

what person undertakes the other projects or what jurisdictions have authority over the projects (Minn. Rule 4410.0200).

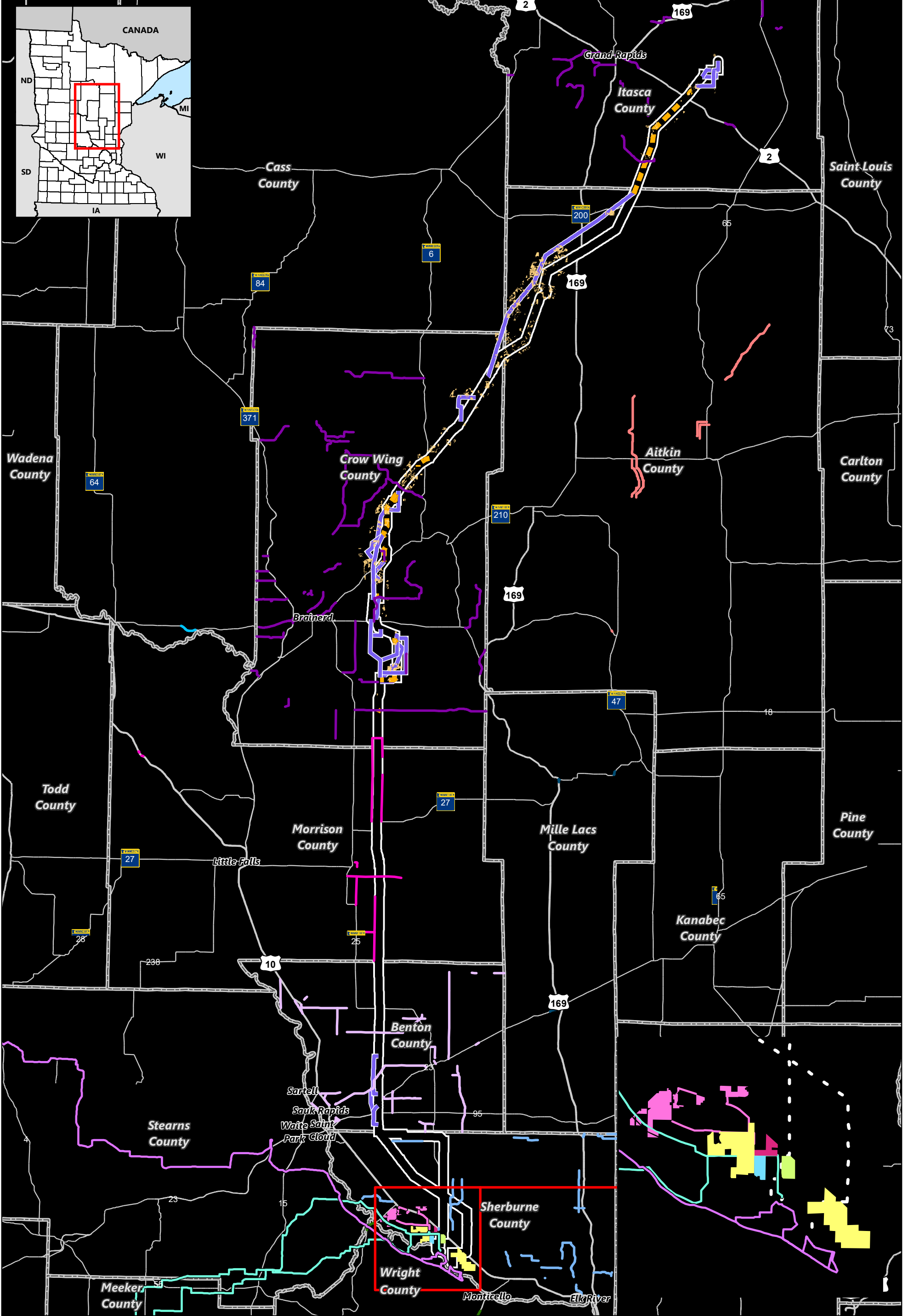
Considering cumulative potential effects serves to assist decision-makers in avoiding decisions about a specific project in isolation. Effects that might seem minimal when viewed in the context of a single project can accumulate and become significant when the broader landscape of all projects is taken into account.

Cumulative effects are discussed here for projects that have been planned or are otherwise foreseeable in the project area. The websites of several agencies/local governments were reviewed, and in some cases agencies/local governments were directly contacted to identify current and reasonably foreseeable future projects that are located within areas traversed by the project; these agencies included: the Minnesota Environmental Quality Board, Commission, Minnesota Department of Commerce, MnDOT, Minnesota BWSR, MPCA, and Minnesota DNR. In addition, the websites for Itasca, Aitkin, Crow Wing, Cass, Morrison, Benton, and Sherburne counties and associated Soil and Water Conservation Districts for each county were reviewed; as well as larger municipalities in the area, including Hill City, Riverton, Ironton, Harding, Lastrup, St. Cloud, and Becker.

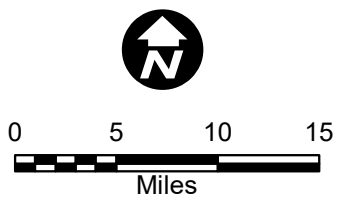
Current and reasonably foreseeable future projects are summarized in Table 5-17 and shown on Map 5-4. The majority of projects identified in Table 5-17 are timber harvesting projects. Forestry is a dominant land use in the counties traversed by the northern part of the project; as such, several areas are proposed for forest harvest on state, county, or private land (Table 5-17 and shown on Map 5-4). These projects were identified through a data request to relevant counties within the project area. Timber harvesting projects are likely to create short-term impacts such as increased noise levels and potential traffic congestion as well as a reduction in tree density within the harvested areas; however, these harvesting activities are considered sustainable and not likely to cause long-term impacts to the project area.

A number of transportation-related projects were also identified through a review of the MnDOT Statewide Transportation Improvement Program (STIP) (Districts 1 and 3) for the period of 2024-2027 (reference (104)) and generally consist of routine maintenance activities such as roadway re-surfacing, asphalt surface treatments, concrete paving, and pedestrian/bike trail improvements. While these projects would provide long-term benefits to the area, their potential for cumulative effects would generally be minimal and tied to short-term construction related effects. As such, these projects are not evaluated as part of the cumulative potential effects analysis.

As noted in Table 5-17 and shown on Map 5-4, there are two other long-range transmission line projects that would connect near Becker, Minnesota. The Alexandria to Big Oaks project would connect to the new Big Oaks Substation, while the Minnesota Energy Connection Project would connect near the retiring Sherco coal plant, approximately 1.5 miles to the northwest of the Big Oaks Substation. Solar projects associated with the retiring Sherco coal plant are also planned in the area as well as up to three data centers (Table 5-17, Map 5-4). The cumulative potential effects of these projects are summarized below.



- Applicants' Proposed Route
- Route Alternative
- Alignment Alternative
- Alexandria to Big Oaks 345 kV Transmission Line Project
- Minnesota Energy Connection
- Sherco 3 Solar
- Aitkin County
- Benton County
- Cass County
- Crow Wing County
- Isanti County
- Itasca County
- Mille Lacs County
- Morrison County
- Sherburne County
- Wright County
- Forest_Harvest_Plans
- Sherco 3 Solar
- Sherco Solar
- Elk River Technologies Data Center
- Microsoft Data Center
- Potential Xcel Data Center



Map 5-4
CUMULATIVE EFFECTS
 Northland Reliability Project

Table 5-17 Current and Reasonably Foreseeable Future Projects

Project Name	Description	Location	Source
Alexandria to Big Oaks 345 kV Transmission Line Project	Xcel Energy proposes to string approximately 105-108 miles of new transmission line on existing double-circuit capable structures running from the existing Alexandria Substation in Alexandria, Douglas County to Becker, Sherburne County where new transmission lines would cross the Mississippi River to facilitate the proposed Big Oaks Substation. Project is currently in environmental review phase.	Sherburne County Region Alexandria (Douglas County) to Becker (Sherburne County); terminating at the new Big Oaks Substation	https://eera.web.commerce.state.mn.us/web/project/15111
Minnesota Energy Connection Project	Xcel Energy proposes a new 345-kilovolt (kV) double-circuit transmission line between the existing Sherco Substation in the city of Becker, Minnesota and a new substation (Terminal Substation) proposed near the town of Garvin in Lyon County, Minnesota. Project is currently in environmental review phase.	Sherburne County Region Sherburne County, southwest to Lyon County	https://apps.commerce.state.mn.us/web/project/15000
Sherco 3 Solar Project	Xcel Energy proposes to construct a new 250 MW solar energy project in Sherburne County, Minnesota.	Sherburne County Region Between U.S. Highway 10 and the Mississippi River in the City of Clear Lake and Clear Lake Township	https://apps.commerce.state.mn.us/web/project/15104
Sherco Solar Project	Xcel Energy is proposing to construct an up to 460-megawatt solar project and two 345 kilovolt transmission lines to interconnect the Solar Project to the grid. Both transmission lines connect the Solar Project to the existing Sherburne County Substation. The Solar Project will partially replace energy production of the Sherco Generating Plant Unit 2	Sherburne County Region Between U.S. Highway 10 and the Mississippi River, and on the east and west sides of the existing Sherco Generating Plant in Becker	https://apps.commerce.state.mn.us/web/project/14335
Microsoft Data Center	Proposed Microsoft data center in Sherburne County near Becker. Microsoft recently purchased 295 acres from Xcel Energy to develop a data center	Sherburne County Region	Alexandria to Big Oaks EA
Elk River Technologies Data Center	Proposed data center in Becker, Sherburne County. Elk River Technologies has an option to develop a data center on 348 acres.	Sherburne County Region	Alexandria to Big Oaks EA
Potential Xcel Data Center	Proposed data center in Becker, Sherburne County. Xcel Energy is marketing a site to the west of the Sherco plant for a potential data center.	Sherburne County Region	Alexandria to Big Oaks EA

Project Name	Description	Location	Source
Benton County Road Construction/ Maintenance Projects	Three road improvement projects including reclaiming and paving	Various roads in the Morrison County Region	STIP, https://www.co.benton.mn.us/DocumentCenter/View/9011/5-YearPlan-2024-2028
Crow Wing County Road Construction/ Maintenance Projects	Seven Highway improvement projects, including TH 18 to CSAH 8, CSAH 3 to TH 6, and TH 25 to CSAH 8	Various highways in the Cole Lake-Riverton Region and Long Lake Region	STIP, https://hub-cwccm.hub.arcgis.com/apps/bc8c694c05f14bbc8cbce805eb5d491a/explore
Itasca County Road Construction/ Maintenance Projects	One Itasca County road construction project, CSAH 67 to CR 427	Hill City to Little Pine Region	Itasca County
Morrison County Road Construction/ Maintenance Projects	Various road improvement projects including paving and culvert work	Morrison County Region	Morrison County
Sherburne County Road Construction/ Maintenance Projects	Various road improvement projects including milling, paving, and overlays	Sherburne County Region	https://gis.co.sherburne.mn.us/arcgis/rest/services/PublicWorks/Construction_Projects_Future/MapServer
County-level Timber Harvesting	Numerous anticipated timber harvesting events within 2,000 feet of the routing alternatives including: <ul style="list-style-type: none"> • 109 timber harvest areas in Aitkin County, • 131 timber harvesting areas in Crow Wing County • 13 timber harvest areas in Itasca County 	Iron Range Substation Region, Hill City to Little Pine Region, Cole Lake-Riverton Region, Long Lake Region	DNR, counties

5.15.1 Human Settlements

Cumulative potential effects on human settlements are anticipated to be minimal. Future projects will result in aesthetic impacts. Most will occur at the southern end of the project where the Alexandria to Big Oaks, Minnesota Energy Connection, and Northland Reliability project will converge with the Sherco Solar project, the proposed data center projects, and the new Big Oaks Substation. In this area, the visual setting will further transition from one that is agricultural and pastoral to one that is more and more developed and industrial in nature. Cumulative aesthetic impacts in this area are anticipated to be minimal to moderate.

These concurrent projects and others that may happen at the same time are anticipated to have no cumulative effect on local zoning and land use, property values, noise, and cultural values.

5.15.2 Transportation and Public Services

Cumulative potential effects on transportation and public services are anticipated to be minimal to slightly positive. Transportation projects completed at the same time as the project would be undertaken to maintain and improve roads, to ensure their safe operation and the public's health and safety. This project and all of the projects identified in Table 5-17 are not anticipated to impact airports, public utilities, or emergency services.

5.15.3 Public Health and Safety

This project, in combination with the current and reasonably foreseeable future projects summarized in Table 5-17, are not expected to create impacts to public health and safety. Because the Commission imposes a maximum electric field limit of 8 kV/m for new transmission projects, this project as well as the Alexandria to Big Oaks project and the Minnesota Energy Connection project would have to meet this permit condition. Accordingly, public health impacts related to induced voltages are anticipated to be minimal.

5.15.4 Climate and Air Quality

This project, in combination with the current and reasonably foreseeable future projects summarized in Table 5-17, could interact to result in cumulative potential effects to climate and air quality. When considered singularly, small amounts of emissions would be associated with each project due to the intermittent operation and maintenance activities of the project via mobile combustion and particulate roadway dust generation. However, each of the proposed transmission line projects would also support the transition to renewable energy. Road construction and maintenance projects would result in temporary construction emissions, but only minimal operational emissions given existing traffic. A small amount of O₃ would also be created due to corona from the operation of each of the three proposed transmission line projects. While individually the emission of O₃ during operations is not anticipated to have a significant impact on the environment, together the projects would result in more O₃ emissions than present-day.

5.15.5 Land-Based Economies

Cumulative potential effects on land-based economies may occur but are anticipated to be minimal. Two projects (Northland Reliability and Alexandria to Big Oaks) would utilize existing transmission line rights-of-way to the extent possible, reducing land conversions and potential displacements. Some land would be converted from agricultural or forested use to other uses.

5.15.6 Archaeological and Historic Resources

This project, in combination with the current and reasonably foreseeable future projects summarized in Table 5-17, could interact to result in cumulative potential effects to archaeological and historic architectural resources. Any time new ground disturbance would occur as the result of a project, there is the potential to impact significant archaeological and historic architectural resources. However, survey and identification of these resources during project planning stages can help determine the presence of these resources. Once identified, prudent routing and/or efforts to avoid or minimize impacts to these resources would reduce the potential for cumulative effects.

5.15.7 Natural Environment

This project, in combination with the current and reasonably foreseeable future projects summarized in Table 5-17, could interact to result in cumulative potential effects to the natural environment, including water, soil, vegetation, and wildlife resources. However, it is anticipated that the cumulative potential effects to these resources would be minimal given the use of existing rights-of-way for this project and the Alexandria to Big Oaks project, the predominantly agricultural landscape of the Minnesota Energy Connection project and solar projects intersecting this project, the temporary nature of forest harvests (i.e., forested vegetation would return to these areas), and project design and impact minimization measures that would be incorporated into this project and the other projects.

This project and all of the other foreseeable projects identified in Table 5-17 would generally avoid or span surface waters; as such, the potential for cumulative effects on surface waters are not anticipated. Conversion of upland and wetland forested vegetation types would occur where this project and the other two transmission line projects identified in Table 5-17 cross forested land. These projects could together result in an increase in vegetation type conversion, forest fragmentation, an increase in the spread of noxious weeds and other non-native species, and soil disturbance in the region. In addition, the areas proposed for forest harvest could interact with this project to result in additional impacts to forested vegetation.

Cumulative potential effects to wildlife and associated habitat could occur as a result of vegetation clearing and associated habitat conversion or fragmentation in the more forested northern part of this project combined with forest clearing associated with proposed forest harvests in the region. However, while some species may abandon cleared habitats for adjacent forested habitats, other species that favor open and edge habitats may move into these areas. Given the extensive forest cover in the northern part of the project, the potential for cumulative effects is anticipated to be minimal.

This project could interact with the other two transmission line projects and solar projects to result in an increased potential for avian collisions with transmission line infrastructure. However, these projects intersect in an agricultural and industrial area, where extensive transmission line infrastructure is already present and the potential for collisions already exists. Furthermore, BMPs, such as bird flight diverters, would be used where necessary to reduce the potential for impacts.

5.15.8 Rare and Unique Natural Resources

This project, in combination with the current and reasonably foreseeable future projects summarized in Table 5-17, could interact to result in cumulative potential effects to rare and unique natural resources, including federally and/or state protected species and sensitive ecological resources. Cumulative potential effects to federal- or state-protected wildlife species would be similar to those described for non-protected species in Chapter 5.15.7.

Sensitive ecological resources, such as native plant communities, often provide habitat for protected species. These areas would generally be avoided or spanned to the extent possible by this project and the two other transmission line projects and solar projects identified in Table 5-17. In addition, areas proposed for forest harvest would likely be located outside of these areas. As such, cumulative potential effects to these sensitive ecological resources and any protected species inhabiting them are anticipated to be minimal.

The clearing of forested vegetation/habitat associated with this project, when considered with forest clearing associated with proposed forest harvests in the region, could contribute to cumulative potential effects of federally or state protected species that rely on forested habitats, such as northern long-eared bats. Given the abundance of forested cover in the northern part of this project and implementation of restrictions on project construction and/or forest harvesting, cumulative potential effects of protected species inhabiting forested areas anticipated to be minimal.

6 Impacts and Mitigation Measures by Region

There are 25 route alternatives and 15 alignment alternatives that could be used for the project (Map 3-1). These route and alignment alternatives could mitigate potential project impacts. This chapter discusses the potential route and alignment alternative impacts, contrasting them with their equivalent segments of the applicants' proposed route (referred to as "applicants' equivalent"). The discussion here proceeds north to south by geographical regions of the project (Map 3-1).

A route alternative is a specifically identified segment that departs from and returns to the applicants' proposed route, and which is routed outside of the applicants' proposed route width. An alignment alternative is an alternative line placement within the applicants' proposed route width. The route width does not change; only the placement (alignment) within the route changes.

For analysis purposes, common start and end points were developed to create a mechanism for comparing relevant routing alternatives against each other. Due to variation in the lengths of the proposed alternatives, in some instances, the start and/or end points add a portion of the applicants' proposed route to the proposed routing alternative.

6.1 Iron Range Substation Region

The Iron Range Substation region, located in Trout Lake and Blackberry Townships, Itasca County, is the northernmost region of the project (Figure 6-1). This region includes the Iron Range Substation, which is the northern project endpoint. In addition to the applicants' proposed route, the region has four route alternatives (A1, A2, A3, and A4) and one alignment alternative (AA15) (Map Book 3A). Chapter 6.1.1 summarizes the potential impacts resulting from construction and operation of the applicants' proposed route in the Iron Range Substation region. Chapter 6.1.2 provides a comparison of the potential impacts resulting from construction and operation of route alternatives A1, A2, A3, A4, and the applicants' equivalent. Chapter 6.1.3 provides a comparison of the potential impacts resulting from construction and operation of alignment alternative AA15 and the applicants' equivalent.

Figure 6-1 Iron Range Substation Region



6.1.1 Applicants' Proposed Route - Iron Range Substation Region

Potential impacts of the applicants' proposed route in the Iron Range Substation region are summarized in Table 6-1 and discussed in Chapters 6.1.1.1 through 6.1.1.5.

Table 6-1 Human and Environmental Impacts – Applicants' Proposed Route, Iron Range Substation Region

Resource	Element	Applicants' Proposed Route
Length (miles)		6.2
Human Settlement	Residences within 0-75 feet (count)	0
	Residences within 75-250 feet (count)	0
	Residences within 250-500 feet (count)	5
	Residences within 500–1,000 feet (count)	9
Land-Based Economies	Agricultural land in 150-foot ROW (acres)	19
Water Resources	Total wetlands in 150-foot ROW (acres)	51
	Forested wetlands in 150-foot ROW (acres)	27
Vegetation	Forested landcover in 150-foot ROW (acres)	81
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	49
	Federal- or state-protected species documented in 150-foot ROW (count)	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	3.2 (51)
	Roadway (miles, percent)	0 (0)
	Field, parcel, or section lines (miles, percent)	2.5 (41)
	Total ROW sharing and paralleling (miles, percent)	5.7 (92)
Estimated Cost	Total estimated cost (2022 dollars in millions)	\$34.2

6.1.1.1 Human Settlements

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

Some elements of human settlement, including cultural values, displacement, electronic interference, noise, property values, and zoning and land use, are anticipated to be minimal. These elements are not analyzed or discussed further. Aesthetics, displacement, socioeconomics, and EJCs are the only human settlement elements for which impacts are anticipated to be non-minimal.

6.1.1.1.1 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. Aesthetic impacts can be minimized by placing the transmission line away from residences (Table 6-2) and by following existing infrastructure ROW (Table 6-3).

The applicants' proposed route was developed to avoid proximity to residences. There are 14 residences within 1,000 feet of the applicants' proposed alignment and the closest residences in the Iron Range Substation region are between 250 and 500 feet of the alignment. With respect to ROW sharing, approximately half of the applicants' proposed route in the Iron Range Substation region would follow an existing transmission line ROW; approximately 92 percent would follow existing infrastructure ROW. Aesthetic impacts are anticipated to be minimal to moderate.

Table 6-2 Iron Range Substation Region Proximity to Residences for Applicants' Proposed Route

Residences, Distance from Anticipated Alignment	Applicants' Proposed Route
Residences within 0-75 feet	0
Residences within 75-250 feet	0
Residences within 250-500 feet	5
Residences within 500-1,000 feet	9
Total Residences within 1,000 feet	14

Table 6-3 Iron Range Substation Region ROW Sharing and Paralleling for Applicants' Proposed Route

Infrastructure	Applicants' Proposed Route miles (percent)
Follows Existing Railroad	0.0 (0)
Follows Existing Roads	0.0 (0)
Follows Existing Transmission Line	3.2 (51)
Total – Follows Transmission Line, Road, or Railroad	3.2 (51)
Follows Field, Parcel, or Section Lines	2.5 (41)
Total – ROW Paralleling and Sharing	5.7 (92)
Total Length of Route Alternative	6.2

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.

6.1.1.2 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.

Impacts to certain elements of land-based economies, including mining and recreation and tourism, are anticipated to be minimal.

Agriculture and forestry are the only elements of land-based economies for which impacts are anticipated to be non-minimal in this region.

6.1.1.2.1 Agriculture

Project impacts to agriculture within the Iron Range Substation 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. There are approximately 19 acres of agricultural land in the ROW of the applicants' proposed route (17 percent of the ROW in this region). This land consists of cultivated crops and hay/pasture lands.

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

6.1.1.2.2 Forestry

Impacts to forestry resources within the Iron Range Substation region were primarily assessed by evaluating forestry resources within the 150-foot ROW of the applicants' proposed route (Chapter 5.7.2). Approximately 81 acres of forested land are located within the ROW of the applicants' proposed route (reference (108)); this forested area is comprised of deciduous forest, evergreen forest, mixed forest, and forested wetlands (Map Book 5C).

As shown in Table 6-4, there are 6 acres of designated forestry resources within the route ROW, consisting of DNR managed forested land, Forest for the Future program land, and SFIA land. There are no State forests within the ROW in this region.

Table 6-4 Designated Forestry Resources within the 150-foot ROW of the Applicants' Proposed Route

Route	Acres of DNR state forest within 150-foot ROW	Acres of Minnesota School Trust Land ¹ within 150-foot ROW	Acres of Forest for the Future ² land within 150-foot ROW	Acres of Sustainable Forest Incentive Act ³ land within 150-foot ROW
Applicant's Proposed Route	0.0	1.00	5.0	4.5

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)).

Potential impacts to designated forestry resources within the 150-foot ROW of the applicants' proposed route include permanent impacts. Vegetation clearing would include permanently removing trees from the ROW before construction.

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 loss of timber from ROW clearing.

6.1.1.3 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 Iron Range Substation region.

There are two documented historic architectural resources within the applicants' proposed route width (1,000 ft) in the Iron Range Substation region. These include resource IC-TLT-00016, a log barn off of County Road 434, and resource XX-ROD-00176, Trunk Highway 2, which crosses the applicants' proposed route near the southeastern edge of the Iron Range Substation region.

As discussed in Chapter 5.9.3, impacts to these resources would mainly consist of changes in the resource's setting due to placement of the transmission line in proximity. However, the applicants' proposed route would cross resource XX-ROD-00176 (Trunk Highway 2) within an existing transmission line ROW, so no changes to this resource are anticipated as a result of the project. In the vicinity of resource IC-TLT-00016 (the log barn), the applicants' proposed route does not follow an existing transmission line ROW; therefore, route construction in this area could affect the resource setting. However, it appears that a dense tree line surrounds resource IC-TLT-00016, shielding visual impacts of the applicants' proposed route on this resource. No other cultural resources are present within the route width.

6.1.1.4 Natural Environment

6.1.1.4.1 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 water resource evaluation elements, floodplains and groundwater, are anticipated to be minimal.

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

6.1.1.4.1.1 Watercourses and Waterbodies

The applicants' proposed route would cross one watercourse (Swan River) in the Iron Range Substation region. The Swan River is classified as a PWI watercourse pursuant to Minn. Statute 103G.005 and is listed as an impaired water for aquatic consumption. The applicants' proposed route would not cross any waterbodies within the Iron Range Substation region.

It is anticipated that the Swan River would be spanned. No structure placements are anticipated within Iron Range region waterbodies and watercourses, meaning no direct impacts to these resources are anticipated. Indirect resource impact, such as increases in turbidity, could be minimized by using BMPs and by choosing a routing alternative that has relatively fewer waterbody and watercourse crossings.

6.1.1.4.1.2 Wetlands

The NWI wetlands within the ROW of the applicants' proposed route ROW consist mainly of forested wetlands, with some shrub-dominated wetlands and emergent wetland. There are approximately 26.5 acres of forested wetlands within the applicants' proposed route ROW and 24.1 acres of non-forested wetlands. There are no PWI wetlands along the applicants' proposed route in the Iron Range Substation region.

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

6.1.1.4.2 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 landcover types across the Iron Range Substation region and, Table 6-5 summarizes the landcover types within the applicants’ 150-foot ROW within this region. The dominant vegetative landcover in the applicants’ 150-foot ROW in this region consists of forest, which represents approximately 72 percent of the ROW. Forest types include forested wetlands and upland deciduous, coniferous, and mixed forest communities.

Table 6-5 Landcover Types in the 150-foot ROW of the Applicants’ Proposed Route in the Iron Range Substation Region

Landcover Type	Acres in ROW	Percent of ROW ¹
Forested (upland and wetland)	81	72
Agricultural (cultivated crops and hay/pasture)	19	17
Herbaceous (upland and wetland)	9	8
Shrub/Scrub	3	2
Developed (low-high intensity; open space)	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 150-foot ROW during construction, and the ROW would be maintained with low-growing vegetation to minimize potential interference with the transmission line. While just over half of the applicants’ proposed route in the Iron Range Substation region would parallel an existing transmission line ROW where the forested areas have already been fragmented, the northern part of this route would traverse an extensive forested area that does not parallel an existing ROW, resulting in new forest fragmentation.

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.

6.1.1.4.3 Wildlife

Wildlife impacts are primarily assessed by evaluating the presence of wildlife habitat, including areas that are preserved or managed for wildlife habitat, within the 150-foot ROW (Chapter 5.10.5.1 and 5.10.5.2). The applicants’ proposed route in the Iron Range Substation region would not traverse any areas that are publicly preserved or managed for wildlife habitat. As discussed in Chapter 6.1.1.4.2, just under three-fourths of the ROW would be converted from forested habitat to open and maintained ROW habitat. In some areas this would occur adjacent to an existing ROW; however, the northern portion of the applicants’ proposed route in this region would fragment forested habitat in an area of extensive forest cover. This could adversely impact wildlife species that depend on contiguous forested habitat while possibly benefiting those species that prefer open or edge habitats. In this area and others where the applicants’ proposed route does not parallel an existing transmission line, there could be an increased potential for impacts to avian species.

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

6.1.1.5 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 Iron Range Substation region. In order to protect federally and state protected species from exploitation or destruction, documented locations of these species are not identified on any maps.

6.1.1.5.1 Protected Species

According to the NHIS database, no federal- or state-protected species have been documented within 1 mile of the applicants' proposed route in the Iron Range Substation region. Four state special concern species have been documented within 1 mile of the applicants' proposed route in this region (Appendix N).

Formal surveys for protected species have not been conducted for the project; as such, it is possible that additional protected species could be present where suitable habitat is available within the 150-foot ROW. In addition, although not tracked in the NHIS database, it is possible that, given the forested landcover in this region, federally threatened gray wolves and Canada lynx could inhabit areas near the applicants' proposed route. Potential impacts to protected species could occur should they be present within or near the ROW. While more mobile species would leave the area for nearby comparable habitats, non-mobile organisms, such as vascular plants or nesting birds, could be directly impacted.

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

6.1.1.5.2 Sensitive Ecological Resources

The 150-foot ROW of the applicants' proposed route would traverse approximately 49 acres of a DNR SBS ranked moderate. As shown on Map Book 5I, the 150-foot ROW of the applicants' proposed route would intersect this SBS in two locations. In one of these locations, and the larger of the two, the applicants' proposed route would traverse the SBS along an existing transmission line ROW, thereby minimizing impacts. However, the other location is in the northern part of the applicants' proposed route, where the anticipated alignment does not parallel any existing rights-of-way and would require new ROW. Both locations would require transmission line structure placement within the SBS, as both locations would cross the SBS for lengths that exceed the maximum span length of 1,000 feet.

Creation of new transmission line rights-of-way 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.

Potential construction and operation-related impacts to sensitive ecological resources are summarized in Chapter 5.11.2.1. 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.

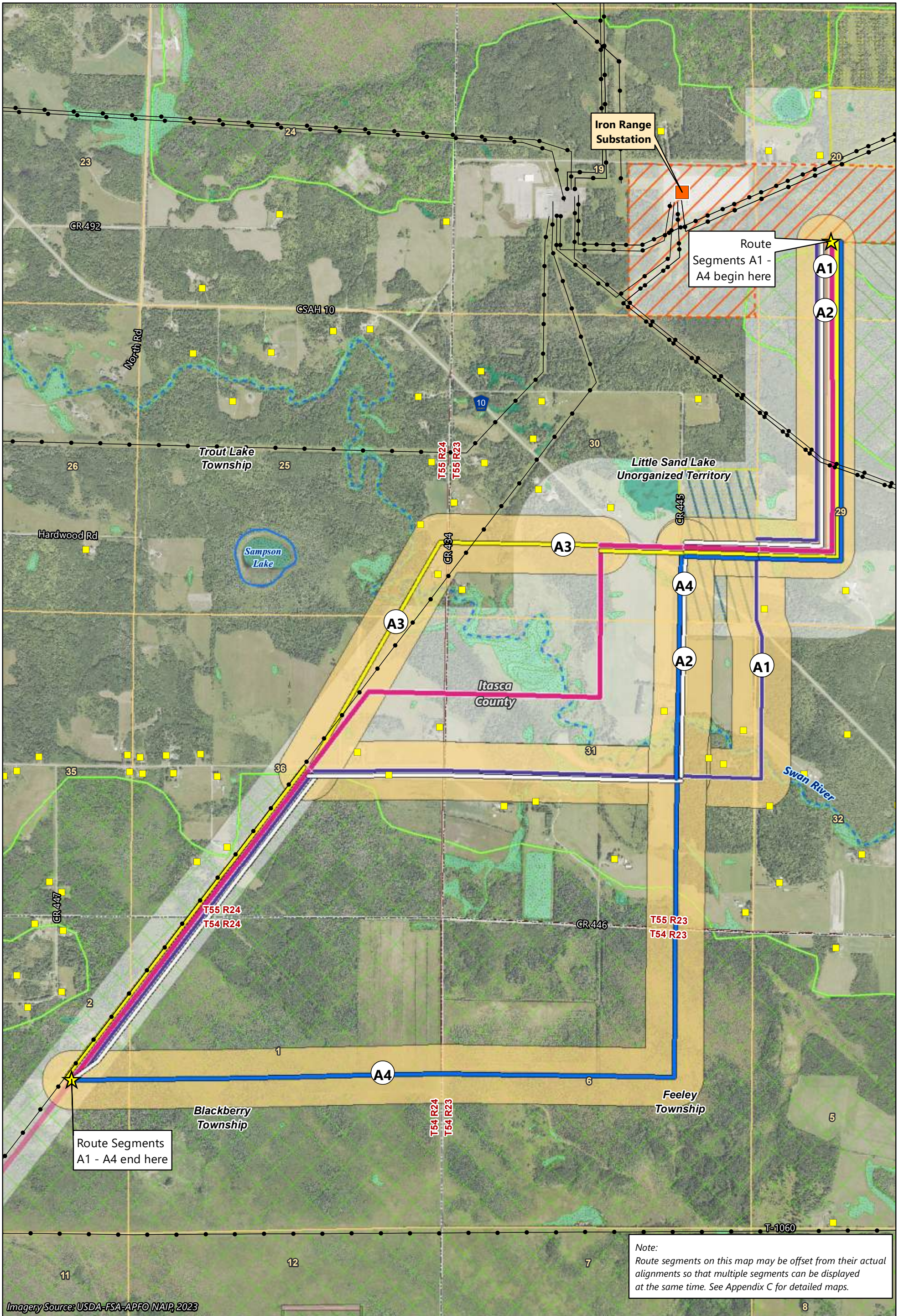
6.1.2 Route Alternatives A1 through A4 – Iron Range Substation Region

Route alternatives A1 through A4 provide different options to the applicants' proposed route in the northernmost part of the project. Route alternatives A1 and A2 are shifted from state land onto property owned by the applicants. Route alternatives A3 and A4 were shifted to minimize impacts to private property. Potential impacts of route alternatives A1 through A4 and the applicants' equivalent are summarized in Table 6-6 and shown on Map 6-1. These route alternatives do not include any transmission line ROW sharing, paralleling, or double-circuiting.

Table 6-6 Human and Environmental Impacts – Route Alternatives A1-A4, Iron Range Substation Region

Resource	Element	Route Alternative A1	Route Alternative A2	Route Alternative A3	Route Alternative A4	Applicants' Equivalent
Length (miles)		4.7	4.7	4.4	5.2	4.6
Human Settlement	Residences within 0-75 feet (count)	0	0	0	0	0
	Residences within 75-250 feet (count)	3	1	1	0	0
	Residences within 250-500 feet (count)	5	5	2	1	2
	Residences within 500-1,000 feet (count)	6	5	7	3	4
Land-Based Economies	Agricultural land in 150-ft ROW (acres)	20	22	17	12	19
Water Resources	Total wetlands in 150-foot ROW (acres)	30	33	35	48	39
	Forested wetlands in 150-ft ROW (acres)	21	21	25	34	27
Vegetation	Forested landcover in 150-foot ROW (acres)	51	48	55	69	53
Rare and Unique Natural Resources	Sites of Biodiversity in 150-foot ROW (acres)	32	32	32	56	32
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0	0	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	1.3 (27)	1.3 (27)	1.6 (36)	0 (0)	1.6 (35)
	Roadway (miles, percent)	1.0 (21)	1.0 (21)	0 (0)	0.5 (10)	0 (0)
	Field, parcel, or section lines (miles, percent)	2.2 (47)	2.0 (42)	2.2 (49)	4.5 (88)	2.5 (55)
	Total ROW sharing and paralleling (miles, percent)	4.0 (84)	3.5 (74)	3.7 (85)	4.8 (92)	4.1 (89)
Reliability	Crossing of existing transmission lines (count)	0	0	2	0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	\$26.1	\$25.9	\$28.4 ¹	\$28.6	\$25.4

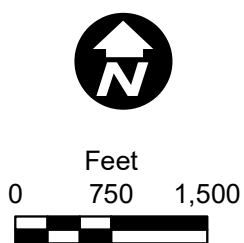
¹ Two specialty structures would be needed to cross an existing transmission line for an estimated additional cost of approximately \$ 4 million (\$24.7 million base cost)



Imagery Source: USDA-FSA-APFO NAIP, 2023

- | | | | | | |
|--|--------------------------------|--|----------------------------|--|--------------------------------|
| | Route Segment A1 | | Existing Transmission Line | | Forests of the Future Easement |
| | Route Segment A2 | | Iron Range Substation | | Other DNR Land |
| | Route Segment A3 | | Substation Siting Area | Wetlands | |
| | Route Segment A4 | | Residence | | Non-Forested Wetland |
| | Applicants' Route A Equivalent | | PWI Watercourse | | Forested Wetland |
| | Route Width | | PWI Waterbody | Site of Biodiversity Significance | |
| | Route Alternative Width | | Native Plant Community | | Moderate Significance |

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.



Map 6-1
ROUTE ALTERNATIVES A1 - A4
Iron Range Substation Region
Northland Reliability Project

6.1.2.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. 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 in Chapter 5.3, include cultural values, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.1.2.1.1 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. The proximity of residences to route alternatives A1 through A4 and the applicants' equivalent are shown in Table 6-7, while ROW paralleling and sharing are shown in Table 6-8.

The applicants' equivalent and route alternative A4 minimize aesthetic impacts by minimizing the project's proximity to residences. Route alternatives A1 and A2 minimize aesthetic impacts by following the greatest amount of existing infrastructure ROW.

Table 6-7 Iron Range Substation Region Proximity of Residences to Route Alternatives A1-A4

Residences, Distance from Anticipated Alignment	Route Alternative A1	Route Alternative A2	Route Alternative A3	Route Alternative A4	Applicants' Equivalent
Residences within 0-75 feet	0	0	0	0	0
Residences within 75-250 feet	3	1	1	0	0
Residences within 250-500 feet	5	5	2	1	2
Residences within 500-1,000 feet	6	5	7	3	4
Total Residences within 1,000 feet	14	11	10	4	6

Table 6-8 Iron Range Substation Region ROW Paralleling and Sharing of Route Alternatives A1-A4

Infrastructure	Route Alternative A1 miles (percent)	Route Alternative A2 miles (percent)	Route Alternative A3 miles (percent)	Route Alternative A4 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Follows Existing Roads	1.0 (21)	1.0 (21)	0 (0)	0.5 (10)	0 (0)
Follows Existing Transmission Line	1.3 (27)	1.3 (27)	1.6 (36)	0 (0)	1.6 (35)
Total – Follows Transmission Line, Road, or Railroad	2.3 (48)	2.3 (48)	1.6 (36)	0.5 (10)	1.6 (35)
Follows Field, Parcel, or Section Lines	2.2 (47)	2.0 (42)	2.2 (49)	4.5 (88)	2.5 (55)
Total – ROW Paralleling and Sharing	4.0 (84)	3.5 (74)	3.7 (85)	4.8 (92)	4.1 (89)
Total Length of Route Alternative	4.7	4.7	4.4	5.2	4.6

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.

6.1.2.1.2 Displacement

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

There are no permanent residences, churches, childcare centers, or schools located within the 150-foot ROW of the applicants' equivalent or route alternatives A1 through A4. However, route alternatives A1 and A2 both have one non-residential building (storage shed, agricultural outbuildings, etc.) located within their 150-foot ROW while A2 and A4 have none (Map 6-1).

The non-residential buildings along project route alternatives A1 or A2 may or may not be displaced. Though buildings are generally not allowed within 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, the applicants would need to conduct a site-specific analysis to determine if the building would need to be removed or relocated.

6.1.2.2 Land-Based Economies

Potential project impacts to land-based economies are assessed through an evaluation of several elements, summarized in Chapter 6.1.1. For some of the elements of land-based economies, project impacts are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter. There are no mining or recreation and tourism resources within the routing alternative rights-of-way. As a result, impacts to these resources are anticipated to be minimal and independent of the route selected and therefore are not discussed in this Chapter.

6.1.2.2.1 Agriculture

Impacts to agricultural land in the 150-foot ROW of route alternatives A1 through A3 and the applicants' equivalent would be relatively similar (Table 6-9). The total amount of agricultural land in the ROW of each route alternative ranges from 12 to 22 acres. Route alternative A4 would impact the least amount of agricultural land with approximately 12 acres of agricultural lands in the ROW.

Impacts to prime farmland in the ROW of route alternatives A1 through A3 and the applicants' equivalent would also be relatively similar (Table 6-9). The total amount of prime farmland within the ROW of each route alternative ranges from 37 to 66 acres. Route alternative A4 would impact the least amount of prime farmland with 37 acres of prime farmland in the ROW. The amount of farmland of statewide importance within the ROW of each route alternative ranges from 5 to 9 acres.

According to the USDA FSA (reference (107)), MDA Organic Farm Directory (reference (105)), and MDA Apiary Registry (reference (106)), there are no CREP enrolled lands, registered organic producers, or apiaries within the 150-foot ROW of route alternatives A1 through A4 or the applicants' equivalent.

Table 6-9 Agricultural Land within the 150-foot ROW of Route Alternatives A1-A4

	Route Alternative A1	Route Alternative A2	Route Alternative A3	Route Alternative A4	Applicants' Equivalent
Acres of agricultural land within 150-foot ROW	20	22	17	12	19
Acres of Prime Farmland ¹ within 150-foot ROW	66	61	54	37	58
Acres of Farmland of Statewide Importance within 150-foot ROW	7	6	9	9	5

Data Sources: references (71), (108)

¹ Prime farmland includes areas designated as prime farmland and prime farmland if drained by the NRCS (reference (71)).

6.1.2.2.2 Forestry

Impacts to designated forestry resources in the 150-foot ROW of route alternatives A1, A3, A4, and the applicants' equivalent would be relatively similar (Table 6-10). Forestry land within the ROW of these five routes is between approximately 6 to 10 acres. Route alternative A2 would impact the least amount of designated forestry resources (2 acres) in the ROW.

No state forests are within the ROW of the applicants' equivalent or the alternative routes. However, Minnesota School Trust lands, Forests for the Future program lands, or SFIA lands are within the ROW of all of these five routes (Table 6-10).

Table 6-10 Designated Forestry Resources Within the 150-foot ROW of Route Alternatives A1-A4

Route	Route Alternative A1	Route Alternative A2	Route Alternative A3	Route Alternative A4	Applicants' Equivalent
Acres of DNR state forest within 150-foot ROW	0	0	0	0	0
Acres of Minnesota School Trust Land ¹ within 150-foot ROW	0	0	1	1	1
Acres of Forests for the Future ² land within 150-foot ROW	2	9	5	9	5
Acres of Sustainable Forest Incentive Act ³ land within 150-foot ROW	2	6	4.5	6	4.5

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)).

Construction of a new transmission line ROW through forested lands would be necessary for all the routing alternatives in the northern part of the region (Map Book 5C), which would result in permanent loss of designated forestry resources. Route alternative A1 would impact the least amount of designated forestry resources in comparison to the other routes.

6.1.2.3 Archaeological and Historic Resources

Six previously documented historic architectural resources and no archaeological sites are located within the 1,000-foot route width of route alternatives A1 through A4 and the applicants' equivalent. The route width of Alternatives A1 and A2 each contain three previously documented historic architectural resources, the most of any of the alternatives (Table 6-11) in this region. As shown on Map Book 5F, some of the same historic architectural resources are located within the route widths of multiple alternatives.

Table 6-11 Historic Architectural Resources within the Route Width of Route Alternatives A1-A4 and the Applicants' Equivalent

Resource Number	Resource Type	NRHP Eligibility	Location
IC-TLT-00012	Log House (moved)	Not evaluated	route alternative A3
IC-TLT-00015	Log Barn	Not evaluated	route alternative A1, route alternative A2
IC-TLT-00016	Log Barn	Not evaluated	applicants' equivalent
IC-UOG-00016	Log Hay Barn	Not evaluated	route alternative A1, route alternative A2
IC-UOG-00017	Frank Gran Farmstead	Listed	route alternative A2 route alternative A4
IC-UOG-00088	Bridge No. 7423 (Marsh Rainbow Arch Bridge)	Eligible	route alternative A1

The applicants' equivalent and route alternatives A3 and A4 each have the potential to impact one historic architectural resource. However, resource IC-TLT-00016 appears to be visually shielded from the applicants' equivalent by a thick tree line whereas both route alternatives A3 and A4 would consist of new transmission line construction adjacent to and visible from resources IC-TLT-00012 and IC-UOG-00017, respectively. Route alternatives A1 and A2 each have the potential to impact three historic architectural resources. It appears that with the exception of resource IC-TLT-00015, which is shielded from view by a tree line, each of the resources within the route width of alternatives A1 and A2 would be visible from and to the new transmission line.

The primary way to minimize impacts on archaeological and historic architectural resources is through careful routing and structure placement, specifically by avoiding known archaeological and historic sites. 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 A1 and A2 have the potential to impact more historic architectural resources than route alternatives A3, A4, and the applicants' equivalent. In addition, route alternatives A1, A2, and A4 each have the potential to impact an NRHP-listed or -eligible resource. As a result, route alternatives A3 and the applicants' equivalent have the least potential to impact significant cultural resources.

6.1.2.4 Natural Environment

6.1.2.4.1 Water Resources

Floodplain and groundwater impacts 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 Book 5G shows water resources features in the vicinity of the Iron Range Substation region.

6.1.2.4.1.1 Watercourses and Waterbodies

The Iron Range Substation region routing alternatives would cross the Swan River once; there are no other watercourse or waterbody crossing. As previously discussed, the Swan River is classified as a PWI watercourse and is listed as an impaired water for aquatic consumption.

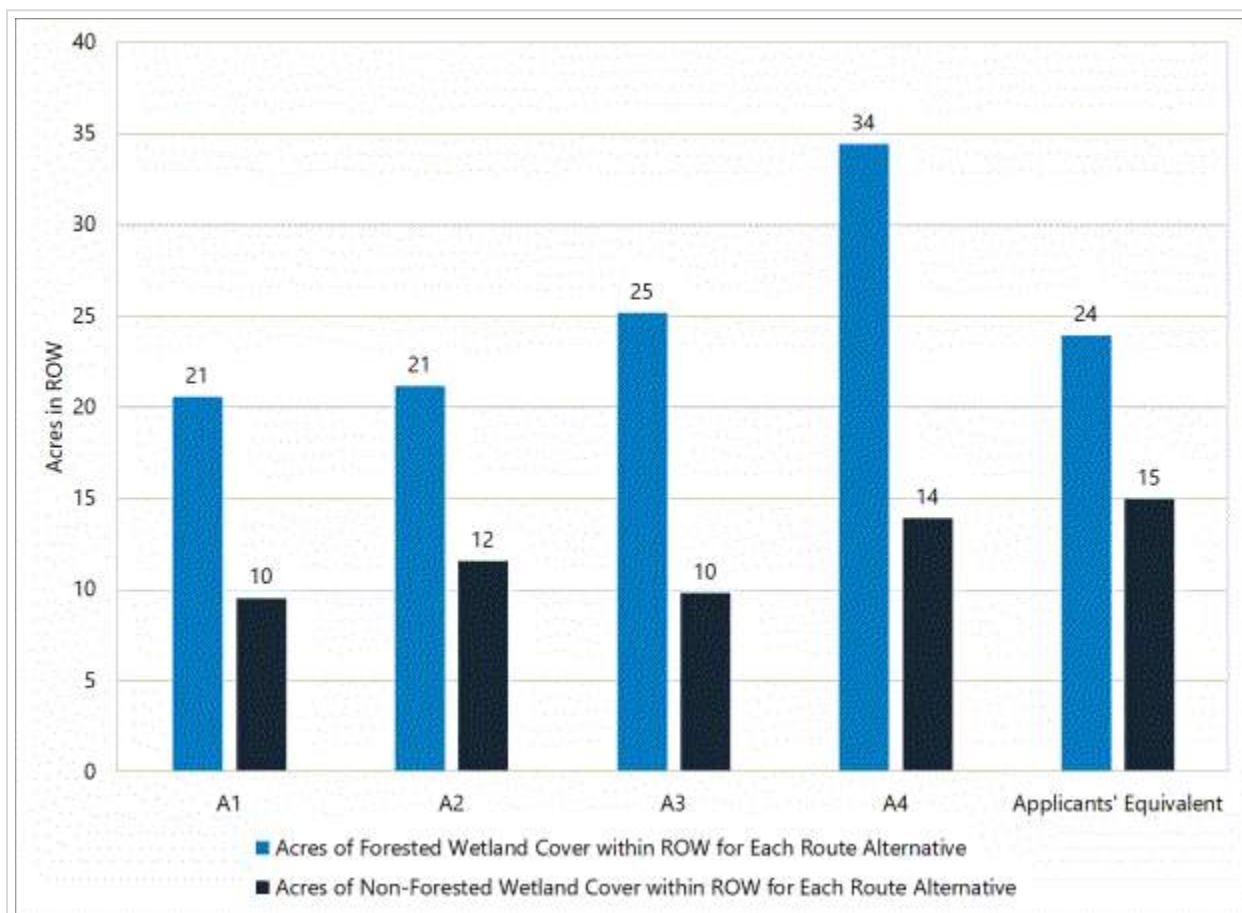
It is anticipated that this watercourse would be spanned. Since no structures are anticipated to be placed within waterbodies and watercourses, no direct impacts to these resources are anticipated. Indirect impacts to these resources, such as increases in turbidity, could be minimized by using BMPs and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

6.1.2.4.1.2 Wetlands

Wetlands within the routing alternative rights-of-way consist mainly of forested wetlands with some shrub-dominated wetlands, and emergent wetlands. Figure 6-2 shows the total area of wetland and forested wetland that are present within the ROW of each routing alternative. The applicants' equivalent route has the greatest amount of non-forested wetland within its ROW (15 acres), while the A1 route has the least (10 acres). The A1 route has the least amount of forested wetland within the ROW (21 acres), while the A4 route has the most (34 acres). No PWI wetlands are crossed by the routing alternatives.

Although wetlands would be spanned to the extent possible, all routing alternatives would cross wetland areas wider than 1,000 feet, which may require one or more structures to be placed in a wetland. Placing a structure in a wetland would result in permanent impacts. Permanent impacts to wetlands could also occur if wetlands in the 150-foot 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 routing alternative with fewer forested wetlands in the ROW. Thus, impacts to forested wetlands could be minimized by selection of the route alternative A1 or A2 or the project.

Figure 6-2 **Acres of Wetlands Crossed by Route Alternatives A1-A4**

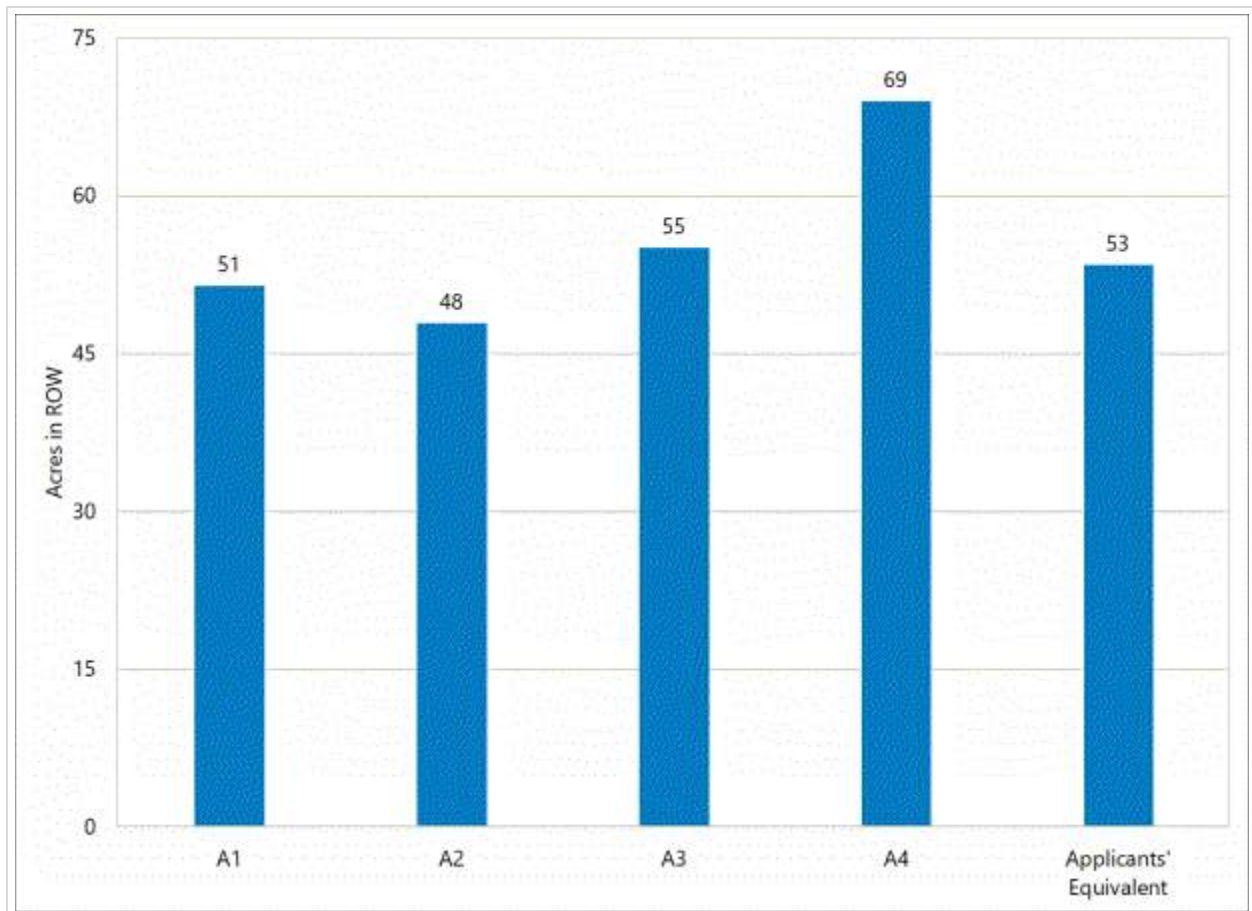


6.1.2.4.2 **Vegetation**

Impacts to forested vegetation in the 150-foot ROW of route alternatives A1 through A3 and the applicants' equivalent would be relatively similar, with route alternative A2 having slightly less forested vegetation in the 150-foot ROW (Figure 6-3). Route alternative A4 would impact the most forested vegetation in its 150-foot ROW (Figure 6-3). Construction of a new transmission line ROW through the densely forested area would be necessary for all routing alternatives in the northern part of the region, where they are located along the same alignment (Map Book 5C). However, each route alternative would also involve establishment of new rights-of-way in other forested areas, with route alternative A4 resulting in the most amount of new transmission line ROW in forested areas. Route alternative A4 is also the longest of these alternatives and parallels the least amount of transmission line or road rights-of-ways.

Route alternatives A1, A2, A3, and the applicants' equivalent would impact the fewest acres of forested vegetation and would minimize impacts associated with forest fragmentation by using a greater amount of existing transmission line ROW through forested areas.

Figure 6-3 Forested Vegetation in the 150-foot ROW of Route Alternatives A1-A4 and the Applicants' Equivalent



6.1.2.4.3 Wildlife

Wildlife habitat impacts would occur for route alternatives A1 through A4 and the applicants' equivalent; however, none of these routing alternatives would traverse areas that are publicly managed or preserved for wildlife. As discussed for vegetation, fragmentation of forested habitat would occur in the northern part of these routing alternatives where they are all located in an area of dense forest without an existing transmission line ROW. Route alternative A4 would require the greatest amount of new transmission line ROW through forested areas. In addition, route alternative A4 is the longest of the Iron Range region alternatives and does not parallel an existing transmission line ROW for any part of its length. As such, the potential for impacts to avian species could be highest with route alternative A4. However, as discussed in Chapter 5.10.5.2, avian impacts can be minimized through use of bird flight diverters.

6.1.2.5 Rare and Unique Natural Resources

From a review of the NHIS database, it was determined that no federal- or state-protected species have been identified within 1 mile of route alternatives A1 through A4 or the applicants' equivalent. All alternatives have four documented state special concern species within 1 mile of each of these routing alternatives (Appendix N).

The 150-foot ROW for route alternatives A1 through A4 and the applicants' equivalent would intersect a DNR SBS ranked "moderate" in two locations. The route alternative A4 ROW would intersect 56 acres, while the other Iron Range alternatives and the applicants' equivalent would intersect 32 acres. As shown on Map 6-1, the 150-foot ROW for route alternatives A1 through A4, as well as the applicants' equivalent, would intersect the site SBS in the same northern location. At this location, the alternatives would require a new transmission line ROW through the SBS to support transmission line structure installation. However, in the other location, the 150-foot ROW of route alternatives A1, A2, A3, and the applicants' equivalent would intersect the SBS along an existing transmission line ROW, thereby minimizing new impacts to the SBS. In contrast, as shown on Map 6-1, route alternative A4 would require a new transmission line ROW through the SBS and placement of transmission line structures within this ROW.

6.1.2.6 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.

Route alternative A3 would require two transmission line crossings, thereby introducing an increased reliability concern. Route alternative A1, A2, A4, and the applicants' equivalent would require no transmission line crossings.

6.1.2.7 Cost

Costs of the route alternatives are generally proportional to length and take into account the need for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-6). There is a difference of approximately \$3 million between the most expensive and least expensive of these route alternatives, and the applicants' equivalent is anticipated to be the least expensive (approximately \$25.4 million).

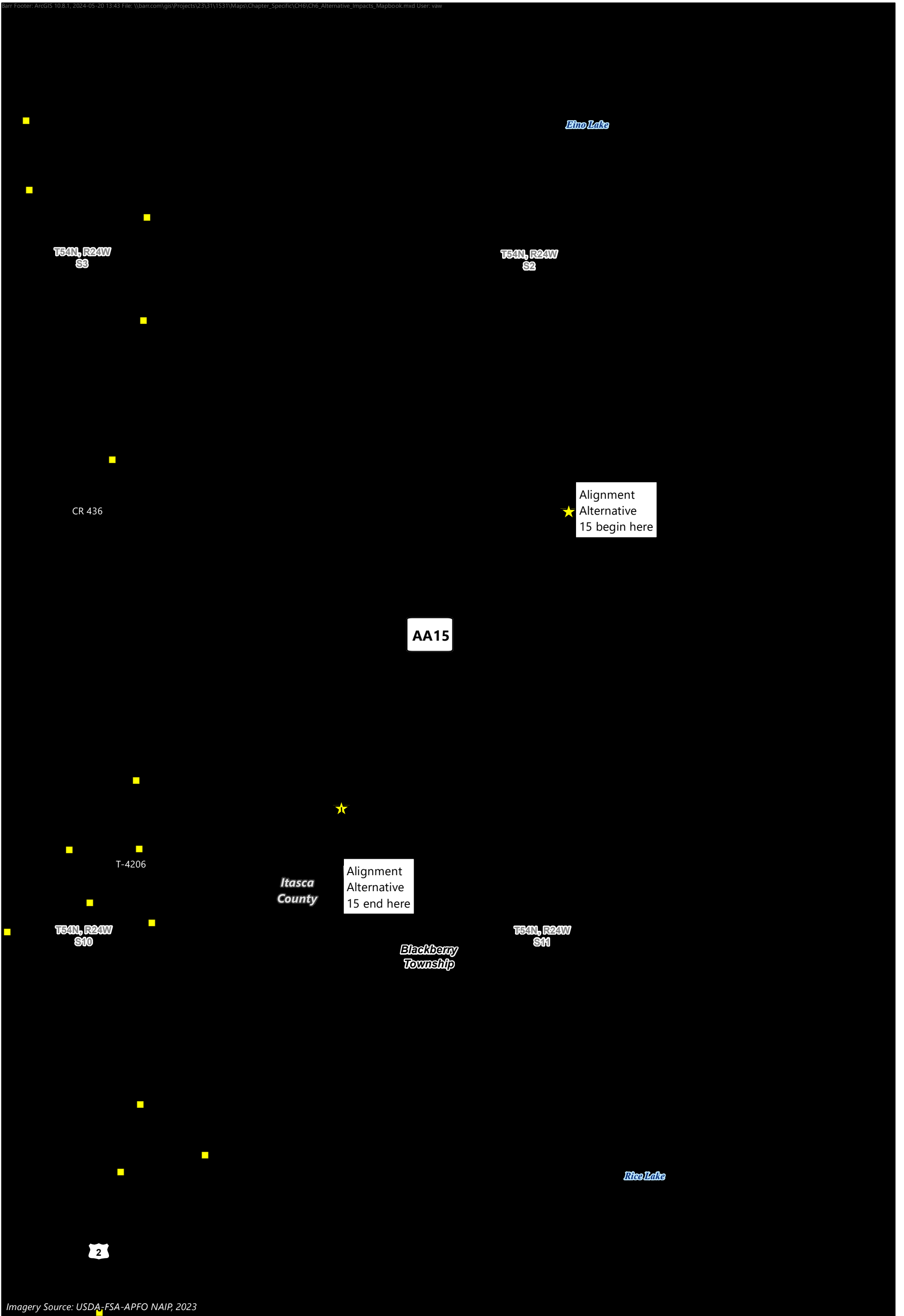
6.1.3 Alignment Alternative AA15 – Iron Range Substation Region

Alignment alternative AA15 provides an alternative placement of the applicants' proposed alignment in the southwest part of the Iron Range Substation region. Alignment alternative AA15 is shifted onto Itasca County tax forfeit land to avoid private property and would parallel an existing transmission line ROW for its entire length. Potential impacts of alignment alternative AA15 and the applicants' equivalent are summarized in Table 6-12 and shown on Map 6-2.

Table 6-12 Human and Environmental Impacts – Alignment Alternative AA15, Iron Range Substation Region

Resource	Element	Alignment Alternative AA15	Applicants' Equivalent
Length (miles)		0.44	0.40
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 (acres)	0	0
Water Resources	Total wetlands in 150-foot ROW (acres)	5	4
	Forested wetlands in 150-ft ROW (acres)	0	0
Vegetation	Forested landcover in 150-foot ROW (acres)	7 ¹	7
Rare and Unique Natural Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	7	6
	Federal- or state-protected species documented in 150-foot ROW (count)	0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	0.39 (89)	0.40 (100)
	Roadway (miles, percent)	0.00 (0)	0.00 (0)
	Field, parcel, or section lines (miles, percent)	0.03 (6)	0.00 (0)
	Total ROW sharing and paralleling (miles, percent)	0.42 (95)	0.40 (100)
Reliability	Crossing of existing transmission lines (count)	2	0
Estimated Cost	Total estimated cost (2022 dollars in millions)	\$6.4 ²	\$2.2


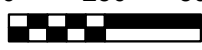
- 1 The NLCD indicates forested vegetation is in the ROW; however, the ROW is an existing transmission line ROW that has been cleared and is routinely maintained.
- 2 Two specialty structures would be needed to cross an existing transmission line for an estimated additional cost of approximately \$4 million (\$2.3 million base cost).



Imagery Source: USDA-FSA-APFO NAIP, 2023

- Alignment Alternative 15
- Applicants' AA15 Equivalent
- Route Width
- Route Alternative Width
- Existing Transmission Line
- Residence
- PWI Waterbody
- Shallow Wildlife Lake
- Wetlands**
- Non-Forested Wetland

- Site of Biodiversity Significance**
- Moderate Significance


 Feet
 0 250 500


Map 6-2
ALIGNMENT ALTERNATIVE AA15
 Iron Range Substation Region
 Northland Reliability Project

6.1.3.1 Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements. 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 in Chapter 5.3, include cultural values, displacement, electronic interference, noise, property values, socioeconomics and EJCs, and zoning and land use.

6.1.3.1.1 Aesthetics

Alignment alternative AA15 and the applicants' equivalent would have similar, minimal aesthetic impacts, as both follow an existing transmission line ROW for similar lengths (Map 6-2), with no residences located within 1,000 feet of the anticipated alignment for either alternative. ROW paralleling and sharing information for alignment alternative AA15 and the applicants' equivalent is shown in Table 6-13.

Table 6-13 Iron Range Substation Region ROW Paralleling and Sharing for Alignment Alternative AA15

Infrastructure	Alignment Alternative AA15 miles (percent)	Applicants' Equivalent miles (percent)
Follows Existing Railroad	0.00 (0)	0.00 (0)
Follows Existing Roads	0.00 (0)	0.00 (0)
Follows Existing Transmission Line	0.39 (89)	0.40 (100)
Total – Follows Transmission Line, Road, or Railroad	0.39 (89)	0.40 (100)
Follows Field, Parcel, or Section Lines	0.03 (6)	0.00 (0)
Total – ROW Paralleling and Sharing	0.42 (95)	0.40 (100)
Total Length of Route Alternative	0.44	0.40

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.

6.1.3.2 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 agricultural, forestry, or mining resources within the ROW of alignment alternative AA15 or the applicants' equivalent. Additionally, the routing alternatives are not anticipated to have an impact on recreation or tourism opportunities due to an absence of these resources in the project vicinity. As a result, land-based economy impacts in this area are anticipated to be minimal and independent of the route selected and are therefore not discussed further.

6.1.3.3 Archaeological and Historic Resources

There are no documented archaeological or historic architectural resources within the route width of alignment alternative AA15 or the applicants' equivalent. As a result, cultural resource impacts are anticipated to be minimal and independent of the route selected.

6.1.3.4 Natural Environment

6.1.3.4.1 Water Resources

6.1.3.4.1.1 Watercourses and Waterbodies

Alignment alternative AA15 and the applicants' equivalent would not cross any watercourses or waterbodies. Therefore, Alignment alternative AA15 and the applicants' equivalent would have no impact on watercourses or waterbodies.

6.1.3.4.1.2 Wetlands

Wetlands within the alignment alternative AA15 and the applicants' equivalent rights-of-way consist of shrub dominant wetlands and emergent wetlands. The applicants' equivalent ROW crosses 4 acres of wetland, of which over 2 acres are classified as shrub dominant wetlands, and just under 2 acres are classified as emergent wetlands. The AA15 alignment alternative cross 5 acres of wetland of which nearly half are classified as shrub dominant wetlands with the remaining area classified as emergent wetlands. Map 6-2 shows the wetlands crossed by the alignment alternative AA15.

Wetlands are small enough to be spanned, thereby avoiding structure placement in these areas. Structure placement in a wetland would result in permanent impacts. Since there are no forested wetlands within the AA15 alignment alternative or the applicants' equivalent, there would be no conversion of wetland type.

6.1.3.4.2 Vegetation

Alignment alternative AA15 and the applicants' equivalent would impact similar amounts of forested vegetation (approximately 7 acres), and both would parallel an existing transmission line ROW through forested areas (Map Book 5C). As such, the potential vegetation impacts would be comparable for these alignments.

6.1.3.4.3 Wildlife

Alignment alternative AA15 and the applicants' equivalent would have similar impacts on wildlife and associated habitats, as both would affect comparable areas of forested land. Both alignments would follow an existing transmission line ROW; alignment alternative AA15 would also require a perpendicular crossing of the existing transmission line, which could increase the potential for avian species impacts. However, as discussed in 5.10.5.2, avian impacts can be minimized through use of bird flight diverters.

6.1.3.5 Rare and Unique Natural Resources

From the NHIS database, it was determined that no federal- or state-protected species or state special concern species have been identified within 1 mile of alignment alternative AA15 or the applicants' equivalent. The 150-foot ROW of both alignments would intersect 6 to 7 acres of the SBS ranked moderate and both would do so along an existing transmission line ROW (Map 6-2). Potential impacts to rare and unique natural resources would be comparable for both alignments.

6.1.3.6 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.

Alignment alternative AA15 would require two transmission line crossings, thereby introducing an increased reliability concern. The applicants' equivalent would require no transmission line crossings.

6.1.3.7 Cost

Costs of the route alternatives are generally proportional to length and account for specialty and heavy-angle structures, which are more expensive than standard and/or tangent structures (Table 6-12). Alignment alternative AA15 would require two specialty structures to cross an existing transmission line in two separate locations. As a result, the applicants' equivalent (approximately \$2 million) would cost approximately \$4 million less than alignment alternative AA15 (approximately \$6 million).

6.2 Hill City to Little Pine Region

The Hill City to Little Pine region is in Aitkin, Cass, Crow Wing, and Itasca counties. In addition to the applicants' proposed route, the region has two route alternatives (B and C) and three alignment alternatives (AA1, AA2, and AA16) (Map Book 3A). Chapter 6.2.1 summarizes the potential construction and operation impacts of the applicants' proposed route in the Hill City to Little Pine region. Chapter 6.2.2 provides a comparison of the potential construction and operation impacts of route alternative B and the applicants' equivalent. Chapter 6.2.3 provides a comparison of the potential construction and operation impacts from route alternative C and the applicants' equivalent. Chapter 6.2.4 provides a comparison of the potential construction and operation impacts of alignment alternative AA1, AA2, and the applicants' equivalent. Chapter 6.2.5 provides a comparison of the potential construction and operation impacts of alignment alternative AA16 and the applicants' equivalent.

6.2.1 Applicants' Proposed Route – Hill City to Little Pine Region

Potential impacts of the applicants' proposed route in the Hill City to Little Pine region are summarized in Table 6-14 and discussed in Chapters 6.2.1.1 through 6.2.1.5.

Figure 6-4 Hill City to Little Pine Region

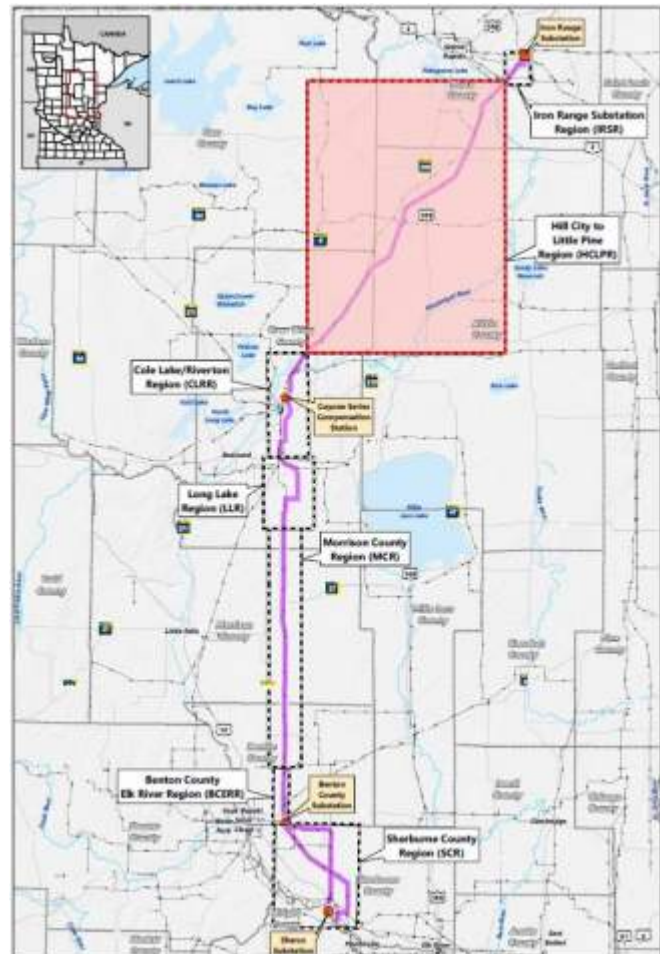


Table 6-14 Human and Environmental Impacts – Applicants’ Proposed Route, Hill City to Little Pine Region

Resource	Element	Applicants’ Proposed Route
Length (miles)		54.2
Human Settlement	Residences within 0-75 feet (count)	0
	Residences within 75-250 feet (count)	9
	Residences within 250-500 feet (count)	9
	Residences within 500–1,000 feet (count)	40
Land-Based Economies	Agricultural land in 150-foot ROW (acres)	70
Water Resources	Total wetlands in 150-foot ROW (acres)	351
	Forested wetlands in 150-foot ROW (acres)	137
Vegetation	Forested landcover in 150-foot ROW (acres)	658
Wildlife	Wildlife Management Areas in 150-foot ROW (acres)	14
Sensitive Ecological Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)	714
	Native Plant Communities in 150-foot ROW (acres)	254
	High Conservation Value Forest in 150-foot ROW (acres)	124
	Federal- or state-protected species documented in 150-foot ROW (count)	0
ROW Sharing and Paralleling	Transmission line (miles, percent)	52.6 (97)
	Roadway (miles, percent)	0 (0)
	Field, parcel, or section lines (miles, percent)	0 (0)
	Total ROW sharing and paralleling (miles, percent)	52.6 (97)
Estimated Cost	Total estimated cost (2022 dollars in millions)	\$300.9

6.2.1.1 Human Settlements

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

For some of the human settlement evaluation elements in the Hill City to Little Pine region, project impacts are anticipated to be minimal. For the Hill City to Little Pine region, aesthetics, displacement, and socioeconomics and EJCs are the only human settlement elements for which impacts may be non-minimal.

6.2.1.1.1 Aesthetics

Aesthetic impacts are assessed through a consideration of the existing viewshed, landscape, character, and setting of any given area, followed by an evaluation of how a proposed 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. Aesthetic impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure ROW.

The proximity of residential buildings to the applicants’ proposed route is shown in Table 6-15. Approximately 97 percent of the applicants’ proposed route in the Hill City to Little Pine region would parallel existing transmission line ROW (Table 6-16); therefore, on whole, the applicants’ proposed route is anticipated to have minimal to moderate aesthetic impacts.

Table 6-15 Hill City to Little Pine Region Proximity of Residences to Applicants’ Proposed Route

Residences, Distance from Anticipated Alignment	Applicants' Proposed Route
Residences within 0-75 feet	0
Residences within 75-250 feet	9
Residences within 250-500 feet	9
Residences within 500-1,000 feet	40
Total Residences within 1,000 feet	58

Table 6-16 Hill City to Little Pine Region ROW Sharing and Paralleling of Applicants’ Proposed Route

Infrastructure	Applicants' Proposed Route miles (percent)
Follows Existing Railroad	0.0 (0)
Follows Existing Roads	0.0 (0)
Follows Existing Transmission Line	52.6 (97)
Total – Follows Transmission Line, Road, or Railroad	52.6 (97)
Follows Field, Parcel, or Section Lines	0.0 (0)
Total – ROW Paralleling and Sharing	52.6 (97)
Total Length of Route Alternative	54.2

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.

6.2.1.1.2 Displacement

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

There are no permanent residences, churches, childcare centers, or schools located within the ROW for applicants' proposed route. However, there is one non-residential building (storage shed, agricultural outbuildings, etc.) located within the 150-foot ROW of the applicants' proposed route (Map Book 5A).

This non-residential building may or may not be displaced as a result of the project. Though buildings are generally not allowed within the transmission line ROW, there are instances where the activities taking place in such a building are compatible with the safe operation of the line (e.g., storage, animal production, etc.). The applicants would need to conduct a site-specific analysis to determine if the building would need to be displaced.

6.2.1.1.3 Socioeconomics and Environmental Justice

Socioeconomic factors provide an indication of how economic activity affects and is shaped by social processes. Socioeconomic measures indicate how societies progress, stagnate, or regress because of the actions and interactions within and between the local, regional, or global economic scale.

Transmission line projects can contribute to growth and progress at the local economic level over time, but generally do not have a significant long-term socioeconomic impact.

The project would improve the socioeconomics of the region through job creation, generation of tax revenue, and providing more reliable electrical service to the surrounding communities. The applicants' proposed route intersects with Macville Township, Wildwood Township, and Little Pine Township; each of which have been identified as communities with EJs (Chapter 5.3.9). No adverse or permanent impacts to the identified communities with EJs are anticipated. While the applicants' proposed route does intersect communities with EJs, these communities are not anticipated to experience disproportionately adverse project impacts, particularly because the project would parallel existing transmission line ROW through these EJs.

6.2.1.2 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 considered in the Hill City to Little Pine region, project impacts are anticipated to be minimal. There are no active mining operations within the project ROW in this region. Thus, for the Hill City to Little Pine region, agriculture, forestry, and recreation and tourism are the only land-based economy elements for which impacts are anticipated to be non-minimal.

6.2.1.2.1 Agriculture

Project impacts to agriculture within the Hill City to Little Pine 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 70 acres of the applicants' proposed route ROW in this region consists of agricultural land comprised of cultivated crops and hay/pasture lands.

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

6.2.1.2.2 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 658 acres of the ROW of the applicants' proposed route 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 6-17, the designated forestry resources consist of DNR state forests, Minnesota School Trust Land, Forest for the Future land, and SFIA land.

Table 6-17 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	424
Acres of Minnesota School Trust Land ¹ within 150-foot ROW	96
Acres of Forest for the Future ² land within 150-foot ROW	14
Acres of Sustainable Forest Incentive Act ³ land within 150-foot ROW	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)).

There are potential impacts to designated forestry resources within the applicants' proposed route ROW. The applicants' proposed route would cross Golden Anniversary State Forest, but it would parallel an existing transmission line through this forest. Vegetation clearing would include permanently removing trees from the ROW before construction.

Designated 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, designated forestry resource impacts could be mitigated by prudent routing and staging area siting. Where these areas cannot be

avoided, commercial foresters and private landowners would be compensated for loss of timber from ROW clearing.

6.2.1.2.3 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. Impacts to recreation and tourism from the applicants' proposed route are expected to be minimal where the project parallels existing ROWs.

The applicants' proposed route crosses two scenic byways, three state forests, two WMAs, 11 off-road vehicle use trails, six snowmobile trails, and one water trail (Map Book 5E). All of the recreation and tourism impacts from the applicants' proposed route occur in areas where the 150-foot ROW parallels existing transmission lines, thus, permanent impacts to resources in this area would be minimal due to existing disturbance from and presence of transmission lines.

Temporary impacts because of the applicants' proposed route could include temporary trail closings during construction and temporary interruptions in recreational opportunities within the Birchdale WMA, Crow Wing State Forest, Golden Anniversary State Forest, Hill River State Forest, and Moose Willow WMA (Chapter 5.8.4.1). Although temporary impacts would occur because of this route, they are expected to have a minimal long-term impact on recreation.

6.2.1.3 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 Hill City to Little Pine region.

There are two archeological resources and nine documented historic architectural resources within the applicants' proposed route width (1,000 ft) in the Hill City to Little Pine region (Table). As discussed in Chapter 5.9.3, impacts to these resources would mainly consists of changes in the resource's setting due to the location of the transmission line placement.

Table 6-18 Cultural Resources within the Route Width of the Applicants' Proposed Route, Hill City to Little Pine Region

Resource Number	Resource Type	NRHP Eligibility
21AK0136	Post-contact artifact scatter, structural ruin	Not evaluated
21AK0137	Precontact single artifact	Not evaluated
AK-MCV-00011	Boyd's Ranch Inn	Not evaluated
IC-BLK-00005	Blackberry Pump Station	Not evaluated
IC-BLK-00008	Eastern Railway/GN/BN/BNSF	Not evaluated
CA-UOG-00088	Soo Line ATV Trail	Not evaluated
XX-ROD-00044	Current TH 169	Not eligible
XX-ROD-00052	Trunk Highway 6	Not eligible
XX-ROD-00176	Trunk Highway 2	Not evaluated
XX-ROD-00181	Trunk Highway 200 / TH 34, TH 81, TH 85, TH 92, TH 116	Not eligible
XX-ROD-00182	Trunk Highway 31 / TH 200, TH 81, TH 85, TH 92, TH 116	Not eligible

The applicants' proposed route would cross resources CA-UOG-00088, XX-ROD-00044, XX-ROD-00052, XX-ROD-00176, XX-ROD-00181, and XX-ROD-00182 within an existing transmission line ROW. Since this transmission line ROW already exists, the project is not expected to alter the resource setting. Therefore, the project will not have an adverse effect on these resources. In the vicinity of IC-BLK-00005 and IC-BLK-00008, the applicants' proposed route follows an existing transmission line ROW. Consequently, no changes in resource setting are anticipated as a result of the project. The applicants' proposed route does not follow an existing transmission line ROW in the vicinity of resources 21AK0136, 21AK0137, and AK-MCV-00011. Ground disturbing activities and the change in setting resulting from the project have the potential to impact these resources if they cannot be avoided. No other cultural resources are present within the route width.

6.2.1.4 Natural Environment

6.2.1.4.1 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 water resource features, floodplains and groundwater, are anticipated to be minimal.

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

important consideration when evaluating routes. Since large-growing woody vegetation would be cleared from the ROW, forested wetlands would be converted to other wetland types, resulting in permanent impacts.

6.2.1.4.1.1 Watercourses and Waterbodies

According to the NHD, the applicants' proposed route would cross 28 watercourses in the Hill City to Little Pine region. Fifteen of these watercourses are classified as public waters, and four of them are classified as impaired, including the Mississippi River, Moose River, an unnamed ditch, and Willow River. The applicants' proposed route would also cross one unnamed NHD waterbody and three public water basins.

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

6.2.1.4.1.2 Wetlands

The applicants' proposed route cross approximately 351 acres of NWI. These NWI wetlands consist mainly of forested wetlands (137 acres), emergent wetlands (105 acres), and shrub-dominated wetlands (97 acres). There is one PWI wetland along the applicants' proposed route in the Hill City to Little Pine region.

Although wetlands would be spanned to the extent possible, the applicants' proposed route would cross wetland areas wider than 1,000 feet, which may require one or more structures to be placed in a wetland. Placement of structures in a wetland would result in permanent impacts to that wetland. Permanent impacts to wetlands could also occur if wetlands if 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 routing alternative with fewer forested wetlands in the ROW.

6.2.1.4.2 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 landcover types across the Hill City to Little Pine region, and Table 6-19 summarizes the landcover types within the 150-foot ROW of the applicants' proposed route within this region. The dominant vegetative landcover in the applicants' proposed route 150-foot ROW consists of forest, which represents approximately 67 percent of the ROW. Forest types include forested wetlands and upland deciduous, coniferous, and mixed forest communities.

Table 6-19 Landcover Types in the 150-foot ROW of the Applicants' Proposed Route in the Hill City to Little Pine Region

Landcover Type	Acres in ROW	Percent of ROW ¹
Forested (upland and wetland)	658	67
Herbaceous (upland and wetland)	213	22
Agricultural (cultivated crops and hay/pasture)	70	7
Shrub/Scrub	27	3
Developed (low-high intensity; open space)	13	1
Open Water	5	<1

Source: reference (110).

¹ Totals may not sum to 100 percent due to rounding.

As discussed in Chapter 5.10.4.1, the applicants would clear forested vegetation from the ROW during construction, and the ROW would be maintained with low-growing vegetation to minimize potential transmission line interference. Approximately 97 percent of the applicants' proposed route in the Hill City to Little Pine region would parallel an existing transmission line ROW where the forested areas have already been fragmented, thereby minimizing new impacts to large areas of contiguous forest.

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.

6.2.1.4.3 Wildlife

Wildlife impacts are evaluated through the presence of wildlife habitat, including areas that are publicly preserved or managed for wildlife habitat, within the ROW (Chapter 5.10.5.1 and 5.10.5.2). The applicants' proposed route in the Hill City to Little Pine region would parallel an existing transmission line ROW for 97 percent of its length. Because of this, the ROW of the applicants' proposed route would occur adjacent to an area where wildlife habitat has been previously disturbed, thereby minimizing potential impacts associated with habitat fragmentation. In addition, the potential for impacts to avian species would be minimized by paralleling this existing transmission line ROW.

The applicants' proposed route would traverse approximately 14 acres of two WMAs, including the Moose Willow WMA and the Birchdale WMA. As shown on Map Book 5H, the applicants' proposed route would traverse the edges of these WMAs and would do so while paralleling an existing transmission line ROW, thereby minimizing new impacts to these WMAs.

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

6.2.1.5 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 Hill City to Little Pine 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.

6.2.1.5.1 Protected Species

Using the NHIS database, it was determined that one federal and five state-protected species have been documented within 1 mile of the applicants' proposed route in the Hill City to Little Pine region, as summarized in Table 6-20. In addition, several state special concern species have been documented within 1 mile of the applicants' proposed route in this region (Appendix N).

Table 6-20 Federal- or State-Protected Species Documented in the Natural Heritage Information System Database – Applicants' Proposed Route in the Hill City to Little Pine Region

Scientific Name	Common Name	Type	State Status	Documented Records within ROW, Route Width, or 1 Mile
<i>Utricularia purpurea</i>	Purple-flowered bladderwort	Vascular plant	Endangered	1 Mile
<i>Botrychium angustisegmentum</i>	Narrow triangle moonwort	Vascular plant	Threatened	1 Mile
<i>Botrychium oneidense</i>	Blunt-lobed grapefern	Vascular plant	Threatened	1 Mile
<i>Cardamine pratensis</i>	Cuckoo flower	Vascular plant	Threatened	Route width
<i>Poa paludigena</i>	Bog bluegrass	Vascular plant	Threatened	Route width
<i>Myotis septentrionalis</i>	Northern long-eared bat	Bat	Special concern (federally endangered)	1 Mile

None of the federally or state protected species identified in Table 6-20 have been documented within the applicants' proposed route ROW; however, two state threatened vascular plant species have been documented within the 1,000-foot route width. 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. In addition, although not tracked in the NHIS database, it is possible that, given the forested landcover in this region, federally threatened gray wolves and Canada lynx could inhabit areas near the applicants' proposed route. 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 impacts to protected species are summarized in Chapter 5.11.1.3. Several measures could be implemented to avoid, minimize, or mitigate impacts to protected species, as described in Chapter 5.11.1.3. In addition, the applicants may be required to conduct field surveys for protected species in coordination with the USFWS and/or DNR prior to construction.

6.2.1.5.2 Sensitive Ecological Resources

The applicants' proposed route ROW in the Hill City to Little Pine region would traverse several sensitive ecological resources, including approximately 714 acres of SBS, 254 acres of native plant communities, and 124 acres of High Conservation Value Forest (Table 6-21; Map Book 5I). As shown on Map Book 5I, with the exception of one SBS ranked moderate in the central part of the region, the applicants' proposed route ROW in the Hill City to Little Pine region would cross these sensitive ecological resources while paralleling an existing transmission line ROW. As a result, new impacts associated with forest/habitat fragmentation would be minimized. However, several of these sensitive ecological resources are too large to span and would therefore require the placement of transmission line structures within them.

Table 6-21 Sensitive Ecological Resources in the ROW of the Applicants' Proposed Route – Hill City to Little Pine Region

Sensitive Ecological Resource	Area within ROW of Applicants' Proposed Route
Sites of Biodiversity Significance	714 total acres; 400 acres ranked high; 256 acres ranked moderate; 58 acres ranked below
Native Plant Communities	254 total acres; 2 acres have a conservation status of S1 or S2; conservation status of remaining acres is S3-S5
High Conservation Value Forest	124 acres

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

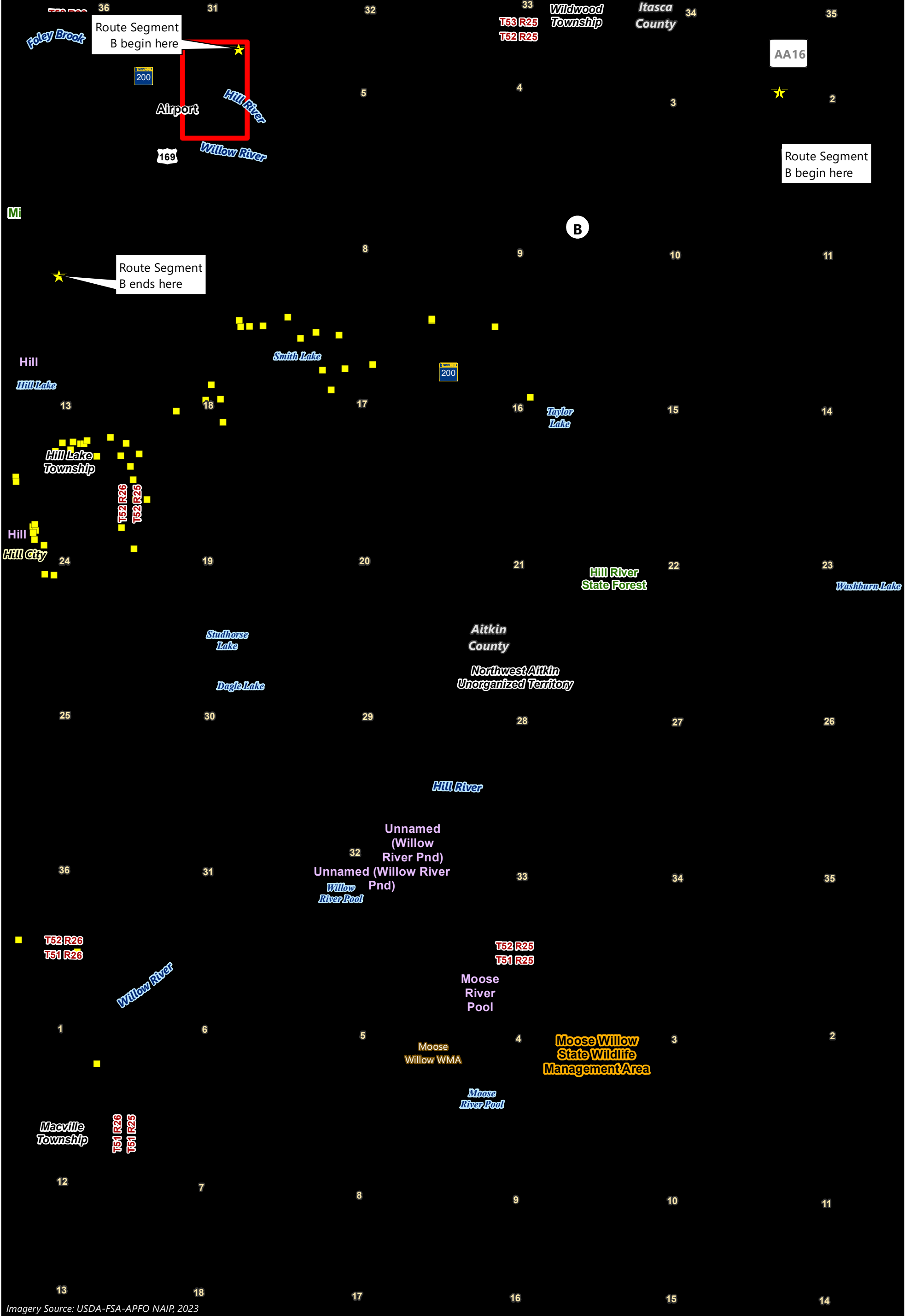
6.2.2 Route Alternative B – Hill City to Little Pine Region

Route alternative B provides an alternative to the applicants' proposed route in the central part of the Hill City to Little Pine region. Route alternative B shifts west from the applicants' proposed route in an effort to reduce impacts to natural resources. Route alternative B would parallel an existing transmission line ROW for its entire length. A portion of route alternative B is adjacent to the Hill City/Quadna Mountain Airport. Potential impacts of route alternative B and the applicants' equivalent are summarized in Table 6-22 and shown on Map 6-3 through Map 6-6.

Table 6-22 Human and Environmental Impacts – Route Alternative B, Hill City to Little Pine Region

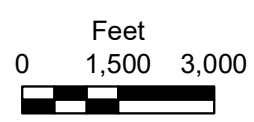
Resource		Element	Route Alternative B	Applicants' Equivalent
Length (miles)			26.4	27.0
Human Settlement	Residences within 0-75 feet (count)		0	0
	Residences within 75-250 feet (count)		1	3
	Residences within 250-500 feet (count)		14	2
	Residences within 500–1,000 feet (count)		14	18
Transportation	Airports within 1 mile (count)		1	0
Land-Based Economies	Agricultural land in 150-foot ROW (acres)		7	29
Water Resources	Total wetlands in 150-foot ROW (acres)		190	150
	Forested wetlands in 150-foot ROW (acres)		104	56
Vegetation	Forested landcover in 150-foot ROW (acres)		376	349
Wildlife	Wildlife Management Area in 150-foot ROW (acres)		0	13
Sensitive Ecological Resources	Sites of Biodiversity Significance in 150-foot ROW (acres)		199	308
	Native Plant Communities in 150-foot ROW (acres)		145	139
	High Conservation Value Forest in 150-foot ROW (acres)		32	123
	Candidate Old Growth Stand in 150-foot ROW (acres)		9	0
	Federal- or state-protected species documented in 150-foot ROW (count)		0	0
ROW Sharing and Paralleling	Transmission line (miles, percent)		26.4 (100)	25.4 (94)
	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)		26.4 (100)	25.4 (94)
Reliability	Crossing of existing transmission lines (count)		0	0
Estimated Cost	Total estimated cost (2022 dollars in millions)		\$146.4 ¹	\$149.9

¹ Significant engineering would be needed to develop the specialty structures required near the Hill City-Quadna Airport to lower structure heights to less than 80 feet as well as the specific ROW needs to accommodate the lower structures. At this time there is no way to estimate these structure costs.

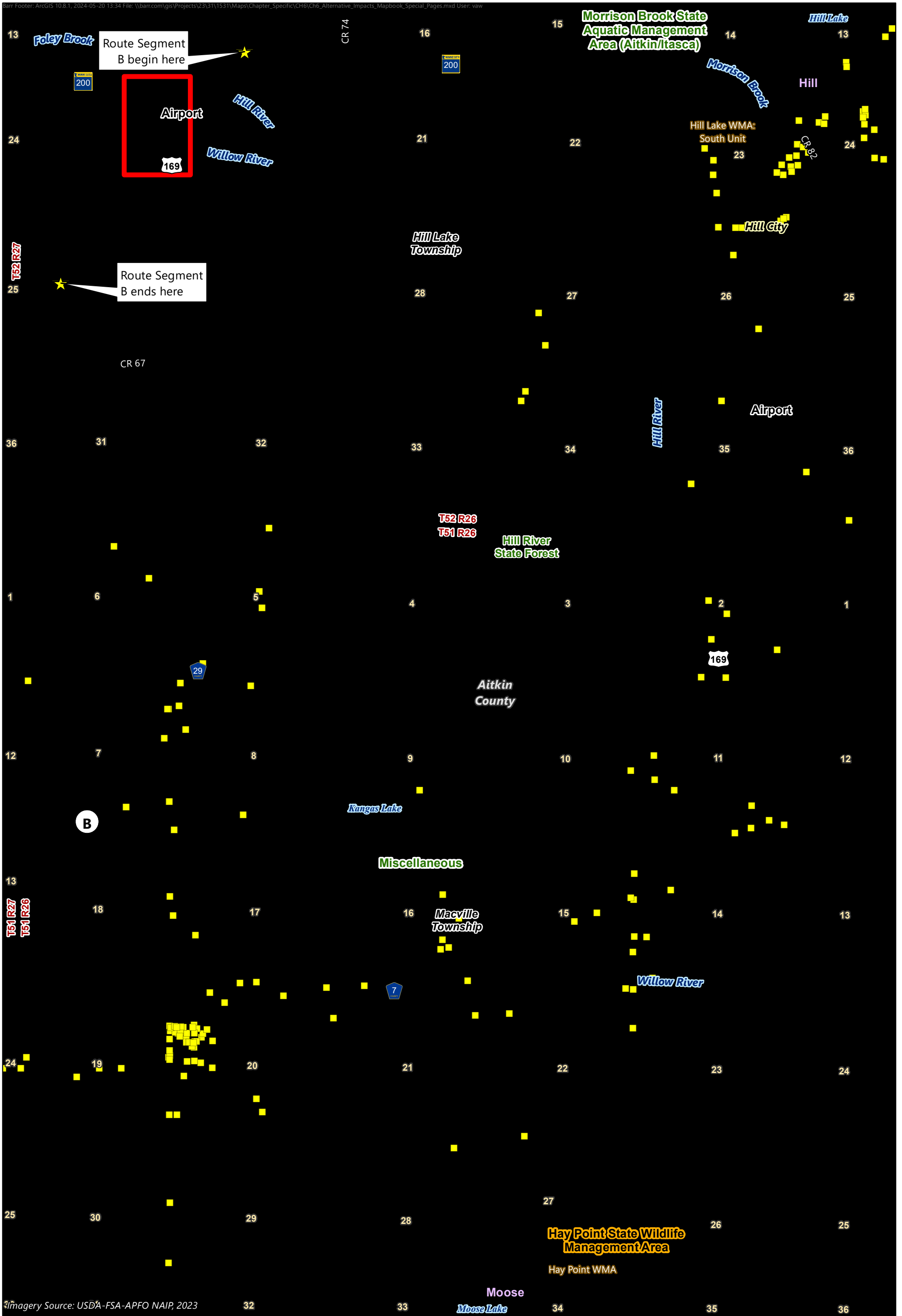


Imagery Source: USDA-FSA-APFO NAIP, 2023

Route Segment B	PWI Waterbody	Other DNR Land	Forest Inventory Old Growth
Applicants' Route B Equivalent	Shallow Wildlife Lake	Municipal Boundary	Designated Old Growth
Route Width	Native Plant Community	Lakes of Biological Significance	Candidate Old Growth
Route Alternative Width	High Conservation Value Forest	Outstanding Significance	Site of Biodiversity Significance
Existing Transmission Line	Forests of the Future Easement	Wetlands	High Significance
Residence	Wildlife Management Area	Non-Forested Wetland	Moderate Significance
PWI Watercourse	State Forest	Forested Wetland	

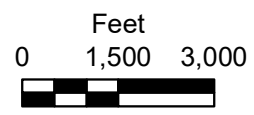


Map 6-3
ROUTE ALTERNATIVE B (PART 1)
 Hill City to Little Pine Region
 Northland Reliability Project

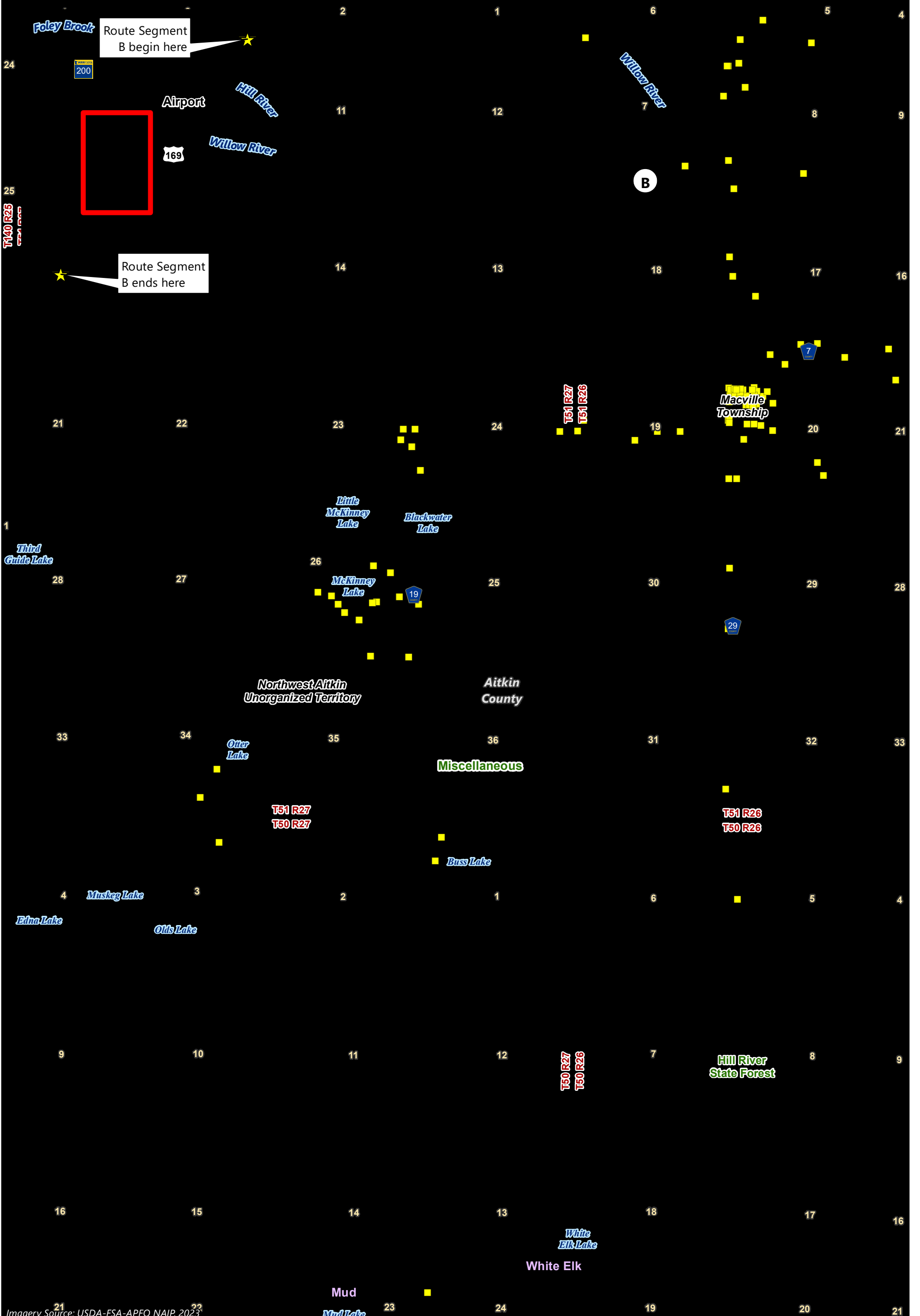


Imagery Source: USDA-FSA-APFO NAIP, 2023

- | | | | |
|--------------------------------|--------------------------|----------------------------------|-----------------------------------|
| Route Segment B | PWI Waterbody | Municipal Boundary | Forest Inventory Old Growth |
| Applicants' Route B Equivalent | Shallow Wildlife Lake | Lakes of Biological Significance | Designated Old Growth |
| Route Width | Native Plant Community | Outstanding Significance | Site of Biodiversity Significance |
| Route Alternative Width | Wildlife Management Area | Wetlands | High Significance |
| Existing Transmission Line | State Forest | Non-Forested Wetland | Moderate Significance |
| Residence | Aquatic Management Area | Forested Wetland | |
| PWI Watercourse | Other DNR Land | | |



Map 6-4
ROUTE ALTERNATIVE B (PART 2)
 Hill City to Little Pine Region
 Northland Reliability Project



Imagery Source: USDA-FSA-APFO NAIP, 2023

- | | | |
|--------------------------------|---|--|
| Route Segment B | PWI Waterbody | Wetlands |
| Applicants' Route B Equivalent | Shallow Wildlife Lake | Non-Forested Wetland |
| Route Width | Native Plant Community | Forested Wetland |
| Route Alternative Width | State Forest | Forest Inventory Old Growth |
| Existing Transmission Line | Other DNR Land | Designated Old Growth |
| Residence | Lakes of Biological Significance | Site of Biodiversity Significance |
| PWI Watercourse | Outstanding Significance | Moderate Significance |

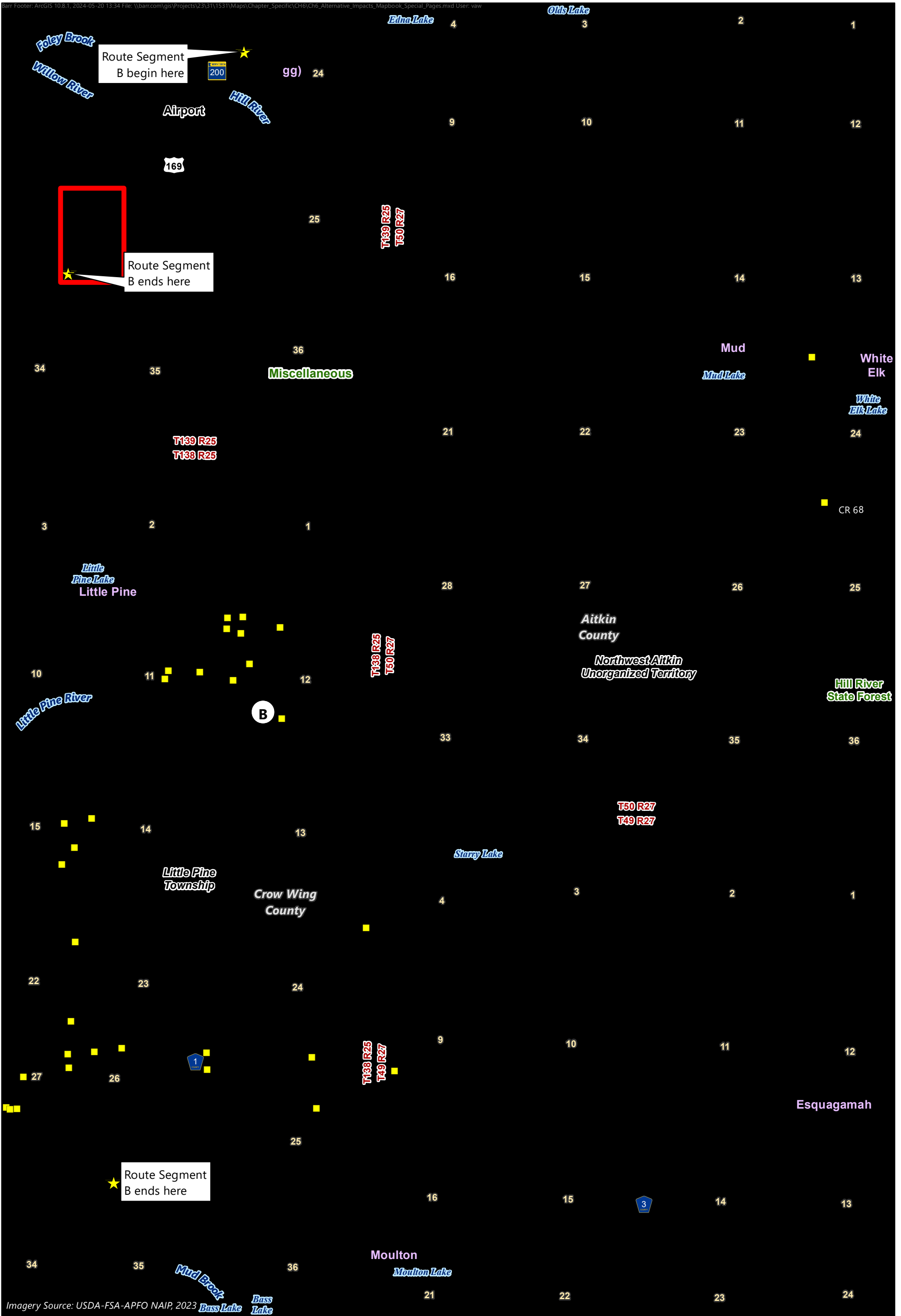
North Arrow

Feet

0 1,500 3,000

Map 6-5

ROUTE ALTERNATIVE B (PART 3)
Hill City to Little Pine Region
Northland Reliability Project



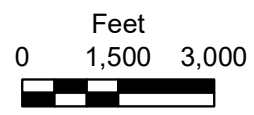
Imagery Source: USDA-FSA-APFO NAIP, 2023

- Route Segment B
- Applicants' Route B 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**
- Outstanding Significance
- High Significance
- Moderate Significance
- Wetlands**
- Non-Forested Wetland
- Forested Wetland

- Forest Inventory Old Growth**
- Designated Old Growth
- Site of Biodiversity Significance**
- High Significance
- Moderate Significance



Map 6-6

ROUTE ALTERNATIVE B (PART 4)
Hill City to Little Pine Region
Northland Reliability Project