	1.8

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.

6.3.6.1.2 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 route alternative G ROW. However, one non-residential building (storage shed, agricultural outbuildings, etc.) is located within the 150-foot ROW of route alternative G.

This non-residential building may or may not be displaced as a result of route alternative G. 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 the building noted here, the applicants would need to conduct a site-specific analysis to determine if the building would need to be displaced.

6.3.6.2 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 active mining operations or designated forestry resources within the ROW of route alternative G or the ROW of the applicants' equivalent. Additionally, there are few recreation and tourism opportunities, and these opportunities do not differ between route alternative G 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.

6.3.6.2.1 Agriculture

Agricultural land impacts differ between the 150-foot ROW route alternative G and the applicants' equivalent. Route alternative G contains the most amount of agricultural land (38 acres) in its ROW, while the applicants' equivalent contains the least amount of agricultural land (7 acres) in its 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 route alternative G or the applicants' equivalent.

6.3.6.3 Archaeological and Historic Resources

One previously documented historic architectural resource is located within the 1,000-foot route width of route alternatives G and the applicants' equivalent (Table 6-78), as shown on Map Book 5F. 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 for the project, regardless of which routing alternative is selected. As a result, impacts to cultural resources are anticipated to be minimal and independent of the route selected.

Table 6-78 Cultural Resources within the Route Width of Route Alternative G and the Applicants' Equivalent

Resource Number	Resource Type	NRHP Eligibility	Location
XX-ROD-00017	Trunk Highway 18	Not Eligible	route alternative G; applicants' equivalent

6.3.6.4 Natural Environment

6.3.6.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This route alternative comparison discussion addresses watercourses and waterbodies and wetlands. Map 6-17 shows the water resources along route alternative G and the applicants' equivalent.

6.3.6.4.1.1 Watercourses and Waterbodies

Table 6-79 identifies the watercourses and waterbodies crossed by route alternative G and the applicants' equivalent. Route alterative G would avoid crossing an unnamed creek, which is also listed as impaired.

Table 6-79 Watercourses and Waterbodies Crossed by Route Alternative G

Resources	Route Alternative G	Applicants' Equivalent
Number of NHD Streams	0	3
Number of impaired stream crossings	0	3
Number PWI stream crossings	0	0
Number of NHD lake crossings	1	0
Number of impaired lake crossings	0	0
Number of PWI basin crossings	0	0
Number of PWI wetland crossings	0	0

6.3.6.4.1.2 Wetlands

Table 6-75 identifies the acreage of wetlands crossed by route alternative G and the applicants' equivalent. The applicants' equivalent would cross more non-forested wetland than route alternative G. However, route alternative G would cross more forested wetlands then the applicants' equivalent. The applicants' equivalent would have three wetland crossings over 1,000 feet and route alternatives G would have two wetland crossings over 1,000 feet. Crossings greater than 1,000 feet cannot be spanned and would require placement of one or more transmission structures in wetland.

6.3.6.4.2 Vegetation

The ROW of route alternative G and the applicants' equivalent would both impact forested vegetation, with route alternative G impacting approximately 13 acres and the applicants' equivalent impacting only 3 acres. Both alternatives would parallel existing transmission line and/or road rights-of-way, for approximately three-fourths of their length, thereby minimizing impacts associated with forested fragmentation.

6.3.6.4.3 Wildlife

Impacts to wildlife habitat would occur for route alternative G and the applicants' equivalent as a result of removal of forested habitat in the ROW and fragmenting habitat through the establishment of new transmission line rights-of-way for approximately one-quarter of their lengths. Neither route alternative would traverse any areas that are preserved or managed for wildlife habitat. While the applicants' equivalent parallels an existing transmission line ROW for 75 percent of its length, route alternative G only parallels an existing transmission line ROW for 50 percent of its length. As a result, route alternative G could pose a higher potential for impacts to avian species as a result of establishing more new transmission line ROW. As discussed in Chapter 5.10.5.2, these impacts can be minimized through use of bird flight diverters.

6.3.6.5 Rare and Unique Natural Resources

Using the NHIS database, no federal- or state-protected species, or state species of special concern, have been documented within 1 mile of route alternative G or the applicants' equivalent. Route alternative G and the applicants' equivalent would not traverse any designated sensitive ecological resources. As

such, potential impacts to protected species and sensitive ecological resources would be comparable for each alternative.

6.3.6.6 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.

6.3.6.7 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 6-75). Route alternative G, in addition to being approximately 1.8 miles longer than the applicants' equivalent, would require one additional heavy angle structure, which costs approximately 3 times that of a tangent structure. As a result, the applicants' equivalent (approximately $9.7 million) would cost approximately $10 million less than route alternative G (approximately $19.4 million).

6.3.7 Alignment Alternative AA7 - Cole Lake-Riverton Region

Alignment alternative AA7 provides an alternative placement of the applicants' proposed alignment in the central part of the Cole Lake-Riverton region. Alignment alternative AA7 is shifted southwest of the applicants' alignment to avoid state land and minimize impacts to natural resources. Alignment alternative AA7 does not include any transmission line ROW sharing, paralleling, or double circuiting. Potential impacts of alignment alternative AA7 and the applicants' equivalent are summarized in Table 6-80 and shown on Map 6-18.

Table 6-80 Human and Environmental Impacts – Alignment Alternative AA7, Cole Lake-Riverton Region

Resource	Element	Alignment Alternative AA7	Applicants' Equivalent
Length (miles)		0.35	0.38
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)	0	0
Land-Based Economies	Agricultural land in 150-ft ROW	0	0
Water Resources	Total wetlands in 150-foot ROW (acres)	2	2
	Forested wetlands in 150-ft ROW (acres)	<1	2
Vegetation	Forested landcover in 150-foot ROW (acres)	2	2
Rare and Unique Natural Resources	Site of Biodiversity Significance in 150-foot ROW (acres)	6	7
	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 (0)	0.15 (40)
	Total ROW sharing and paralleling (miles, percent)	0 (0)	0.15 (40)
Reliability	Crossing of existing transmission lines (count)	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$1.9	$2.1

T46N, R29W S6

T46N, R29W S5

Miscellaneous

Trommald

1st Ave W

Cuyuna Country

Pascoe Lake

AA3

Cuyuna Series Compensation Station

Alignment Alternative 7 begins here

T-309

Crow Wing County

AA7

Irondale Township

Alignment Alternative 7 ends here

E5

T46N, R29W S7

T46N, R29W S8

E3

E2

Rabbit River

E1

T-310

Portage Lake

Little Rabbit Lake

Little Rabbit

T46N, R29W S18

T46N, R29W S17

Irondale Twp 204

Little Rabbit Lake

Imagery Source: USDA-FSA-APFO NAIP, 2023

- Alignment Alternative 7
- Applicants' AA7 Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Cuyuna Series Compensation Station
- Substation Siting Area
- Residence
- Active Aggregate Mine
- 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
0 250 500

Map 6-18

ALIGNMENT ALTERNATIVE AA7
Cole Lake/Riverton Region
Northland Reliability Project

6.3.7.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. For some of the human settlement elements, 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, socioeconomics and environmental justice concern, and zoning and land use.

6.3.7.1.1 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. Neither alignment alternative AA7 nor the applicants' equivalent have residents within 1,000 feet of the alignment (Table 6-81). ROW paralleling and sharing are shown in Table 6-81. Neither alignment alternative AA7 nor the applicants' equivalent parallel existing infrastructure ROW in this area; the applicants' equivalent may minimize aesthetic impacts by sharing a small amount of ROW with field, parcel, or section lines.

Table 6-81 Cole Lake-Riverton Region ROW Sharing and Paralleling of Alignment Alternative AA7

Infrastructure	Alignment Alternative AA7 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 (0)	0.15 (40)
Total – ROW Paralleling and Sharing	0 (0)	0.15 (40)
Total Length of Alignment Alternative	0.35	0.38

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.

6.3.7.2 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 or active mining operations within the rights-of-way of alignment alternative AA7 or the applicants' equivalent. Additionally, there are few recreation and tourism opportunities, and these opportunities do not differ between alignment alternative AA7 or the applicants' equivalent. As a result, potential impacts to agriculture, mining, and recreation and tourism would be minimal and independent of the route selected.

6.3.7.2.1 Forestry

Impacts to forestry within the Cole Lake-Riverton region were primarily assessed by evaluating the designated forestry resources within the 150-foot ROW (Chapter 5.8.2). Forested land comprises approximately 2 acres of the ROW of route alternative AA7 and 2 acres of the ROW of the applicants' equivalent (reference (108)). The forested land is comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands within this region (Map Book 5C). The ROW of alignment alternative AA7 does not contain any designated forestry resources. The ROW of the applicants' equivalent route contains 1 acre of Minnesota School Trust Land.

Only the applicants' equivalent route would have potential impacts to designated forestry resources within its 150-foot ROW. Impacts to forestry resources would include permanently removing trees from the ROW before construction (Chapter 5.8.2.1).

6.3.7.3 Archaeological and Historic Resources

One previously documented archaeological resource is located within the 1,000-foot route width of alignment alternative AA7 and the applicants' equivalent (Table 6-82), as shown on Map Book 5F. Site 21CWy consists of the former location of Rabbit River Mission. Archaeological site 21Cwy may be impacted if it is present within the footprint of ground disturbance and if it 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 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 alternative AA7 and the applicants' equivalent each have the potential to impact archaeological resource 21CWy, if it is present within the footprint of ground disturbance.

Table 6-82 Cultural Resources within the Route Width of Alignment Alternative AA7 and the Applicants' Equivalent

Resource Number	Resource Type	NRHP Eligibility	Location
21CWy	Rabbit River Mission (Precontact artifact scatter)	Not evaluated	alignment alternative AA7; applicants' equivalent

6.3.7.4 Natural Environment

6.3.7.4.1 Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This route alternative comparison discussion addresses watercourses and waterbodies and wetlands. Map 6-18 shows the water resources along alignment alternative AA7 and the applicants' equivalent.

6.3.7.4.1.1 Watercourses and Waterbodies

Alignment alternative AA7 and the applicants' equivalent would not cross any watercourses or waterbodies.

6.3.7.4.1.2 Wetlands

Table 6-80 identifies the acreage of wetlands crossed by alignment alternative AA7 and the applicants' equivalent. The applicants' equivalent would cross more forested wetlands than alignment alternative AA7. The applicants' equivalent and alignment alternative AA7 would not have any wetland crossings over 1,000 feet; as such, both route alternatives would span wetlands.

6.3.7.4.2 Vegetation

Alignment alternative AA7 and the applicants' equivalent would impact approximately 2 acres of forested vegetation. Neither alternative would parallel an existing transmission line or road ROW; however, the area appears to have been disturbed by previous logging activity so the impacts of forest fragmentation would be minimized.

6.3.7.4.3 Wildlife

Alignment alternative AA7 and the applicants' equivalent would have similar impacts on wildlife habitat because both alternatives would remove the same amount of forested habitat and neither alternative parallel an existing transmission line or road ROW. Neither alternative would traverse any areas that are preserved or managed for wildlife habitat.

6.3.7.5 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 AA7 or the applicants' equivalent. The ROW of alignment alternative AA7 and the applicants' equivalent would intersect 6 to 7 acres of a DNR SBS ranked moderate. As shown on Map 6-18, neither alternative would parallel an existing transmission line or road ROW through the SBS. Potential impacts to protected species or sensitive ecological resources would be similar for alignment alternative AA7 and the applicants' equivalent.

6.3.7.6 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. 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.

6.3.7.7 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 6-80). Alignment alternative AA7 is anticipated to cost approximately $1.9 million, while the applicants' equivalent is anticipated to cost approximately $2.1 million, making alignment alternative AA7 the least expensive option.

6.3.8 Alignment Alternatives AA8 and AA9 - Cole Lake-Riverton Region

Alignment alternative AA8 and AA9 provide an alternative placement of the applicants' proposed alignment in the central part of the Cole Lake-Riverton region. Both alignment alternatives are shifted west to avoid impacts to the Cuyuna Recreation Area. Neither AA8 nor AA9 include any transmission line ROW sharing, paralleling, or double-circuiting. Potential impacts of alignment alternative AA8, AA9, and the applicants' equivalent are summarized in Table 6-83 and shown on Map 6-19.

Table 6-83 Human and Environmental Impacts – Alignment Alternatives AA8 and AA9, Cole Lake-Riverton Region

Resource	Element	Alignment Alternative AA8	Alignment Alternative AA9	Applicants' Equivalent
Length (miles)		1.6	1.6	1.6
Human Settlement	Residences within 0-75 feet (count)	0	0	0
	Residences within 75-250 feet (count)	1	0	1
	Residences within 250-500 feet (count)	3	4	4
	Residences within 500–1,000 feet (count)	12	14	7
Land-Based Economies	Agricultural land in 150-ft ROW	2	<1	0
Water Resources	Total wetlands in 150-foot ROW (acres)	5	4	14
	Forested wetlands in 150-ft ROW (acres)	<1	1	<1
Vegetation	Forested landcover in 150-foot ROW (acres)	15	11	18
Rare and Unique Natural Resources	Native Plant Communities in 150-foot ROW (acres)	0	6	0
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	0 (0)	0 (0)	0 (0)
	Roadway (miles, percent)	1.4 (90)	1.4 (91)	0 (0)
	Field, parcel, or section lines (miles, percent)	1.5 (97)	1.6 (100)	1.0 (61)
	Total ROW sharing and paralleling (miles, percent)	1.5 (97)	1.6 (100)	1.0 (61)
Reliability	Crossing of existing transmission lines (count)	0	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	$8.7	$8.6	$9.1

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

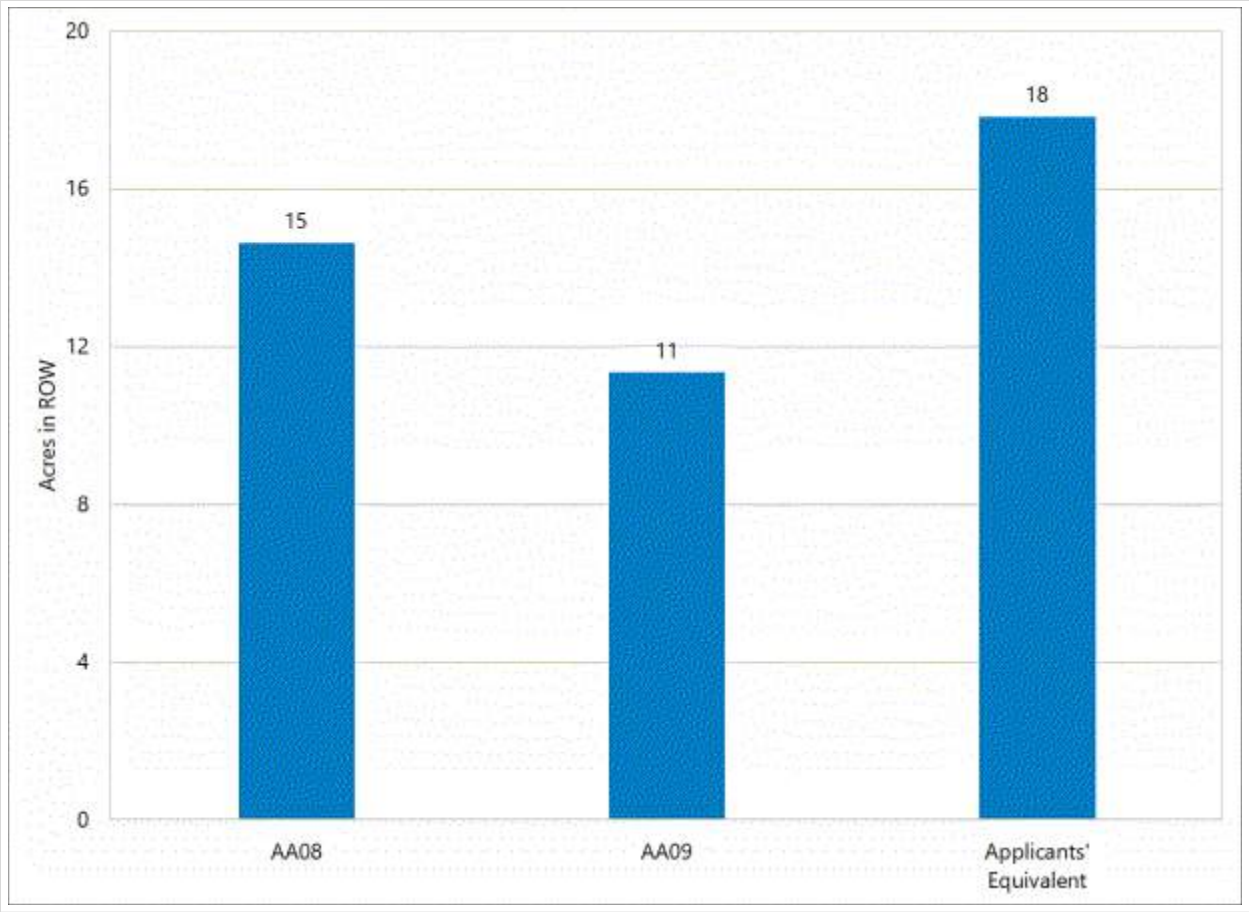
6.3.8.4.1.2 Wetlands

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,