5 Proposed Transmission Project and Routing Alternatives

Chapter 4 describes the applicant's Proposed Route, two alternative routes proposed by the applicant, and three route segment alternatives proposed by the applicant, and one route segment alternative proposed during scoping. It also describes how the new 161 kV overhead HVTL and substation would be constructed, operated, and maintained. Unless otherwise noted, the source of information for this chapter is the route permit application and supplemental information provided by the applicants.

5.1 What route and route alternatives does this EA study?

One proposed route, two route alternatives, and two points of interconnection (POI) are studied.

The applicants' proposed route would begin at the Big Bend Wind Project and Red Rock Solar Project Substations, and extend generally to the southeast to the POI at the Crandall Switching Station (**Figure 5-1)**. The EA also studies two alternative routes that were presented in the route permit application. One is referred to as the Crandall Alternate Route, which takes a more direct route from the Big Bend Wind Project and Red Rock Solar Project Substations, generally south, to the Crandall Switching Station POI. The second alternative route is referred to as the Peaking Plant Alternate Route, which takes a relatively direct route from the Big Bend Wind Project and Red Rock Solar Project Substations, generally south, to the Lakefield Junction Station POI. (**Figure 5-1**).

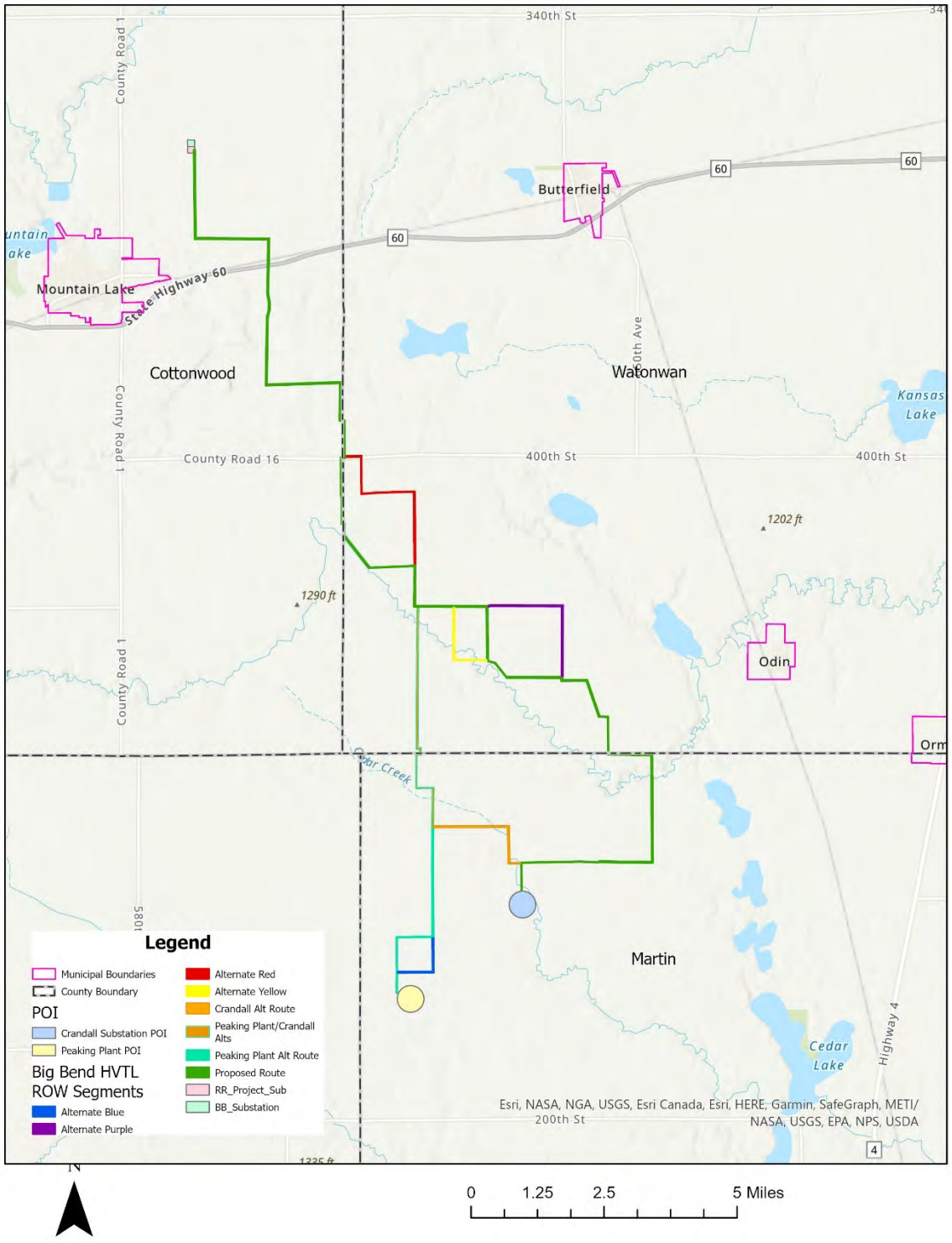
Proposed Route

The Applicant's Proposed Route will extend from the Big Bend Wind Project and Red Rock Solar Project Substations, generally to the southeast, to the Crandall Switching Station.

The applicant's proposed route begins at the collocated Big Bend Wind Project and Red Rock Solar Project Substations at the northwest corner of the intersection of 590th Avenue and 360th Street in Cottonwood County. The Proposed Route travels south on the west side of 590th Avenue for 1.2 miles before turning east on the north side of 370th Street for one mile. The Proposed Route turns south along the west side of 600th Avenue for two miles before turning east along the north side of 390th Street for one mile and turning south again along 610th Avenue. The Proposed Route follows the west side of 610th Avenue for a half mile before crossing to the east side of 610th Avenue for an additional half mile before crossing back to the west side of 610th Avenue and continuing for an additional 0.9-mile. The Proposed Route crosses a parcel line to the east and continues south for 0.15 mile before turning southeast to parallel the Watonwan River for 0.55 mile and then travels east along the parcel line for 0.65 mile to County State Aid Highway (CSAH) 2 (620th Avenue). The Proposed Route then turns south along the west side of CSAH 2 for half mile before turning east along the south side of CSAH 22 (420th Street) for one mile and then turning south again on the west side of County Road 128. The Proposed Route travels south along County Road 128 for three-quarters of a mile before crossing to the east side of the road and paralleling the north side of the Watonwan River through agricultural land for 0.4-mile to the north side of County Road 134 (430th Street). This 0.4-mile segment is proposed to be buried to avoid impacts to a landing strip (see Section 5.1.12). The Proposed Route continues east on the north side of County Road 134 for three-quarters of a mile

before crossing County Road 134 and continuing east for an additional 0.35 mile. The Proposed Route then travels southeast through agricultural land for approximately 0.5 mile before turning east for 0.1 mile. The Proposed Route then turns south along a parcel line through agricultural field for 0.5 mile to 250th Street before turning east along the south side of the road for 0.6 mile to the west side of CSAH 9. The Proposed Route follows CSAH 9 south along the west side for 1.5 miles before turning west for 1.8 miles along agricultural field edges. The Proposed Route turns south for 0.5 mile to the Step-up Substation along 230th Street.

Figure 5-1. Proposed Route, Alternate Routes, Alternate Route Segments, and POIs



Alternate Routes and POI Locations

The Alternate Crandall Route and Alternate Peaking Plant Route have been put forward by the Applicant as possible alternates to the Proposed Route and would interconnect to the electrical grid at the Crandall Switching Station and the Lakefield Junction POI, respectively.

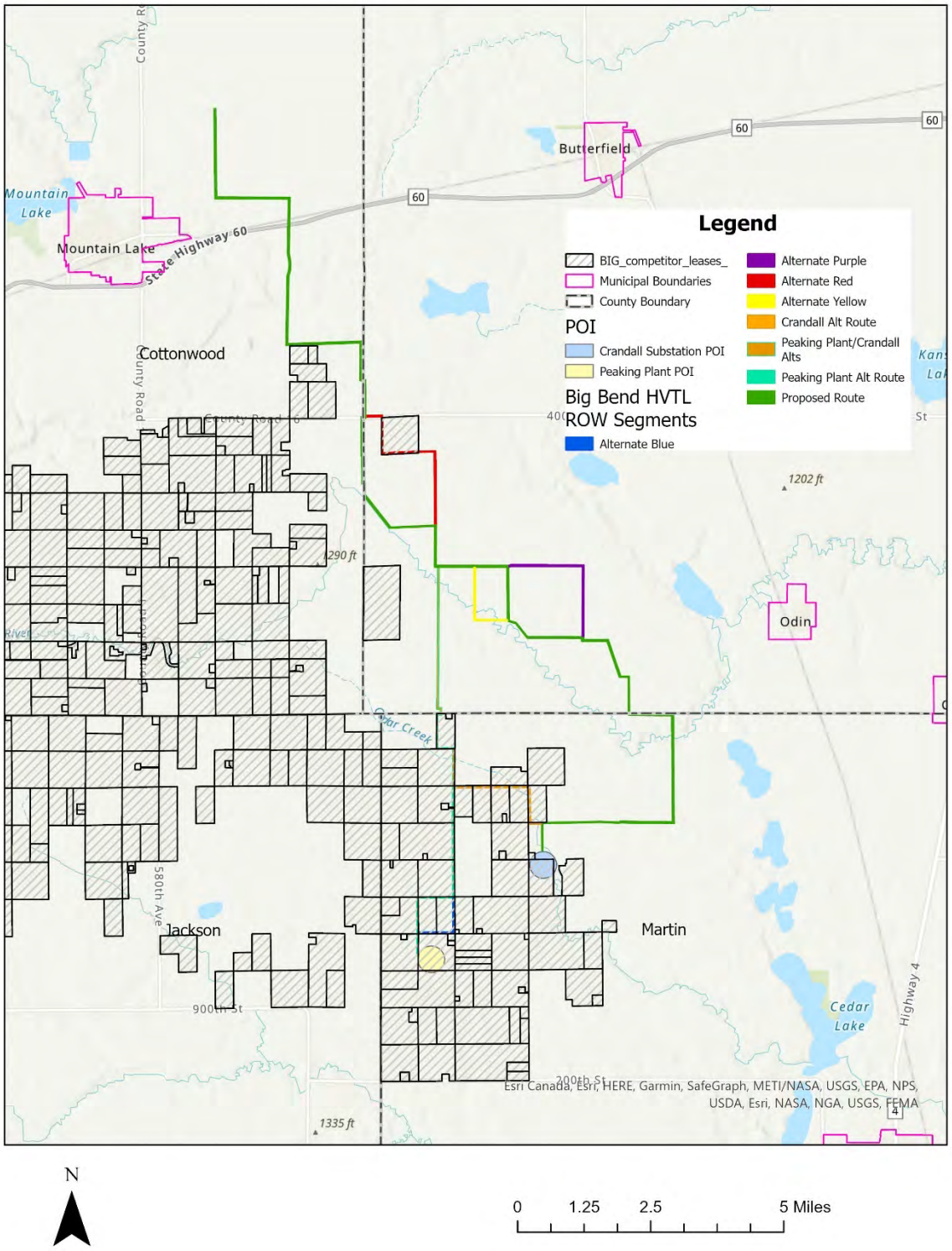
Many parcels in northwestern Martin County are under lease with different developers as part of the Odell and Trimont Wind Farms. Additionally, this area already includes wind turbines, gen-tie transmission lines, and an existing 345 kV transmission line. From the intersection of CSAH 2 and CSAH 22 along the Proposed Route, Big Bend has signed voluntary transmission easements for a route south along CSAH 2 for two miles to the Martin County border. At the Martin County border, the applicants have indicated that easement constraints have challenged route development, see Figure 21. The applicant nonetheless has identified two alternate routes through this area.

The Alternate Crandall Route, which would be approximately 3.5 miles shorter than the Proposed Route, also ends at the Crandall Switching Station POI.

The Alternate Peaking Plant Route ends at the Lakefield Junction POI.

For purposes of comparison, this EA provides analysis of end-to-end routes (the Proposed Route, Alternate Crandall Route, and Alternate Peaking Plant Route).

Figure 5-2. Current Land Easement Constraints



5.2 What route segment alternatives does this EA study?

Four route segments are studied in the EA.

For the purposes of this EA, the applicant proposed three alternate route segments for consideration, Alternate Red Route Segment, Alternate Yellow Route Segment, and Alternate Purple Route Segment (**Figures 5-3, 5-4, and 5-5** respectively). The three alternate route segments proposed by the applicant are alternates to two different segments of the Proposed Route.

An additional alternate route segment was added during the scoping process to provide an alternative to a portion of the Peaking Plant Alternate Route. This additional alternate route segment is referred to as the Alternate Blue Route Segment, which was referred to as the Peaking Plant Alternate Route – Alternate Route Segment in the Scoping Decision, see **Figure 5-6**. Should the Commission issue a route permit for the project, it must select the applicant's proposed route, the Crandall Alternate Route or the Peaking Plant Alternate Route. If the Commission selects the applicant's proposed route they may designate the use of the Alternate Red Segment. Additionally, they may designate either the Alternate Yellow Segment or Alternate Purple Segment. If the Commission selects the Peaking Plant Alternate Route they may designate the use of the Alternate Blue Route Segment.

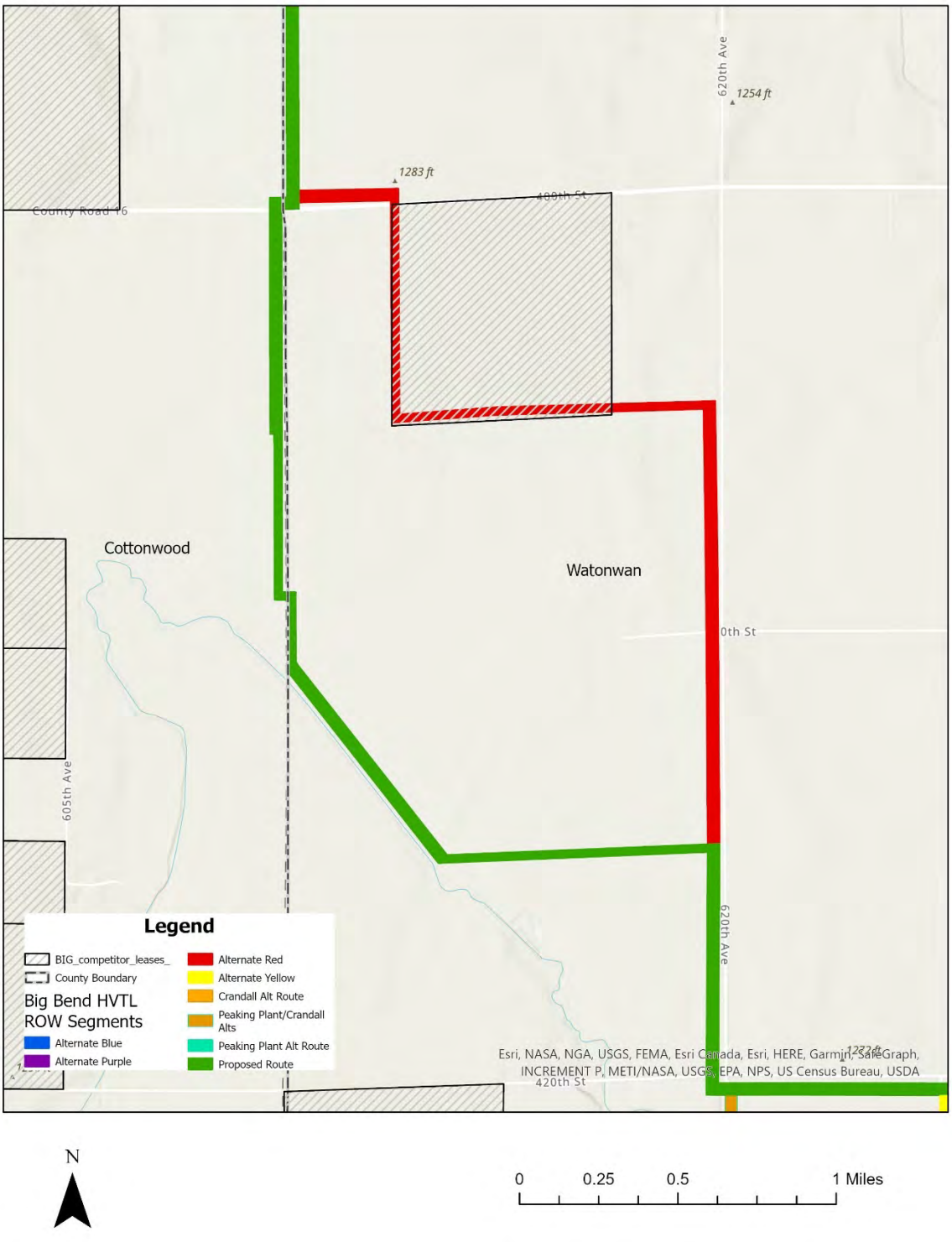
Alternate Red Route Segment

The Alternate Red Route Segment was proposed as an alternate route segment to a portion of the applicant's proposed route in the route permit application. It begins at the intersection of 610th Avenue and CSAH 10 and continues to a point rejoining the Proposed Route along CSAH 2.

The Alternate Red Segment begins at the intersection of 610th Avenue and CSAH 10 on the border of Cottonwood and Watonwan Counties. The Alternate Red Segment follows the north side of CSAH 10 for 0.25 mile before turning south through agricultural field edge for half mile. The Alternate Red Segment then turns east for 0.7-mile to the west side of CSAH 2 and travels south paralleling CSAH 2 for one mile before rejoining the Proposed Route.

The Alternate Red Segment is approximately 2.5 miles in length, approximately 0.15 mile longer than the comparative segment on the Proposed Route. The Alternate Red Segment would have more of its length collocated with roads and is routed further from the Watonwan River.

Figure 5-3. Alternate Red Route Segment



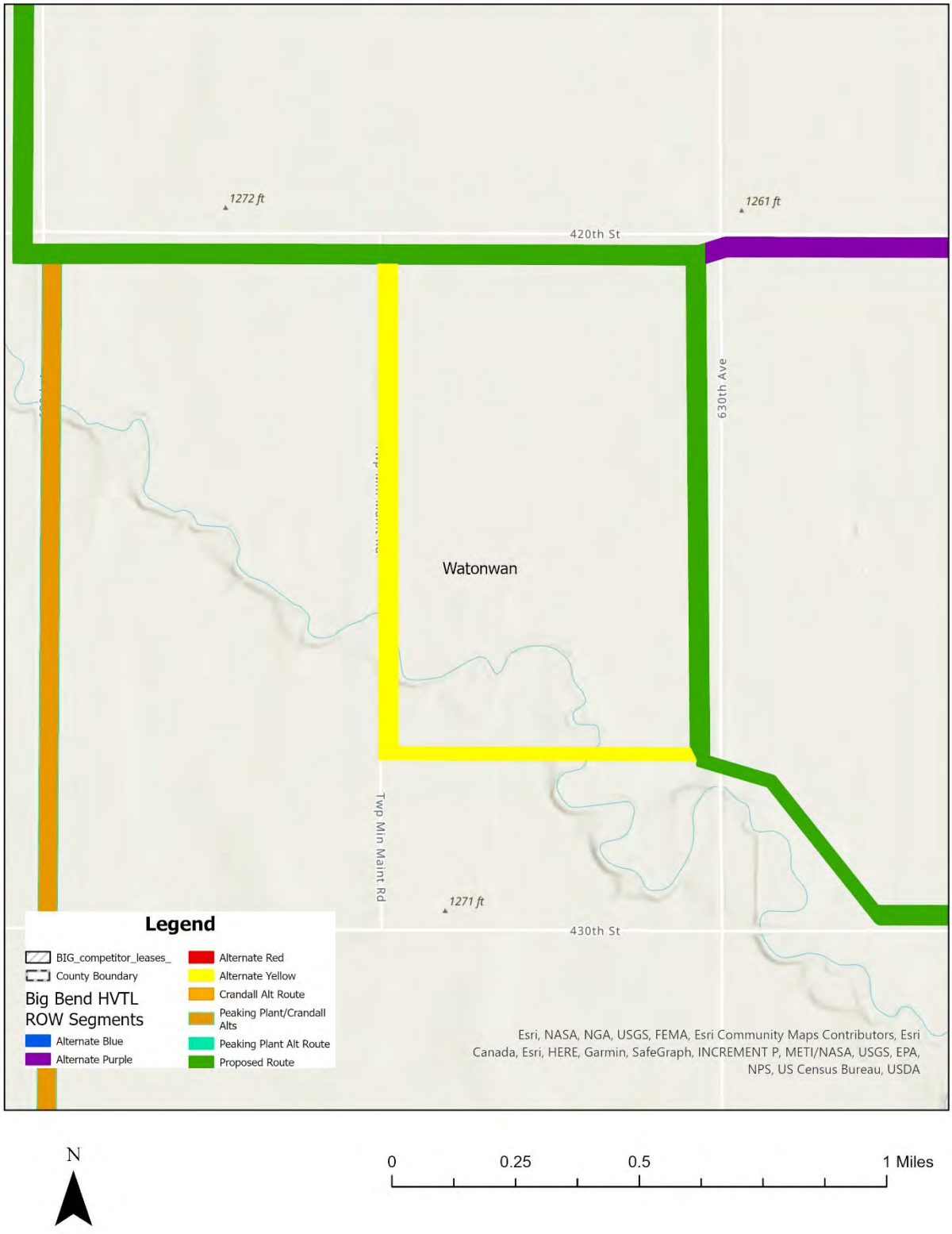
Alternate Yellow Route Segment

The Alternate Yellow Route Segment was proposed as an alternate route segment to a portion of the applicant's proposed route in the route permit application. It begins at the intersection of 420th Street and township minimum maintenance road that runs north and south along the half-section line between CSAH 2 and County Road 128 and continues to a point rejoining the applicant's proposed route along County Road 128.

The Alternate Yellow Segment begins at the intersection of 420th Street and a township minimum maintenance road that runs north to south along the half-section line between CSAH 2 and County Road 128. The Alternate Yellow Segment follows the township road south for 0.35 mile before turning east and following a parcel line/field edge 0.5 mile east to Country Road 128 and the Proposed Route.

The Alternate Yellow Segment is the same length as its comparative segment on the Proposed Route. The landowner that resides on the west side of County Road 128 along the Proposed Route has indicated a concern about aesthetics. The Alternate Yellow Segment would cross the property on the west side of the residence, which has existing vegetative screening (i.e., trees).

Figure 5-4. Alternate Yellow Route Segment



Alternate Purple Route Segment

The Alternate Purple Route Segment was proposed as an alternate route segment to a portion of the applicant's proposed route in the route permit application. It begins at the intersection of 420th Street and County Road 128 and continues to a point rejoining the Proposed Route along a township minimum maintenance road.

The Alternate Purple Segment begins at the intersection of 420th Street and County Road 128 and follows the south side of 420th east for mile before turning south along a township minimum maintenance road for one mile and rejoining the Proposed Route.

The Alternate Purple Segment addresses the same aesthetic concerns as the Yellow Segment. Additionally, the Alternate Purple Segment would eliminate the need to bury approximately 0.4 mile of the Proposed Route due to an existing landing strip located on the east side of County Road 128, north of the Watonwan River and south of the farmstead driveway.

Figure 5-5. Alternate Purple Route Segment

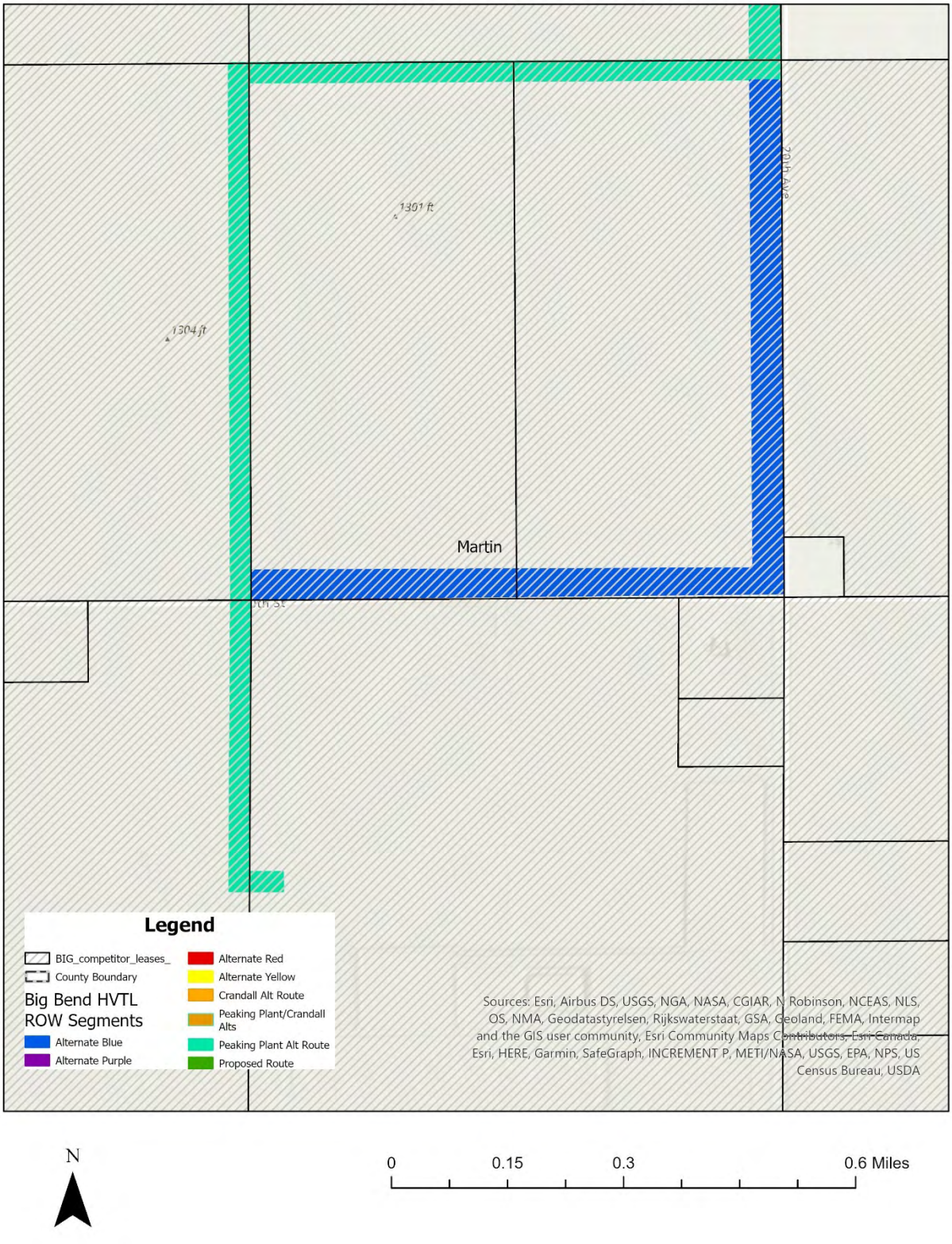
Alternate Blue Route Segment

The Peaking Plant Alternate Route Segment was proposed during the initial EA scoping comment period. It begins at the point along the east side of Section 18 where the Peaking Plant Alternate Route turns to the west and continues to the point where the Peaking Plan Alternate Route enters the proposed step-up substation adjacent to the Lakefield Junction Station.

Alternate Blue Route Segment leaves the Peaking Plant Alternate Route along 20th Avenue along the east side of Section 18, extends south to the intersection of 20th Avenue and 220th Street, and then extends west along 220th Street to the proposed step-up substation adjacent to the Lakefield Junction Station, see **Figure 5-6**.

The Peaking Plant Alternate Route and Peaking Plant Alternate Route – Alternate Route Segment are essentially the same length, but the Peaking Plant Alternate Route would extend through, and place pole structures, in approximately a half mile of agricultural crop field where no fence lines or other ROWs currently exist.

Figure 5-6. Alternate Blue Route Segment



5.3 How is the project designed?

The project would meet the future need to interconnect the Big Bend Wind Project and Red Rock Solar Project to the electrical grid if the Commission issues permits for Big Bend Wind Project and Red Rock Solar Project. It is sized to accommodate and transmit additional electricity to the grid if there is additional generation development in the area in the future.

The transmission needs for the proposed Big Bend Wind and Red Rock Solar hybrid project will be up to 335 MWs. The proposed transmission line will designed, constructed, and operated to accommodate total generation capacity of 374 MWs, which will allow for future electricity generation development in the area. Both the HVTL and substation will be designed in compliance with all applicable standards regarding clearance to ground, clearance to existing utilities, clearance to buildings, strength of materials, and ROW widths. Crews will follow standard construction practices; Apex and Big Bend, LLC procedures; and industry safety procedures.

HVTL

The HVTL Project will consist of pole structures (wood or steel monopoles), generally between 70 to 120 feet tall, and will be approximately 600 to 800 feet apart where the right-of-way (ROW) is 100 feet wide and 800 to 1,100 feet apart where the ROW is 150 feet wide. The average diameter of the wood structures at ground level will be 30 inches. The applicant's proposed route will need to cross over an existing 345 kV transmission line in two locations, which will require the use of two 170 to 190 feet tall pole structures at each of the crossing. The conductor will be strung between the pole structures. Transmission lines are usually either single-circuit (carrying one three-phase conductor set) or double-circuit (carrying two three-phase conductor sets). There are three conductors per circuit because power plants generate electricity such that each of the three conductors operates at a different phase.

Alternative current transmission lines, such as the proposed project, consist of three separate phases. Each phase requires a conductor to carry the electrical power. Each phase at the end of a separate insulator and physically supported by a structure that holds it above ground. This project will use a single-phase conductor. A typical conductor is a cable consisting of aluminum wires stranded around a core of steel wires. There will be a shield wire strung above the phases to prevent damage from lightning strikes. The shield wire will also include a fiber optic cable that allows substation protection equipment to communicate with other terminals on the line.

A 100-foot ROW is necessary for the project, but a 150 foot wide ROW will be utilized where the proposed HVTL parallels existing roads. The ROW paralleling existing roads will be 50 feet wide on the roadside of the line, and 100 feet wide on the non-road side of the line. The HVTL pole structures will be located on private property adjacent to the road ROW, and the poles will be within approximately 15 feet of the road ROW allowing for the sharing of road and HVTL ROWs. Three locations along the HVTL ROW, not parallel to existing roads, will maintain a 150 foot width versus the general 100 foot width, which is being maintained to better facilitate current farming practices.

The expected service life is about 40 years, although it is possible the line and structures will last longer than 40 years. During this time, Big Bend expects the HVTL should not be out of service for any extended period except for the rare times when scheduled maintenance is required or when a natural event, such as a tornado, thunderstorm, or ice storm causes an outage.

Step-up Substation

Big Bend will build a Step-up Substation on a five-acre parcel near the intersection of 230th Street and 30th Avenue in Martin County that the applicant has an option to purchase. The Step-up Substation location is on the opposite side of 230th Street from the Crandall Switching Station. A less-than 1,500 foot 345-kV segment will connect the Step-up Substation to the existing transmission grid via the Crandall Switching Station. The Step-Up Substation will require a construction workspace of approximately 5 acres, with the final fenced-in area anticipated to be approximately 350 feet by 350 feet. For the purposes of this this EA permanent impacts to the 5.0-acre construction workspace were assumed. The Step-up Substation components will be mounted on concrete pads. For electrical and fire safety, the Step-up Substation will be graveled to maintain the area free of vegetation. The area will be fenced to prevent unauthorized entry by individuals and wildlife.

5.4 How would the applicants acquire land rights?

The applicants would negotiate with landowners for easement rights. Easement acquisition involves distinct processes for private and public land.

In addition to long-term easements for the operation and maintenance of the HVTL, agreements for the use of temporary workspace might be obtained from some landowners. Temporary workspace generally includes a laydown yard(s) used to stage or store structures, vehicles, equipment, and supplies. Laydown yards are generally sited on previously disturbed or developed areas.

The five acre parcel needed for the HVTL Project step-up substation, near the intersection of 230th Street and 30th Avenue in Martin County, is currently under an option to purchase agreement.

Companies must follow the procedure outlined in Minnesota Statute 84.415 and Minnesota Rules 6135 to cross state-owned land. The Division of Lands and Minerals within DNR grants permission to cross state lands and waters in the form of a crossing license. The license is usually granted for 25 to 50 years and may be renewed when it expires.[xxxviii] To apply for an easement the applicants must file an *Application for License to Cross Public Lands and Waters*.[xxxix]

5.5 How would the project be constructed?

HVTL construction practices are similar for all routing options. Substation construction procedures are also explained. More detailed descriptions for construction procedures and restoration procedures are found in the route permit application at Sections 4.2 and 4.3, respectively.

HVTL Construction

Construction will not begin until the applicant obtains necessary federal, state, and local approvals, ROW acquisition is complete, soil conditions are determined, and project design has been completed for a specific construction area or segment. The applicant will notify landowners of the anticipated construction schedule, which might ultimately vary due to permit conditions, weather, and available workforce and materials.

Construction would progress, generally, as follows:

- Survey marking of the ROW.
- ROW clearing and access preparation.
- Grading or filling as necessary.
- Installation of poles, insulators, and hardware.
- Conductor stringing.
- Installation of any markers required by state or federal permits on conductors or shield wires.

Typical construction equipment includes: tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front-end loaders, bucket trucks, bulldozers, pullers, tensioners, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks, and various trailers. Excavation equipment can be wheel or track-driven. The applicants will negotiate with landowners to establish ingress and egress points. Access is typically made directly from existing roads or paths that run parallel or perpendicular to the ROW. However, improvements to existing access (temporary culverts) or new access could be required to accommodate construction equipment.

Temporary storage of materials and equipment storage might be established along or near the ROW. Portions of the ROW might also be used for this purpose. The primary area for storage of materials prior to construction will be at the staging area associated with the Big Bend Wind Project and extra space at the step-up substation area.

ROW Preparation

Before ground disturbance occurs, surveyors will mark the anticipated alignment and ROW boundary. ROW preparation begins by removing trees and other vegetation from the ROW that will interfere with safe construction and operation of the HVTL. The Commission route permits generally require that applicants minimize tree removal to the maximum extent practicable and leave undisturbed low growing species that will not interfere with operation or construction.

Structures are generally installed at existing grade; structure locations will not be graded or leveled unless it is necessary to provide a reasonably level area for construction access and activities. Crews will install erosion control where needed. Prior to structure installation, the HVTL alignment might again be surveyed and marked to guarantee proper placement of structures.

Structure Installation

This phase of construction begins by marking underground utilities using Gopher State One Call. Structures will be delivered to the installation location either directly from the manufacturer or from the staging areas. Crews will install hardware while the structure is on the ground. The structure is then lifted, placed, and secured.

The process of securing a structure depends on its type. Structures can be directly imbedded or placed on a concrete foundation, also referred to as drill pier foundations. Both foundation types require excavation of a hole to place the foundation. Most structures are expected to be directly imbedded into augured holes up to five feet in diameter and 15 feet deep. The structure then set in the hole and the hole backfilled. Drill pier foundations will vary from three to eight feet in diameter and 20 to 30 feet deep. Once crews have augured the foundation hole, steel reinforcing bars and anchor bolts are installed. Concrete is poured—usually to one foot above grade. After the foundation is set structures are bolted to it.

Tangent and angle structures will be directly embedded or concrete foundations, and dead end poles will have concrete foundations. The process used to secure the structure, along with the actual diameter and depth of a foundation depends on many factors including structure type, soil conditions, slope, line materials, line tension, and the angle of the lines on the structure. All structure types might generate excess soil. Crews will spread and level excess soil from excavation near the structure or remove it from the site, as requested by the landowner or required by permit conditions. Big Bend will minimize impacts to wet areas by spanning wetlands, streams, and rivers when possible. If a structure is located within a wetland, excess soil must be placed in uplands. There is one MNDNR mapped native prairie along the Proposed Route, and Big Bend currently plans to span the prairie area, and avoid any pole placement, clearing or construction traffic through this area. Should construction traffic needed to access the native prairie area, Big Bend will coordinate with MNDNR and implement BMPs, such as matting and potential seasonal timing restrictions.

Once structures are installed conductors are strung along the line. Construction crews will have to access each pole structure to secure the conductor wire and the shield wire once the final sag is established. Crews will use temporary guard or clearance structures to provide adequate clearance over roads, existing power lines or communication lines, waterways, or other potential obstructions, as well as to protect the conductor.

Restoration

Big Bend will conduct a pre-construction survey that will identify areas requiring special restoration procedures. During construction activities the crews will attempt to limit ground disturbance when possible. Areas disturbed by construction in will be restored in accordance with BMPs and permit conditions.

As construction is completed on each parcel disturbed areas will be restored to original conditions to the maximum extent practicable. Individual property owners will be contacted by the applicant or their contractor once construction is completed, and the property will be evaluated to identify and

address any damaged that may have occurred to crops, fences, drain tiles, or the property. The applicant will either fairly compensate the landowner for the damages sustained or possibly engage an outside contractor to restore the damaged property, as specified in the terms and conditions agreed upon in the Transmission Easement Agreement entered into by the landowner and Big Bend.

Areas with permanent vegetation disturbed or removed by construction activities will be re-established to pre-disturbance conditions. Common grasses and shrubs are typically re-establish naturally with minimal problems. Areas within the approved route that experience significant soil compaction or disturbance during construction will require additional work to re-establish the vegetation and control soil erosion.

Commonly used BMPs to control soil erosion and re-establish vegetation may include, but are not limited to:

- Erosion control blankets with embedded seeds
- Silt fencing
- Hay bales
- Hydro-seeding
- Mulching
- Planting individual seeds or seedlings of non-invasive native species

Step-up Substation

Construction

Following survey, staking, and utility locates through Gopher State One Call, erosion control erosion control BMPs, will be installed as necessary. Approximately five acres of land will be needed for construction space at the step-up substation location, which will be cleared and graded. All components of the step-up substation will be mounted on concrete pads, and the remainder of the fenced area (approximately 350 feet by 350 feet) will be graveled to maintain the area free of vegetation to reduce potential for electrical and fire safety issues. A less-than 1,500 foot, 345 kV line segment will connect the step-up substation to the Crandell Switching Station. The short 345kV line will be permitted at the local level.

Restoration

Upon completion of construction activities, disturbed areas outside the fence will be restored and temporary erosion control measures removed. Post-construction reclamation activities include removing and disposing debris, dismantling all temporary facilities (including staging areas), and reseeding areas disturbed by construction activities to establish permanent vegetation cover similar to the surrounding area or decompacting disturbed soils in areas to be returned to cultivated cropland.

5.6 How would the project be operated and maintained?

Big Bend Wind, LLC would be responsible for the operation, maintenance, and, when necessary, repair of the HVTL and the step-up substation.

Big Bend or their contractor will perform monthly inspections of the transmission facilities by truck or by air. Inspections will be conducted to make sure the transmission line is fully functional and to check for vegetation that may have encroached into the maintained clearance zones. Maintenance of transmission line structures and components will be completed as necessary when damage occurs during severe weather such as tornados or heavy ice storms.

Protective relaying equipment will take the transmission line out of service automatically if a fault is sensed along the system.

A certain amount of maintenance would be required at the step-up substation to ensure proper operation within NESC and NERC standards. Transformers, circuit breakers, batteries, protective relays, and other equipment would need to be serviced periodically in accordance with the manufacturer's recommendations.

5.7 If a permit is issued when will construction start?

The applicant anticipates beginning construction in the third quarter of 2022.

The applicant anticipates beginning construction in the third quarter of 2022. Construction is expected to take between six to nine months. The project would be energized in the second quarter of 2023. This schedule is based on information available to date.

5.8 How much would the project cost?

Costs along the Proposed Route are expected to range between $12 and $14 million.

Costs are dependent upon the approved routing option, timing of construction, costs of materials and labor. These estimates are engineering estimates, and are anticipated to reflect actual costs within 20 percent. Annual operation and maintenance costs, including ROW maintenance and annual inspections, are anticipated to be $1,500 per mile for all alternatives.

Notes

6 HVTL Potential Impacts and Mitigation

Chapter 5 defines how potential impacts and mitigative measures are described for the Big Bend Wind HVTL Project. It discusses the environmental setting, and highlights topics dismissed from detailed analysis. This chapter details potential human and environmental impacts and mitigative measures across all HVTL routing options.

6.1 Describing Potential Impacts

Potential impacts are measured on a qualitative scale based on an expected impact intensity level; the impact intensity level takes mitigation into account.

A potential impact is the anticipated change to an existing condition caused either directly or indirectly by the construction and operation of a proposed project. Potential impacts can be positive or negative and short- or long-term. Impacts vary in duration and size, by resource, and across locations. In certain circumstances, potential impacts can accumulate incrementally meaning that impacts from the project would be in addition to on-the-ground impacts already occurring.

Direct impacts are caused by the proposed action and occur at the same time and place. An indirect impact is caused by the proposed action but is further removed in distance or occurs later in time. This EA considers direct and indirect impacts that are reasonably foreseeable, which means a reasonable person would anticipate or predict the impact. Cumulative potential effects are the result of the incremental impacts of the proposed action in addition to other projects in the environmentally relevant area.

Potential Impacts and Mitigation

To provide appropriate context, the following terms and concepts are used to describe and analyze potential impacts:

Duration Impacts vary in length. Short-term impacts are generally associated with construction. Long-term impacts are associated with the operation of the project. Permanent impacts extend beyond project decommissioning and reclamation.

Size Impacts vary in size. To the extent possible, potential impacts are described quantitatively, for example, the number of impacted acres or the percentage of affected individuals in a population.

Uniqueness Resources are different. Common resources occur frequently, while uncommon resources are not ordinarily encountered.

Location Impacts are location dependent. For example, common resources in one location might be uncommon in another.

The context of an impact—in combination with its anticipated on-the-ground effect—is used to determine an impact intensity level, which can range from highly beneficial to highly harmful. Impact intensity levels are described using a qualitative scale, which is explained below. These terms are not intended as value judgments, but rather a means to ensure common understanding among readers and to compare potential impacts between alternatives.

Negligible impacts do not alter an existing resource condition or function and are generally not noticeable to an average observer. These short-term impacts affect common resources.

Minimal impacts do not considerably alter an existing resource condition or function. Minimal impacts might, for some resources and at some locations, be noticeable to an average observer. These impacts generally affect common resources over the short- or long-term.

Moderate impacts alter an existing resource condition or function and are generally noticeable to the average observer. Impacts might be spread out over a large area making them difficult to observe but can be estimated by modeling. Moderate impacts might be long-term or permanent to common resources, but generally short- to long-term to uncommon resources.

Significant impacts alter an existing resource condition or function to the extent that the resource is impaired or cannot function. Significant impacts are likely noticeable or predictable to the average observer. Impacts might be spread out over a large area making them difficult to observe but can be estimated by modeling. Significant impacts can be of any duration and affect common or uncommon resources.

Also discussed are opportunities to mitigate potential impacts by avoiding, minimizing, or correcting the on-the-ground effect. Collectively, these actions are referred to as mitigation.

To avoid an impact means to eliminate it altogether, for example, by not undertaking part or all the project, or relocating the project.

To minimize an impact means to limit its intensity, for example, by reducing project size or moving a portion of the project.

To correct an impact means fixing it by repairing, rehabilitating, or restoring the affected resource, or compensating for it by replacing it or providing a substitute resource elsewhere. Correcting an impact can be used when an impact cannot be avoided or further minimized.

Some impacts can be avoided or minimized; some might be unavoidable but can be minimized; others might be unavoidable and unable to be minimized but can be corrected. The level at which an impact can be mitigated might change the impact intensity level.

Regions of Influence

Potential impacts to human and environmental resources are analyzed within specific geographic areas called regions of influence (ROI). The ROI is the geographic area where the project might exert some influence and is used as the basis for assessing potential impacts. ROIs vary by resource. As necessary, the EA discusses potential impacts and mitigation measures beyond the identified ROI to provide appropriate context. Also, direct impacts within the ROI might cause indirect impacts outside the ROI.

This EA uses the following ROIs: anticipated **ROW** (50 feet on each side of HVTL centerline generally, where the HVTL ROW parallels a road ROW 50 feet on the road side of the HVTL centerline and 100 feet on the non-road side of the centerline, plus step-up substation areas); **Local Vicinity** (1,000 feet); **One mile** (one mile from the anticipated HVTL centerline (anticipated alignment)); and **Project Area** (Cottonwood, Watonwan, and Counties). The ROIs are based on a distance from an anticipated alignment developed by the applicant and extend on both sides of the centerline. **Table 6-1** summarizes the ROIs used in this EA by resource element.

Table 6-1. Regions of Influence for the Big Bend HVTL Project

Resource Type	Resource Element	Region of Influence
Human Settlement	Displacement	ROW
	Electrical Interference	Local Vicinity
	Aesthetics, Noise, Property Values, Recreation	Local Vicinity
	Cultural Values, Environmental Justice	Project Area
	Socioeconomics, Land Use and Zoning	Project Area
Public Services	Airports, Roads, Emergency Services, Public Utilities	Project Area
Public Health and Safety	Electric and Magnetic Fields, Implantable Medical Devices, Stray Voltage, Worker and Public Safety	ROW
Land-based Economies	Agriculture, Forestry, Mining	ROW

	Tourism	Local Vicinity
Archaeological and Historic Resources		Project Area
Natural Environment	Geology, Soils, Vegetation	ROW
	Water Resources, Wetlands, Wildlife (except birds), Wildlife Habitat	ROW
	Wildlife (birds)	Local Vicinity
	Air Quality, Climate Change	Project Area
	Rare and Unique Resources	One Mile

6.2 Environmental Setting

The project area is rural open space. Agriculture, both cultivated croplands and livestock are present throughout the project area, as are homesteads.

Prior to colonization, Dakota and Ojibwe peoples occupied lands in the future state of Minnesota. "Dakota and Ojibwe cultures arise from an intimate knowledge of place, from personal, local connections among people and the rest of the natural world. Ojibwe and Dakota languages, family and political structures, traditional economies, and spirituality arose from and were shaped by the landscape through which people walk."[xl]

Figure 6-1 Land Cover in the Big Bend HVTL Project Area (NLCD)

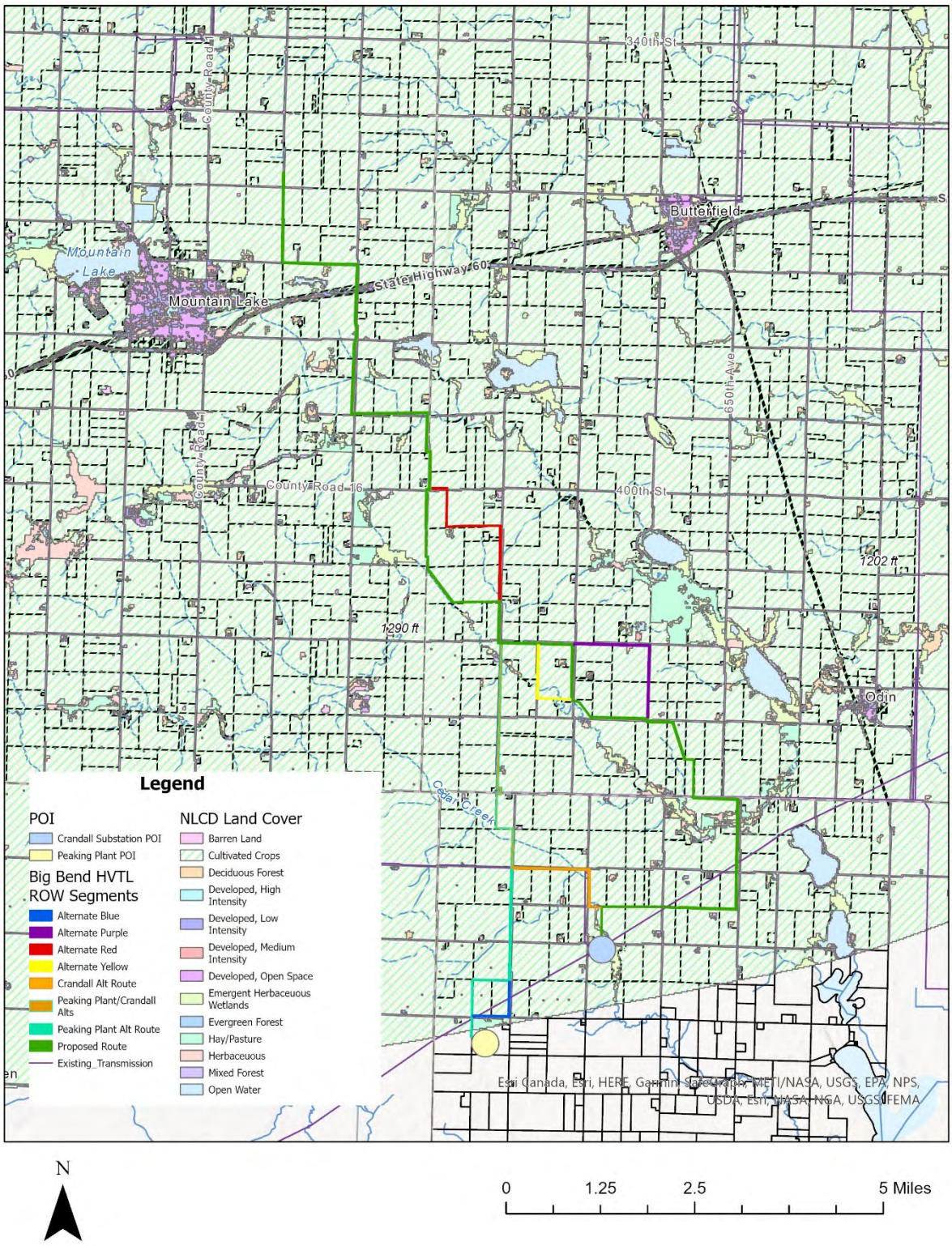
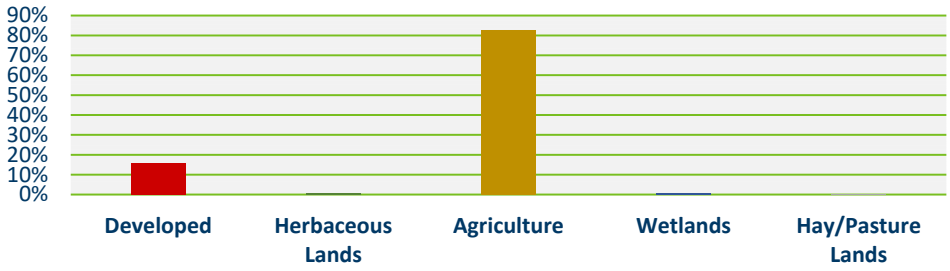


Table 6-2. Percent Land Cover in Project Area - Generalized (NLCD)



Based on the MNDNR and U.S. Forest Service Ecological Classification System (ECS) the Big Bend HVTL Project is located within the Minnesota River Prairie ecological subsection in the North Central Glaciated Plains Section of the Prairie Parkland Province. The landscape within and around the Big Bend HVTL Project Area was heavily influenced by glacial activity and consists of large till plains along the Minnesota River and a gently rolling ground moraine about 60 miles wide. The glacial till depth is typically 100 to 400 feet over the existing bedrock, but there are exposures of bedrock in areas of Cottonwood County. Soils in this portion of the State are composed of loamy, well-drained, and have thick dark surface horizons. Annual precipitation in the area ranges from 25 to 30 inches, and the average growing season lasts approximately 147 to 152 days. Prior to Euro-American settlement the area was predominately tallgrass prairie, with islands of wet prairies and forested areas primarily along the Minnesota River and other streams on the landscape.[383]

The current landscape is rural open space. The project area is primarily agricultural cultivated cropland, with scattered residences and livestock operations. The National Land Cover Database (NLCD) provides "spatial reference and descriptive data for characteristics of the land surface" nationwide.[xli] Land cover types within the HVTL ROW are approximately 82.5 percent agricultural (cultivated crops), 15.8 percent developed areas (low density, medium density, and open space), 0.6 percent each, of herbaceous lands and emergent herbaceous wetlands, and 0.5 percent are hay/pasture land, see Table 6-2 and Figure 6-1. Cedar Creek, the South Fork of the Watonwan River, and a couple unnamed streams are found within the project area.

The topography is level to gently rolling. Elevations range from about 1210 feet to 1280 feet above sea level with elevation gradually increasing from east to west.

[383] Department of Natural Resources (n.d.) *Minnesota River Prairie Subsection*, retrieved from: https://www.dnr.state.mn.us/ecs/251Ba/index.html

The HVTL project area is rural and sparsely populated with farmsteads located along local township and county roads. The Big Bend Wind HVTL Project is located away from population centers, the closest municipal areas are Mountain Lake and Odin, 0.4 miles to the west and 1.6 miles to the east, respectively. Relatively speaking, Cottonwood, Watonwan, and Martin counties have small populations when compared to other counties throughout the State of Minnesota.

6.3 Resource Topics for which Impacts are Anticipated to be Negligible

Select resource topics received abbreviated study because impacts to these resources are anticipated to be negligible and of relatively minor importance to the Commission's route permit decision.

Potential impacts to the resources in this subsection are anticipated to be negligible. This determination is based on information provided by the applicants, field visits, scoping comments received, environmental analysis, and staff experience with similar projects. Additional information regarding these topics is provided in the route permit application.

6.3.1 Airports

According to navigational charts[xlii] and GIS desktop review[xliii] the closest public airport to the project area is 11 miles to the west of the Proposed Route in Windom, Minnesota. There is a private landing strip located along County Road 128 in Watonwan County. The Anticipated Alignment is located on the opposite site of County Road 128 from the landing strip, and the Anticipated Alignment turns east and crosses County Road 128 and the southern end of the private landing strip. Big Bend has agreed to bury approximately 0.4 miles of the HVTL, beginning on the west side of County Road 128, crossing the road and landing strip, and continuing southeast to County State-aide Highway (CSAH) 7. Impacts to public airports and private landing strip will not occur, as sufficient mitigation efforts are being completed by Big Bend.[384]

6.3.2 Electrical Interference

Interference associated with electrical infrastructure is related with a phenomenon known as corona. Corona is the result of small electrical discharges at discrete locations along the surface of a conductor that ionize surrounding air molecules. These discharges generate radio frequency noise. If the radio frequency noise is excessive relative to the strength of the broadcast signal it can interfere with signal reception. Additionally, structures might block line-of-sight communication signals.

Radio interference would likely occur in the AM frequency range directly underneath the conductors or close to them within the ROW. Negligible impacts might occur when vehicles or equipment pass underneath the HVTL at road crossings. Interference is not expected to FM radio signals, emergency

[384] Big Bend HVTL RPA – Section 5.2.12.1

services signals (Allied Radio Matrix for Emergency Response (ARMER) system), television, wireless internet, or cellular phones as these operate at frequencies higher than corona generated noise.

Impacts to AM radio frequencies can be avoided by increasing the distance between the receiver and the HVTL or by increasing signal strength through antenna modifications. In situations where a HVTL does cause electronic interference, Section 5.4.3 of the sample route permit requires that any "interference with radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices is caused by the presence or operation of the transmission line, the Permittee shall take whatever action is necessary to restore or provide reception equivalent to reception levels in the immediate area just prior to the construction of the line."[385]

6.3.3 Emergency Services

Power line construction and operation can potentially impact emergency services by interfering with the ability to communicate during an emergency or respond to an emergency. The ARMER system is used across Minnesota. Broadcast frequencies range from 851 MHz to 859 MHz; therefore, the ARMER system will not be impacted .[xliv] Regardless of the route segment chosen, project construction is not anticipated to affect emergency services because emergency response will be prioritized over construction activities to the greatest extent possible. Moreover, any temporary lane restrictions or slow-moving traffic that might affect emergency response services would be coordinated with local jurisdictions to ensure that safe alternative access is available for police, sheriff, fire, ambulance, and other rescue vehicles. Thus, impacts to emergency services are anticipated to be negligible, and will be mitigated.[386]

6.3.4 Forestry

Cutting tall growing vegetation (trees) is required to allow for the safe operation of the transmission line or to clear land for the step-up substation. Tree clearing can impact current and future forestry operations. There are no commercial timber companies and no other forestry operations within the Proposed Route, alternate routes, or alternate route segments, and no large contiguous forested parcels are bisected. Trees along the Proposed Route, alternate routes, and alternate route segments typically consist of rows of trees functioning as shelter belts and windbreaks. The Anticipated Alignment has been planned and developed to minimize tree clearing. Impacts to forestry are anticipated to be negligible.

[385] Big Bend Wind HVTL SPA – Section 5.2.1 and 5.2.11

[386] Big Bend Wind HVTL SPA – Section 5.2.1 and 5.2.10

6.3.5 Geology

Thick glacial drift covers the project area, and depth to bedrock varies from 100 to 600 feet.[xlv] Neither the step-up substation foundations nor the HVTL structures/foundations will reach bedrock; therefore, impacts will not occur.

6.3.6 Mining

The *Aggregate Source Information System*[xlvi] maintained by MnDOT shows one aggregate source (Source No. 17006) west of 610th Avenue in Section 12, Mountain Lake Township, Cottonwood County, which is approximately 1,400 feet from the Anticipated Alignment and outside the HVTL ROW for the Proposed Route. Satellite imagery from August 2019 shows no evidence of mining operations at this location.[xlvii] There are no active mining operations within the ROW of the Proposed Route, alternate routes, or the alternate route segments. Impacts to mining resources are not anticipated; mitigation is not proposed.

The Big Bend HVTL Project may increase the short-term demand for a sand and aggregate, which could benefit local mines through the purchase of materials. Project demands will not lead to new mines or the expansion of existing mining operations.

6.3.7 Topography

Impacts to topography, such as the creation of abrupt elevation changes or modifications to natural drainage patterns are not expected. Transmission line structures will be installed at existing grade. Should grading occur it will be restricted to establishing a flat, safe workspace in and around the structure—major topographical changes to the landscape would not occur. Once the structure is set the topography will be repaired and restored to allow natural drainage patterns to persist and to blend with the natural terrain.

The step-up substation will require grading about five acres. Sand and gravel will be installed as base material. Nevertheless, the step-up substation will be constructed at grade to the extent possible, and disturbed areas outside the step-up substation footprint will be repaired and restored to blend with the natural terrain. Appropriate permanent stormwater management measures will address drainage from the newly established impervious areas.

6.3.8 Tourism

The ROI for tourism is the local vicinity. Indirect impacts to tourism are associated with direct impacts to recreational opportunities. These unavoidable impacts will be minimal, short-term, and isolated during construction, and negligible during operation. The Big Bend Wind HVTL Project will be located away from municipalities, county parks, and other public areas typically utilized by visitors to the area.

The HVTL Project will be approximately 11 miles from the Jeffers Petroglyphs site at it's closest point. HVTL Project construction and operation would have no impact on user access to the Jeffers

Petroglyphs site, and it is unlikely that users of the Jeffers Petroglyph site will be able to see the HVTL Project structures and components.

Additional noise and dust generated during construction would be short-term, isolated, unavoidable impacts to visitors utilizing public lands in the area, but Big Bend has committed to minimizing noise from construction equipment and implementing a dust control plan to minimize impacts to the greatest extent practicable.

HVTL Project construction activities and operation would not preclude future tourist activities in the area.

In 2019 the leisure and hospitality industry accounted for about $11.4 million in gross sales and 299 private sector jobs in Cottonwood County, $7.4 million in gross sales and 252 private sector jobs in Watonwan County, and $40.9 million in gross sales and 862 private sector jobs in Martin County.[xlviii] The leisure and hospitality industry does not account for a significant portion of the local economies in Cottonwood or Watonwan Counties. Only a small portion of the HVTL Project is located within Martin County, and it is a significant distance from areas within the county utilized for tourism.

Aesthetic impacts vary by routing alternative but are not expected to significantly impact recreational activities. Aesthetic impacts are subjective, and unique to the individual.

6.4 Potential Impacts to Human Settlement

6.4.1 Aesthetics

The ROI for aesthetics is the local vicinity. Aesthetic impacts are subjective. How an individual values aesthetics, as well as perceived impacts to a viewshed, can vary greatly. Thus, potential impacts are unique to the individual and can vary widely. Visual impacts are expected to be minimal for those with low viewer sensitivity, such as people traveling to and from work. For those with high viewer sensitivity, for example, neighboring landowners or recreationalists, visual impacts are anticipated to be moderate to significant. On the whole, impacts are anticipated to be minimal to moderate for all routing options. Potential impacts might dissipate over time depending on the individual. Impacts will be short- and long-term, and localized. Potential impacts to aesthetics are unavoidable but can be mitigated in part.

Aesthetics refers to the visual quality of an area as perceived by the viewer and forms the impression a viewer has of an area. Aesthetics are subjective, meaning their relative value depends upon the perception and philosophical or psychological responses unique to individuals. Impacts to aesthetics are equally subjective and depend upon the sensitivity and exposure of an individual.

A viewshed includes the natural landscape and built features visible from a specific location. Natural landscapes can include wetlands, surface waters, distinctive landforms, and vegetation patterns. Homes, businesses, roads, bridges, cell towers, and power lines are examples of built features. Generally, an intact and harmonious viewshed is considered by many to be more aesthetically pleasing. Viewsheds might be important regardless of whether they are considered beautiful by the observer, for example, a scattered stone foundation of a historical resource.

Viewer sensitivity is an individual's interest or concern for the quality of a viewshed and varies depending upon the activity viewers are engaged in, their values and expectations related to the viewshed, and their level of concern for potential changes to the viewshed. Individuals using protected, natural, cultural, or historic areas will likely have high viewer sensitivity to changes within the viewshed of the area they are visiting and using. High viewer sensitivity is generally associated with individuals engaged in recreational activities, traveling to scenic sites for pleasure and to or from recreational areas, experiencing viewsheds from resorts, or road-side pull-outs. Residents may have a high sensitivity to potential aesthetic impacts. Low viewer sensitivity is generally associated with individuals commuting, working, or passing through an area.

Viewer exposure refers to variables associated with observing a viewshed, and can include the number of viewers, frequency and duration of views, and view location. Viewer exposure would typically be highest for views experienced by high numbers of people, frequently, and for long periods. These variables, as well as other factors such as viewing angle or time of day, all affect the aesthetic impact.

Potential Impacts

The project will introduce new built features—structures, conductors, and a step-up substation—on the landscape. These features will create aesthetic impacts. To the extent these subjective impacts can be quantified depends on the presence of several on-the-ground factors linked to the concepts of viewer quality, sensitivity, and exposure. These factors include the proximity to:

- Views valued by the public at large, for example, scenic overlooks or scenic byways.
- Locations where relatively more people are present, for example, schools, churches, and residences; or
- Locations where people recreate or otherwise enjoy leisure activities.

The presence of terrain and vegetation can screen views of newly constructed infrastructure. These features are also important when determining potential aesthetic impacts. Screening is not discussed here but is left to individual landowners to consider. This is because landowners are the best judge of the ability of the terrain and vegetation on their property to screen a project from view based on their daily activities and routine.

There are no scenic overlooks or scenic byways in the Big Bend HVTL Project Area. There are no schools or churches within the local vicinity of any routing option. The number of residences within the local vicinity of each alternate route is as follows: Proposed Route 12, Crandall Alternate Route 5, Peaking Plant Alternate Route 7. The number of residences within the local vicinity of each alternate route segment/comparative segment of the Proposed Route or Peaking Plant Alternate Route is as follows: Red 5, Yellow 0, Purple 2, and Alternate Blue Route Segment 0. Because count is by distance overlap exists. For example, if a residence is within 200 feet of all routing options it is counted four times—once for all segments. While duplicative, this eliminates potential for underestimating potential impacts. The distance between residences and the various routing options is shown in **Table 6-3**. The location of these residences is shown in **Figure 6-2**

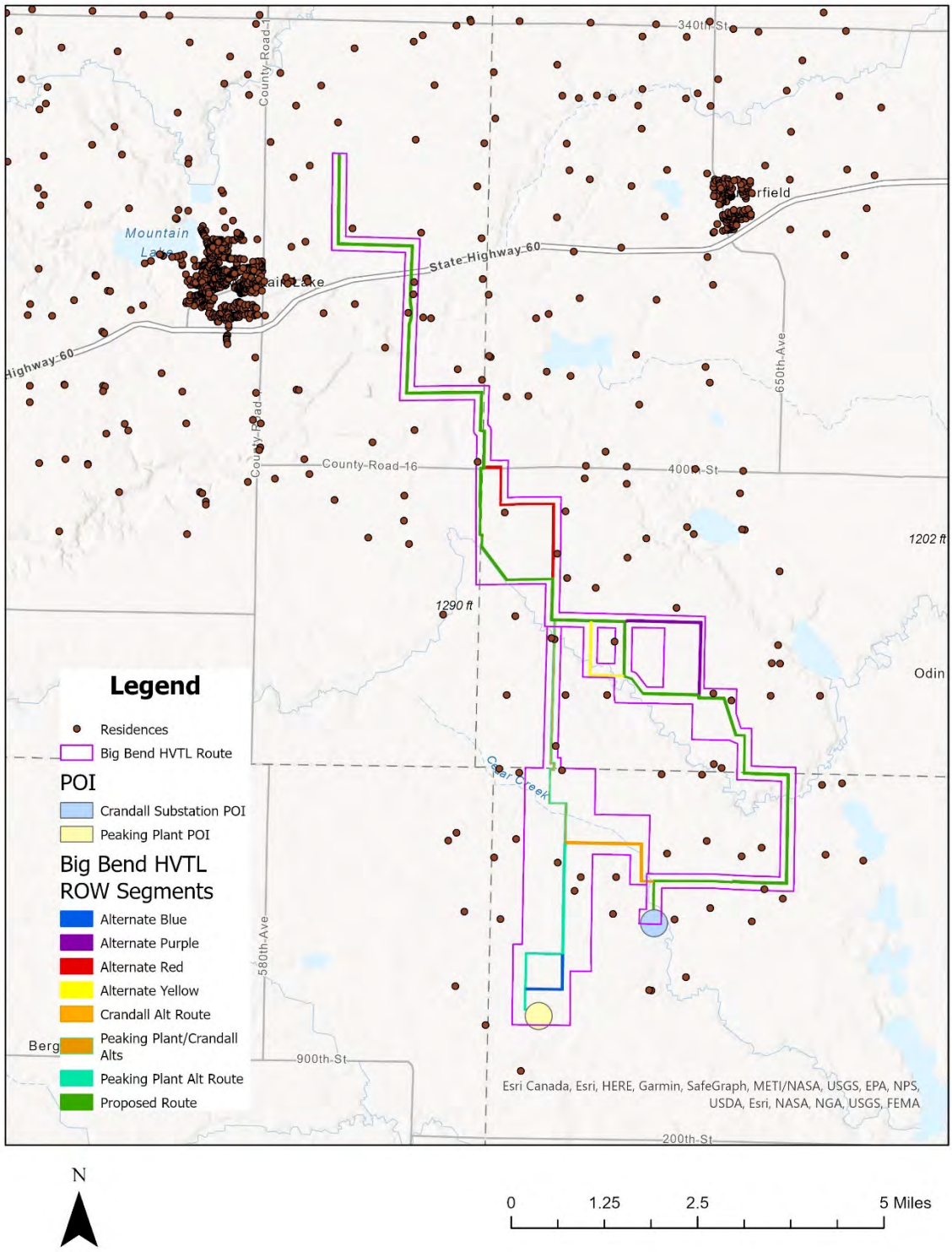
The number of residences within the local vicinity are generally distributed randomly along all routing options. Alternate Yellow Route Segment was developed to address concerns of aesthetic

impacts identified by a resident along County Road 128. The Proposed Route would place the Anticipated Alignment along the west side of County Road 128, between the residence and County Road 128, shown in **Figure 5-4**. The Alternate Yellow Route Segment would take the Big Bend HVTL to the west of the residence, where there is existing vegetation that would allow for screening of the HVTL.

Table 6-3. Residences within the Local Vicinity (All Routing Options)

Route or Route Segment	Distance from ROW (ft)					Total Residences
	0-100	100-200	200-400	400-800	800-1,000	
Proposed Route	0	3	4	3	2	12
Crandall Alternate Route	1	1	1	1	1	5
Peaking Plant Alternate Route	1	1	2	2	1	7
Alternate Red	0	1	0	3	1	5
Alternate Yellow	0	0	0	0	0	0
Alternate Purple	0	0	0	0	2	2
Alternate Blue	0	0	0	0	0	0

Figure 6-2. Residences within the Local Vicinity of HVTL Project



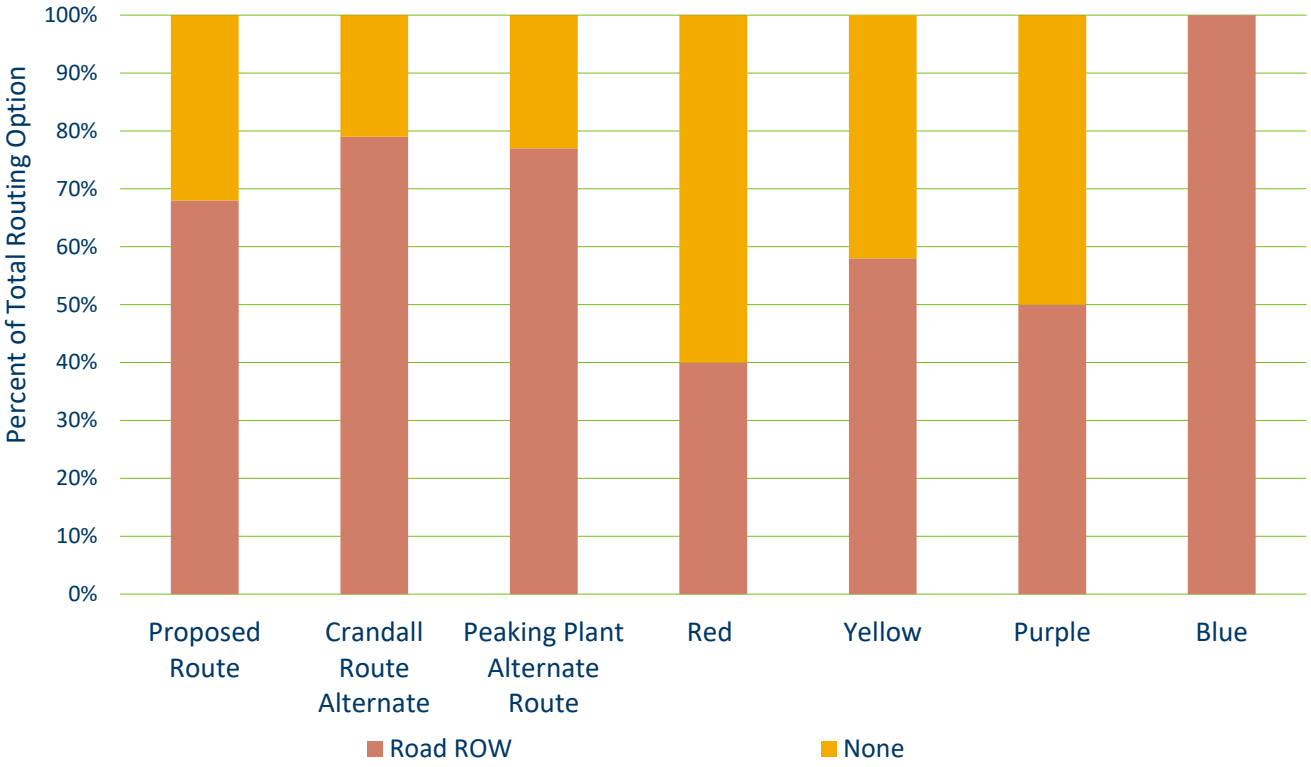
In addition to residents and recreational users, travelers along the roads may also experience visual impacts from the project. Annual daily traffic counts, discussed in more detail in *Public Utilities and Infrastructure* in Section 5.4.1, indicate that traffic levels are highest on State Highway 60. State Highway 60 is crossed by the Proposed Route on the north end of the Big Bend HVTL, so all routing options will cross State Highway 60 at that single intersection point. Impacts to recreational activities and other scenic views are anticipated to be similar for all routing options.

Step-up Substation A new step-up substation will be constructed. This will introduce an industrial structure to an otherwise rural agricultural space. The step-up substation will be enclosed in a 350 x 350 foot fenced area. Based on the anticipated step-up substation locations being considered, both locations are adjacent to existing substation areas with existing infrastructure present. The step-up substation will add additional infrastructure to the area and remove agricultural cropland from production. With existing substations already present, aesthetic impacts caused by the addition of the step-up substation is likely going to be negligible.

Mitigation

Aesthetic impacts can be minimized by choosing routes and alignments that are, to the extent practicable, consistent with the existing viewshed or reduce viewer exposure. Routing a transmission line with existing infrastructure ROWs can mitigate potential impacts because the new built feature would be consistent with previous human modification and an incremental increase. **Table 33** shows where impacts can be mitigated by following existing infrastructure.

Table 6-4. Existing Infrastructure Paralleled by Big Bend HVTL Project (%)



Impacts can also be mitigated by limiting vegetation clearing to only what is necessary for the safe construction and operation of the HVTL. Commission route permits require permittees to minimize vegetation removal when constructing an HVTL. Adverse impacts can be further mitigated by ensuring that damage to natural landscapes during construction is minimized, and, to the extent that it does not interfere with safe operation of the transmission line, planting lower growing woody vegetation in a transition area near the edge of the ROW in wooded areas.

Impacts from the step-up substation will be minimized by choosing a site where the facility is consistent with the existing landscape, and not immediately adjacent to homes. Any lighting at the step-up substation should be downlit to eliminate impacts to night sky and nearby residents.

Big Bend has committed to the following routing and project design measures to minimize potential impacts to aesthetics:

- Selection of routes along roads and field edges to the extent possible
- Crossing rivers and streams using the shortest distance possible, and with existing roads if possible
- Avoid the placement of structures directly in front of residences
- Using construction BMPs that will minimize damage to vegetation near the transmission line location
- Used of downshielded lighting for security lights at the step-up substation

6.4.2 Cultural Values

The ROI for cultural values is the Project Area. Impacts associated with rural character and sense of place are expected to be dependent on the individual. For those residents that place high value on rural character and a sense of place, impacts are anticipated to be minimal to moderate. These impacts will be localized, short- and long-term, but might diminish over time depending on the individual. Any impacts to cultural values are likely to occur regardless of which routing option is selected. These impacts are anticipated to be minimal to moderate and long-term. Impacts are unavoidable.

Cultural values can be described as shared community beliefs or attitudes that define what is collectively important to the group. These values provide a framework for individual, and community thought and action. Infrastructure projects believed inconsistent with these values can deteriorate community character. Those found consistent with these values can strengthen it. Projects often invoke varying reactions and can pit neighbor against neighbor, which weakens shared beliefs and attitudes deteriorating a community's shared sense of self, that is, weakens community unity.

Cultural values are informed, in part, by history, heritage, work, recreational pursuits of residents, and geographical features. Cultural values in the Project Area are primarily tied to agricultural production, light industry, and recreational activities such as hunting and fishing.

The Jeffers Petroglyphs site is located approximately 11 miles to the northwest of the Big Bend HVTL Project. The Jeffers Petroglyphs is a sacred and culturally significant site for several Native American Tribes throughout the United States, including Tribes in Minnesota. The rock carvings found at the Jeffers Petroglyphs site provide direct documentation of Native American presence in the area over the past several thousand years. The rock carvings also document significant Tribal historic events and spiritual beliefs tied to the sacred landscape. The Jeffers Petroglyphs site is still utilized by Native Americans for ceremonial and worship purposes, exchanging and learning Tribal oral histories, and providing a sense of place allowing Native Americans to connect with their ancestors.[387]

Potential Impacts

The value residents put on the character of the landscape within which they live is subjective, meaning its relative value depends upon the perception and philosophical or psychological responses unique to individuals. Because of this, construction of the project might—for some residents—change their perception of the area's character thus potentially eroding their sense of place. This tension between infrastructure projects and rural character creates real tradeoffs.

While negative impacts will occur to specific resource elements, for example, aesthetics, the construction and operation of the project is not anticipated to impact or alter the work and leisure pursuits of residents in the Project Area or land use in such a way as to impact the underlying culture of the area. There is currently a significant presence of existing transmission lines and operating wind projects in all three counties, so the current aesthetics of the Project Area has structures that will be similar to those constructed for the Big Bend HVTL Project.

For those residents that place high value on rural character and a sense of place, impacts from the Big Bend HVTL Project are anticipated to be minimal to moderate. These impacts will be localized, short- and long-term, but might diminish over time depending on the individual. Any impacts to cultural values are likely to occur regardless of which routing option is selected. These impacts are unavoidable.

The Big Bend HVTL Project is not anticipated to be visible to individual users at the Jeffers Petroglyphs site, so no impacts to the cultural values of the Jeffers Petroglyphs are expected to occur.

Mitigation

There are no conditions included in the sample permit that directly mitigate impacts to cultural values, sense of place, or community unity.

The impacts to cultural values are unavoidable. The project area has existing energy generation and transmission infrastructure. A significant portion of the the Big Bend HVTL routing options have been

[387] Minnesota Historical Society. Jeffers Petroglyphs. https://www.mnhs.org/jefferspetroglyphs

designed along existing road ROWs. No additional mitigative measures specific to cultural values are proposed at this time.

6.4.3 Displacement

The ROI for displacement is the anticipated ROW. Removal of homes or buildings to facilitate the safe construction and operation of the project is not expected. Displacements are not expected to occur with any of the routing options.

In the context of this EA, displacement means removing a residence or building to facilitate the safe operation of a transmission line.[xlix] For electrical safety code and maintenance reasons, utilities generally do not allow residences or other buildings within the ROW of a transmission line; however, there are instances where the activities taking place in these buildings are compatible with the safe operation of a transmission line. Displacements are relatively rare and are more likely to occur in more populated areas where avoiding all residences and businesses is not always feasible.

The closest residence to the Anticipated Alignment is 185 feet. The Crandall Alternate Route has an abandon building in the ROW, and Big Bend would work with the owner to get the building removed if the Crandall Alternate Route is selected.

Potential Impacts

No displacements are expected for any of the routing options or at potential step-up substation locations.

Mitigation

No displacements are expected to occur as a result of the Big Bend HVTL Project, so no mitigation is proposed at this time.

6.4.1 Environmental Justice

The ROI for environmental justice is the project area, which intersects four census tracts, two of those tracts, #2701 and #2704 are identified as areas of concern for environmental justice due to poverty levels. However, based on EERA's analysis no impacts to low income or persons of color populations are not anticipated to occur when considering the project area.

The EPA defines Environmental justice as the "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income in the development, implementation, and enforcement of environmental laws, regulations, and policies," and is intended to ensure that all people benefit from equal levels of environmental protection and have the same opportunities to participate in decisions that might affect their environment or health.[l]

An important second step in an environmental justice assessment is identifying whether an environmental justice area of concern is present within the project's region of influence. This is a critical component of the assessment because if there is not an area of concern in the region impacted

by the project, there is no possibility of disproportionate impacts to an environmental justice area of concern and the environmental justice analysis stops there.

EJSCREEN, an interactive screening and mapping tool developed by the U.S. Environmental Protection Agency, provides a nationally consistent dataset and approach for combining EJ environmental and demographic indicators.[li] An assessment of existing conditions provides an important baseline to assess susceptibility and the possibility that the project impacts may be exacerbated by existing conditions or existing disproportionate impacts.[lii]

EERA utilized data from EJSCREEN at various scales and extents to analyze the Big Bend HVTL Project's potential disproportionate impacts on individuals below the poverty level and persons of color. EJSCREEN reports were generated for the county level, and also at the more refined census tract level, the full EJSCREEN Reports are available in Appendix F.

EJSCREEN data at the census tract level, shows that all negative environmental indicators are below the state average except for the ozone (ppb), NATA cancer risk, lead paint indicator (percentage of pre-1960s housing), Risk Management Plan (RMP) Proximity (facility count/kilometer distance), and wastewater discharge indicator (toxicity-weighted concentration/meter distance). Additionally, there are no Superfund Sites at the county or project area level. Analysis at the county level indicates one Hazardous Waste Treatment, Storage, and Disposal Facilities, but at the refined census tract level there are no Hazardous Waste Treatment, Storage, and Disposal Facilities.

For the purposes of this impact evaluation, environmental justice due to poverty levels if at least 40 percent of the people within a tract report income less than the 185 percent of the federal poverty level. MnRiskS identifies the census tracts (#2701 and #2704) as areas of concern for environmental justice due to poverty issues.

Potential Impacts

The ROI for this analysis is the project area, which intersects four census tracts, #2701, #2704, #9503, #7901. These census tracts are the best approximation of the geographic area within which potential disproportionate adverse impacts from the project could occur. Cottonwood, Watonwan and Martin counties, which contain these census tracts, are considered representative of the general population in the project area against which census tract poverty and demographic data can be compared. These counties serve as the region of comparison (ROC) for this assessment.

Staff conducted a demographic assessment of the affected community to identify low-income and people of color populations that might be present. U.S. Census data was used to identify low-income and people of color populations. Low-income and people of color populations are determined to be present in an area when the low-income percentage or people of color group percentage exceeds 50 percent or is "meaningfully greater" than in the general population of the larger ROC. In this analysis, a difference of 10 percentage points or more was used as the threshold to distinguish whether a "meaningfully greater" low-income or minority population resides in the ROI.

Table 6-5 lists the percentage of individuals living below the poverty level, population size, and the percentage of those persons who did not self-identify as white alone. Information about Minnesota and Cottonwood, Watonwan, and Martin counties is provided for context.

Table 6-5 Low-Income and Persons of Color Population Characteristics

Area	Census Tract	% Low Income	Population Size	% Persons of Color**
Minnesota	—	10.13	5,636,632	20.9
Cottonwood County	—	32	11,372	13
Watonwan County		33	10,973	27
Martin County	—	30	19,964	7
ROC*	—	31	42,309	14
Cottonwood County	2701	37	2,797	23
	2704	34	2,925	9
Watonwan County	9503	27	2,709	15
Martin County	7901	26	2,918	4

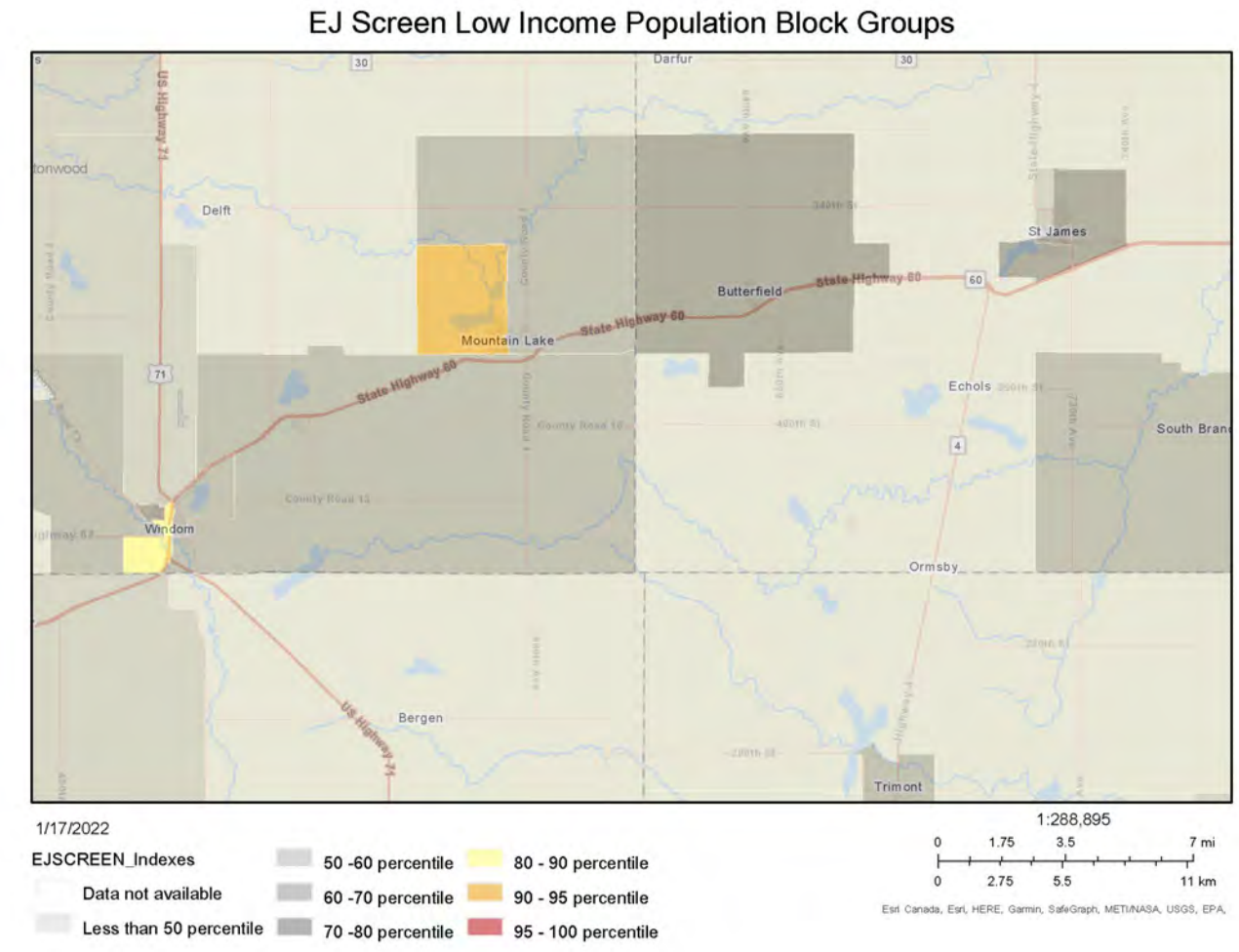
Source: EPA EJScreen, 2014-2018 American Community Survey

* The ROC is calculated by dividing the total low income and persons of color population in the ROC by the total population of the ROC.

** Persons of color population includes all persons excluding those who self-identified as non-Hispanic white alone.

The low-income and persons of color populations in the census tracts, represented by the percentage living in poverty and those not self-identifying as white alone, were compared with the ROC to determine if any were greater than 50 percent or 10 percentage points or more than the ROC. None of the census tracts exceeded 50 percent, and none of the census tracts exceeded the ROC percentage by 10 percentage points or more, which is the defined threshold of significance for potential environmental justice impacts from the project.

Figure 6-3. EJ Screen Low Income Population Block Groups



The northwestern most portion of the Big Bend HVTL project area crosses census tracts identified by MnRiskS, #2701 and #2704, as areas of concern for poverty issues. As shown in Table 6-5 the census tracts are not significantly different than the large county populations. Additionally, when looking at census tracts #2701 and #2704 in greater detail, at the census block group level, see Figure 6-3, the census tracts data for low income populations appears to be significantly impacts by larger population centers of the City of Mountain Lake and City of Windom. The Big Bend HVTL project area is located entirely outside of the City of Mountain Lake, which is the primary population center in the area.

Based on EERA's analysis and evaluation of current low income and persons of color populations within Cottonwood, Watonwan, and Martin counties and local communities, no impacts to these populations are not anticipated to occur.

Mitigation

The Big Bend HVTL Project is not anticipated to have any environmental justice impacts, and no mitigation is proposed at this time.

6.4.1 Land Use and Zoning

The ROI for land use and zoning is the anticipated ROW. No conflicts with existing land uses are anticipated for any of the routing options.

Interference with county zoning ordinances is not expected. Constructing the HVTL is not expected to change the underlying land use. The step-up substation, however, will permanently change the underlying land use from agricultural to an industrial use.

Land use is the use of land by humans, such as residential, commercial, or agricultural uses, and often refers to zoning. Zoning is a regulatory tool used by local governments (cities, counties, and some townships) to promote or restrict certain land uses within specific geographic areas. Power lines have the potential to impede current and future land use.

A route permit supersedes local zoning, building, and land use rules.[liii] The Commission's route permit decision must be guided, in part, however, by consideration of impacts to local zoning and land use in accordance with the legislative goal to "minimize human settlement and other land use conflicts."[liv] Thus, the Commission can and does consider impacts to zoning and land use when considering route permit applications.

The Proposed Route does not cross any lands currently under easement or agreement with other energy developers. However, the Crandall Alternate Route, Peaking Plant Alternate Route, and the Alternate Red Route Segment would have to cross lands currently held under easement or agreement with other energy developers with infrastructure in the area.

It is unclear at this time if the Applicant possess the power of eminent domain, but if they do, it would means the can acquire ROW for the project whether a landowner is a willing participant or not.[lv] This power applies regardless if parcels are encumbered by existing easement held by other energy developers.

Land Use Land cover types within the Proposed Route are approximately 82.5 percent cultivated croplands, 15.8 percent developed areas (low density, medium density, and open space), 0.6 percent herbaceous lands, 0.6 percent emergent herbaceous wetlands, and 0.5 percent hay/pastureland. Land cover/land use in the project area is shown in **Table 31,** which lists land cover/land use by acre and percent within the ROW for the different routing options.

Zoning The majority of the Big Bend HVTL Proposed Route within Cottonwood County is located in the Agricultural District, with the Route crossing a few parcels zoned as Residential – Single Unit. These Residential – Single Unit parcels are farmsteads within the rural landscape and are not the same a residential area in an urban or municipal setting.

The majority of the Big Bend HVTL Proposed Route in Watonwan County is located within the Agricultural District and a smaller portion of the Route travels through the Flood Plain Overlay District and the Shoreland Overlay District.

The majority of the Big Bend HVTL Proposed Route in Martin County is located within the Agricultural District and smaller portions of the Route travel through the Shoreland District. Where the Proposed Route crosses Cedar Creek, Martin County has specifically identified lands adjacent to Cedar Creek as a Special Protection District.

Potential Impacts

Impacts can occur to zoning ordinances, land uses, or existing easements.

Zoning The Proposed Route predominantly crosses areas zoned as agriculture in all three counties. Some portions of the Route within Cottonwood County are zoned as residential, and some portions of the Proposed Route cross areas zoned as floodplain and shoreland districts in all three counties.

Land Use Constructing the HVTL is not expected to change the underlying land use. For example, planting agricultural crops or using the ROW for grazing land is generally not precluded. The step-up substation, however, will permanently change the underlying land use from agricultural to an industrial use. Changes in the underlying land use are unavoidable.

Table 6-6. Route ROW Land Cover/Land Use (NLCD)

Land Cover/Use	Proposed Route		Crandall Alternate Route		Peaking Plant Alternate Route		Alternate Red		Alternate Yellow		Alternate Purple		Alternate Blue	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Developed (low density, medium density, and open space)	47.5	15.8	54.5	21.8	65.3	25.4	5.1	13.6	2.4	12.5	13.5	36.8	3.2	20.4
Deciduous/ Mixed Forest	--	--	1.1	0.4	1.1	0.4	--	--	--	--	0.8	2.3	--	--
Grassland/ Herbaceous	1.9	0.6	--	--	--	--	--	--	--	--	--	--	--	--
Pasture/ Hay	1.4	0.5	--	--	0.9	0.3	--	--	--	--	--	--	--	--
Cultivated Crops	247.8	82.5	193.8	77.3	190.4	73.8	32.1	85.8	16.5	87.5	22.4	61.0	12.5	79.6
Emergent Herbaceous Wetlands	1.8	0.6	1.1	0.4	--	--	0.2	0.6	--	--	--	--	--	--

Big Bend has indicated there are several easements held by other energy developers on properties along the Crandall Alternate Route, the Peaking Plant Alternate Route, the Alternate Red Route Segment, and the Peaking Plant Alternate Route – Alternate Route Segment. These easements make it more difficult for Big Bend to acquire access and agreements to cross these already existing easements help by other developers. Properties along the Proposed Route, Alternate Yellow Route Segment Alternate, and Alternate Purple Route Segment Alternate do not currently have any known agreements or easements that may conflict with Big Bend efforts to acquire an easement. Figure 5-2, shows some of the easements that are causing routing difficulties for Big Bend at this time.

Mitigation

Potential impacts to current and future land use can be mitigated by selecting routes and alignments that are compatible, to the extent possible, with current and future land use and zoning.

The Anticipated Alignment, within the Proposed Route, has been sited outside of the residential areas in Cottonwood County, by placing the HVTL on the opposite side of the road.

Big Bend indicated in their Route Permit Application they intend to span all shoreland districts, and not place any pole structures within them. Big Bend has also committed to avoiding pole placement within the floodplain districts to the greatest extent practicable, and when pole structures must be

placed in the floodplain districts the poles will be placed in a manner that is consistent with the floodplain districts requirements and ordinances.

Impacts to other parcels can be mitigated through negotiated easement agreements. These agreements are not within the scope of this EA.

6.4.2 Noise

The ROI for noise is the local vicinity. Distinct noises are associated with construction and operation. Noise created by construction activities are anticipated to be minimal for all routing options. Construction activity and crews would be present at a particular location during daytime hours for a few days at a time but on multiple occasions over the course of six to nine months. Potential impacts are anticipated to be intermittent, short-term, and localized. Impacts are unavoidable but can be minimized. Since operational noises are not expected to rise above background levels for any significant period of time, potential impacts are expected to be minimal.

Noise can be defined as any undesired sound.[lvi] It is measured in units of decibels on a logarithmic scale. The A-weighted scale (dBA) is used to duplicate the sensitivity of the human ear.[lvii] A three dBA change in sound is barely detectable to average human hearing, whereas a five dBA change is clearly noticeable. A 10 dBA change is perceived as a sound doubling in loudness. Noise perception is dependent on a number of factors: wind speed, wind direction, humidity, and natural and built features between the noise source and the listener. Table 6-7 provides decibel levels for common indoor and outdoor activities.[lviii]

Noise standards in Minnesota are based on *noise area classifications* (NAC), which correspond to the location of the listener, referred to as a receptor. These classifications are not necessarily synonymous with zoning classifications. NACs are assigned to areas based on the type of land use activity occurring at that location. Household units, designated camping and picnicking areas, resorts and group camps are assigned to NAC 1; recreational activities (except designated camping and picnicking areas) and parks are assigned to NAC 2; agricultural and related activities are assigned to NAC 3. A complete list is available at Minnesota Rule 7030.0050.

Table 6-7. Noise Levels from Common Sources

Sound Pressure Level (dBA)	Typical Sources
140	Jet Engine at 25 meters (~80 feet)
130	Jet Engine at 100 meters (~400 feet)
120	Rock concert
110	Pneumatic chipper
100	Jackhammer at 1 meter (~3 feet)
90	Chain saw at 1 meter (~3 feet)
80	Heavy truck traffic
70	Business office, vacuum cleaner
60	Conversational speech
50	Library
40	Bedroom
30	Secluded woods
20	Whisper

Source: MPCA

Noise standards are expressed as a range of permissible dBA over one hour. L_{10} may be exceeded 10 percent of the time, or six minutes per hour, while L_{50} may be exceeded 50 percent of the time, or 30 minutes per hour. Standards vary between daytime and nighttime hours. There is no limit to the maximum loudness of a noise.[lix] 6-8 shows current Minnesota noise standards.

The project is in a rural area. "Quiet daytime noise levels in rural areas with no significant noise sources might be in the 35 to 40 dBA range."[lx] Noise levels increase with passing vehicle or rail traffic; high winds and storms; or use of farm equipment, chainsaws, all-terrain vehicles, boats, or snowmobiles.[388]

The primary noise receptors within the local vicinity are residences and farmsteads. These receptors are assigned to NAC 1. Table 6-9 shows the number of residences within the local vicinity.

Table 6-8. Noise Area Classifications (dBA)

Noise Area Classification	Daytime (7:00 a.m. to 10:00 p.m.)		Nighttime (10:00 p.m. to 7:00 a.m.)	
	L_{10}	L_{50}	L_{10}	L_{50}
1	65	60	55	50
2	70	65	70	65
3	80	75	80	75

Source: MPCA

[388] Big Bend HVTL RPA, Section 5.2.4

Table 6-9. Sensitive Noise Receptors (residences)

Route or Route Segment	Distance from ROW (ft)					Total Receptors
	0-100	100-200	200-400	400-800	800-1,000	
Proposed Route	0	3	4	3	2	12
Crandall Alternate Route	1	1	1	1	1	5
Peaking Plant Alternate Route	1	1	2	2	1	7
Alternate Red	0	1	0	3	1	5
Alternate Yellow	0	0	0	0	0	0
Alternate Purple	0	0	0	0	2	2
Alternate Blue	0	0	0	0	0	0

‡ Count by distance; overlap exists. For example, if a residence is within 200 feet of all routing options it is counted four times—once for all segments. While duplicative, this eliminates potential for underestimating potential impacts.

* Point source sound. Sound level estimate does not consider any mitigating factors, such as topography, vegetation, wind speed and direction, weather, or background noise, and likely overestimates perceived sound levels.

Potential Impacts

Distinct impacts from construction and operation of the project will occur.

Construction Crews and activity would be present at a particular location during daytime hours for a few days at a time but on multiple occasions throughout the period between initial ROW clearing and final restoration. Intermittent construction noise will occur and is dependent upon the activity. Major noise producing activities are associated with clearing and grading, material delivery, auguring foundation holes, setting structures, and stringing conductors.

Noise from heavy equipment and increased vehicle traffic will be intermittent and occur during daytime hours. Noise associated with heavy equipment can range between 80 and 90 dBA at full

power 50 feet from the source.[lxi] Heavy equipment generally runs at full power up to 50 percent of the time.[lxii] Point source sounds decrease six dBA at each doubling of distance;[lxiii] therefore, a 90 dBA sound at 50 feet is perceived as a 72 dBA sound at 400 feet and a 60 dBA sound at 1,600 feet.

Construction noise might exceed state noise standards for short intervals at select times and locations. An exceedance of noise standards need not occur for a negative impact to occur. For example, "interference with human speech begins at about 60 dBA."[lxiv] A 70 dBA sound interferes with telephone conversations, and an 80 dBA sound interferes with normal conversation.

Operation Audible noise from power lines is created by small electrical discharges at specific locations along the surface of the conductor that ionize surrounding air molecules. This phenomenon—common to all power lines—is known as corona and sounds like a crackling sound. In general, any imperfection on the surface of the conductor might be a source for corona. Examples include dust and dirt, or nicks and burrs from construction. Resulting noise levels are dependent upon voltage level (corona noise increases as voltage increases) and weather conditions.

In foggy, damp, or rainy conditions, audible corona noise is common. In light rain, dense fog, snow or other relative moist conditions, corona noise might be higher than rural background levels. In heavy rain, corona noise increases even more, but because background noise increases too, corona noise is undetectable. During dry weather, corona noise is less perceptible.

More specifically, based on results from the Bonneville Power Administration Corona and Field Effects Program, a 115 kV transmission line is exposed to heavy rain conditions (one inch per hour) anticipated L_5 and L_{50} noise levels are 17.7 dBA and 14.2 dBA at the edge of ROW, respectively.[lxv] The Center for Hearing and Communication indicates that rainfall is commonly measured at 50 dBA,[lxvi] meaning rainfall covers the corona noise it creates.

Step-up substation noise is associated with the transformer and switchgear. Transformers produce a consistent humming sound, resulting from magnetic forces within the transformer core. This sound does not vary with transformer load and are expected to be constant throughout the night and day. Switchgear produces short-term noises during activation of circuit breakers. These activations are infrequent. The closest residences to the Crandall Step-up substation is over 1,000 feet away and the closest residences to the Peaking Plant Step-up substation is over 1,000 feet away meaning the sound level will be, at most, 30 dBA at the receptor without considering mitigating factors such as topography or vegetation.

Mitigation

Section 5.3.5 of the sample permit requires that "construction and maintenance activities shall be limited to daytime working hours to the extent practicable to ensure nighttime noise level standards will not be exceeded." Sound control devices on vehicles and equipment, for example, mufflers; conducting construction activities during daylight hours, and, to the greatest extent possible, during normal business hours; and running vehicles and equipment only when necessary are common ways

to mitigate noise impacts. Impacts to state noise standards can be mitigated by timing restrictions. During operation, permittees are required to adhere to noise standards and all appropriate locations. No additional mitigation is proposed.

6.4.3 Property Values

The ROI for property values is the local vicinity. A property's value is influenced by a complex interaction of factors. The presence of a HVTL or step-up substation becomes one of these factors. Reductions in property value could occur, but changes to a specific property's value are difficult to predict. If effects occur, they tend to be small, almost always less than 10 percent, and usually in the range of three to six percent. On whole, impacts are anticipated to be negative, of a small size, and dissipate rapidly with distance. However, impacts to specific properties could vary widely. Smaller properties are generally more vulnerable to value impacts. Long-term impacts might or might not occur. Impacts are anticipated to be minimal to moderate. Potential impacts to these unique resources can be mitigated.

Impacts to property values that result from power line construction have been studied for over half a century. These studies have focused primarily on residential, agricultural, and undeveloped properties as opposed to commercial or industrial properties. While the research demonstrates that property value impacts vary, the majority indicate that HVTLs have "no significant impact or a slight negative impact on residential properties."[lxvii]

The impact to property values from the presence of a HVTL can be measured in three ways: sale price, marketing time, and sales volume.[lxviii] These measures are influenced by a complex interaction of factors. Most of these factors are parcel specific: condition, size, improvements, acreage and neighborhood characteristics; the proximity to schools, parks and other amenities; and the presence of existing infrastructure, for example, highways, railways, or power lines. In addition to property-specific factors, local and national market trends, as well as interest rates can affect all three measures. Thus, impacts from HVTLs on property values depend upon "many factors, including market condition, location, and personal preference."[lxix] The presence of a HVTL becomes one of many interacting factors that could affect a specific property value.

Generally, impacts to property values resulting from the existence of an HVTL are based on individual perceptions relating to "aesthetic concerns about the effect of overhead wires and supporting towers on views [and] concerns about the possible adverse health impacts associated with exposure to [EMFs]."[lxx] The use and size of a property also influences potential impacts. Properties used exclusively for residential purposes "are more vulnerable to value impact than agricultural or recreational uses, where a broader set of property attributes become relevant for the purchaser."[lxxi] Smaller properties are more vulnerable to value impacts "due to decreased flexibility in the siting of improvements," though, due to topography, access, and related constraints, this can also apply to larger sized parcels.[lxxii] Whether or not an HVTL would encumber future land use,[lxxiii] and the "existence of close substitutes unaffected by transmission lines" can increase the likelihood of value impact.[lxxiv]

Researchers have used survey-based techniques and statistical analyses to draw conclusions about the relationship between HVTLs and property values. In general, surveys provide useful insights into buyer behavior based on stated preferences or when market data is not available.[lxxv] However, survey research presents inherent disadvantages; for example, respondents might not give realistic or truthful responses.[lxxvi] Additionally, conducting a survey regarding the relationship between HVTLs and property values in and of itself might trigger negative responses from respondents.[lxxvii]

The results of survey studies are generally consistent, and can be summarized as follows:

- A high proportion of the residents were aware of the HVTLs at the time of purchase.
- Between one-half and three-fourths of the respondents have negative feelings about the HVTLs.
- These negative feelings center on fear of negative effects to aesthetics, health, and property values.
- Of those who have negative feelings about HVTLs, the majority (67 percent to 80 percent) report that the purchase decision and the price they offered to pay were not affected by the HTVLs.[lxxviii]

The use of multiple regression statistical analysis is generally accepted as the current professional and academic standard for evaluating potential property value impacts, as it reflects the actual behavior of property buyers and sellers in terms of recorded sales prices, while controlling for other factors, for example, home size.[lxxix] This type of analysis allows researchers to identify "revealed preferences" or what people actually did, in contrast to survey research, which identifies what people say they would do.[lxxx] This type of research requires large data sets; therefore, it is less subjective and more reliable than paired sales studies.[lxxxi] The results are often reported as an average change over a number of properties; however, the effect to individual properties can vary—increase or decrease—widely.[lxxxii]

The results of these studies can be summarized, generally, as follows:

- Over time, there is a consistent pattern with about half of the studies finding negative property value effects and half finding none.
- When effects have been found, they tend to be small; almost always less than 10 percent and usually in the range of 3 percent to 6 percent.
- Where effects are found, they decay rapidly as distance to the lines increases and usually disappear at about 200 feet to 300 feet.
- Two studies investigating the behavior of the effect over time find that, where there are effects, they tended to dissipate over time.[lxxxiii]

Potential Impacts

The ROI for property values is the local vicinity. Impacts to property values could occur; however, specific changes to a property's value are difficult to predict. Impacts, if they occur, are expected to decay over time. Property value impacts fall off rapidly with distance; therefore, impacts are anticipated to be localized. On whole, impacts are anticipated to be minimal and dissipate quickly at

distances greater than 400 feet from the HVTL. However, impacts to specific properties could vary widely. Smaller properties are generally more vulnerable to value impacts. Long-term impacts might or might not occur.

Aesthetic impacts might be greater based on the number of homes; however, given this is simply a house count[lxxxiv] and mitigating factors such as topography, vegetation, lot size, etc. are not considered, this might not be the case. The presence of a home does not necessarily translate into greater potential for impacts to a property's value—property value impacts can occur whether a home is present or not.

Every landowner has a unique relationship and sense of value associated with their property. Thus, a landowner's assessment of potential impacts to their property's value is often a deeply personal comparison of the property "before" and "after" a proposed project is constructed. These judgements, however, do not necessarily influence the market value of a property. Rather, appraisers assess a property's value by looking at the property "after" a project is constructed. Moreover, potential market participants likely see the property independent of the changes brought about by a project; therefore, they do not take the "before" and "after" into account the same way a current landowner might. Staff acknowledges this section does not and cannot consider or address the fear and anxiety felt by landowners when facing the potential for negative impacts to their property's value.[lxxxv]

All routing options could have minimal to moderate impacts on local property values, but it will be highly variable to individual properties and will depend on individual property location, distance from the selected routing option, and existing infrastructure currently present around or on a given property. The step-up stations are likely to have negligible impact on property values as the step-up substations will be located directly adjacent to an existing substation and power plant, so the areas are already have significant infrastructure existing nearby and the step-up substations will add minimal new infrastructure.

Mitigation

Impacts to property values can be mitigated by reducing aesthetic impacts, perceived health risks, and encumbrances to future land use. Routing the HVTL away from residences might reduce aesthetic impacts and perceived health risks. Co-locating the HVTL with existing infrastructure might reduce aesthetic impacts and potential land use conflicts. Property value impacts can also be mitigated through inclusion of specific conditions in easement agreements with landowners along the ROW. Examples might include offsetting the HVTL a certain distance from field or parcel lines to allow for use of farm equipment. These agreements are outside the scope of this EA.

6.4.4 Recreation

The ROI for recreation is the local vicinity. Potential impacts to recreational opportunities are anticipated to be minimal for all routing options. During construction, unavoidable short-term impacts

will occur. Construction equipment and vehicle traffic will create noise, dust, and visual impacts. These impacts will be intermittent and localized. Operational impacts will be long-term, and are primarily associated with visual impacts caused by new built features introduced to the landscape. Because direct long-term impacts are primarily aesthetic in nature, indirect long-term impacts to recreation are expected to be subjective and unique to the individual. Potential impacts can be minimized.

Various recreational opportunities exist in the local vicinity including bird watching, fishing, hunting, canoeing/kayaking, hiking, and snowmobiling. Activities in the project area are associated with watercourses, WMAs, snowmobile trails, and county and city parks. **Figure 6-4** shows recreational opportunities in and around the project area.

The Fossum WMA: Bettlin Tract is outside of the Proposed Route ROW, and is approximately 2,000 feet east of the Proposed Route. The north end of the Proposed Route crosses and runs parallel to the Cottonwood and Jackson County Snowmobile Trail, the crossings would be located at 340th Street and State Highway 60 and the Anticipated Alignment would parallel approximately 2,400 feet of 600th Street to the north and east of Mountain Lake.

The Anticipated Alignment will run parallel, approximately 50 feet to the north, of the driveway to Mountain County Park, but the HVTL will be approximately 0.5 miles from the park itself.

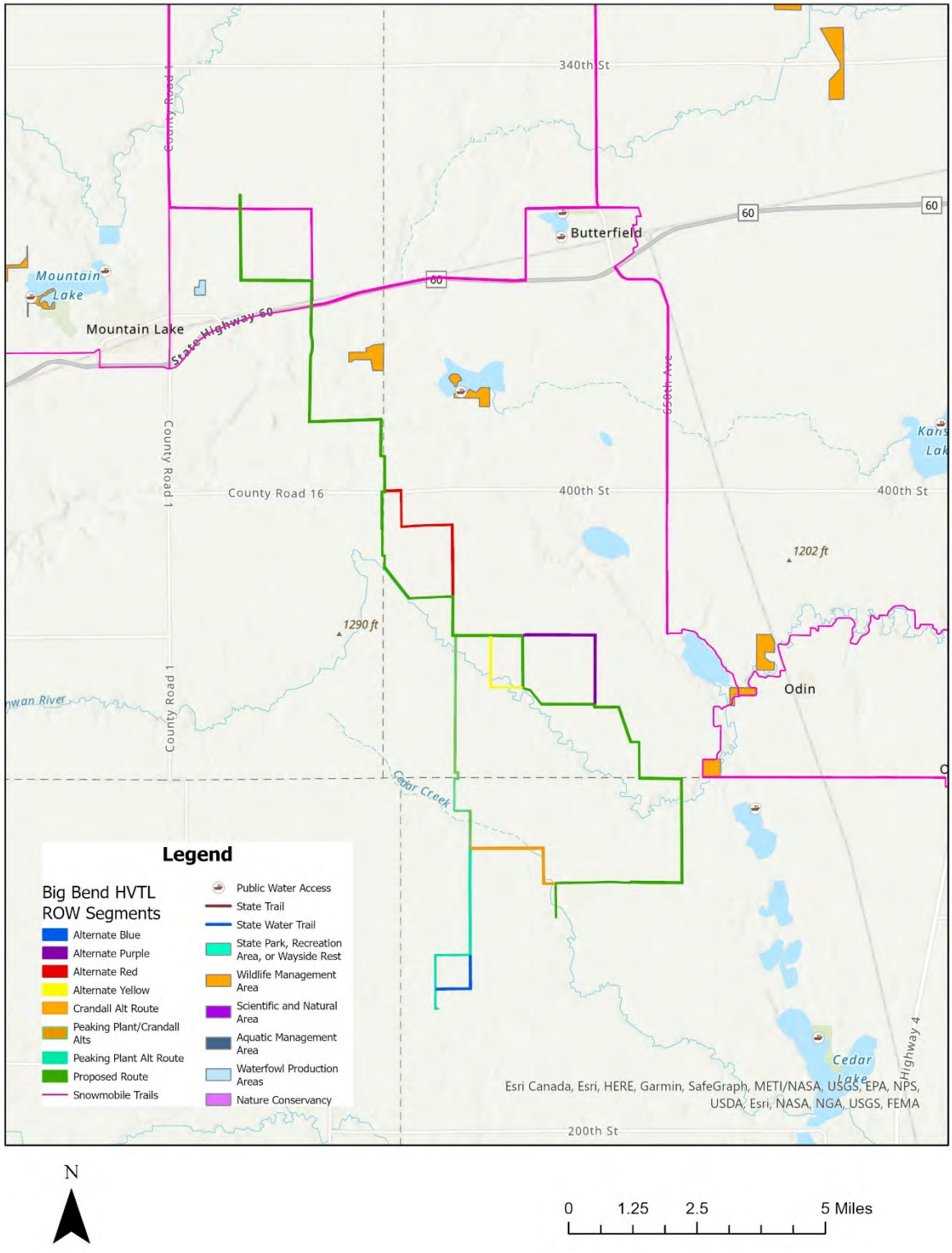
There are no other DNR classified lands, such as State Forests, Parks, Trails, or SNAs within 1,000 feet of any routing option. There are no federal parks, forests, or refuges; or county parks, other than Mountain County Park discussed previously, within the local vicinity.

Potential Impacts

Power lines have the potential to impact recreational activities. Impacts might be negative if the line interferes with the resources that provide these activities, for example, changing the aesthetic of a recreational destination in a way that reduces visitor use. Alternatively, a power line might increase recreational opportunities, for example, ROW clearing might provide increased opportunities for wildlife viewing or hunting.

Noise impacts from construction are anticipated to be short-term and intermittent. Operational noise is negligible, and will not affect recreationalists. Dust associated with construction might indirectly impact recreationalists or natural areas.

Figure 6-4. Recreational Opportunities Near the HVTL Project Area



New built features will be introduced to the landscape, and construction equipment and vehicle traffic will affect aesthetics. While visual impacts will occur, the HVTL and step-up substation will not impede recreational activities, such as snowmobiling, canoeing, hunting, or fishing.

Construction activities that occur on the portion of the Proposed Route adjacent to the Mountain County Park driveway may have some minimal and short-term impacts to park access.

Mitigation

Impacts to recreation can be mitigated by selecting routes and alignments that avoid resources utilized for recreational purposes. Impacts can also be mitigated by reducing impacts to natural landscapes during construction. Various sections of the sample permit indirectly address impacts to recreation, such as noise, aesthetics, soils, etc.

Construction timing and BMPs can be used to further minimize short-term impacts related to accessing Mountain County Park.

6.4.5 Socioeconomics

The ROI for socioeconomics is Cottonwood, Watonwan, and Martin counties. Economic factors related to construction and operation of the project are anticipated to be short-term and positive, but minimal, for all routing options. Positive impacts come from increased expenditures at local businesses during construction, the potential for some materials to be purchased locally, and the use of local labor. Because potential impacts are positive, no mitigation is proposed.

The proposed HVTL Project is located in Minnesota's Economic Development Region 8 (Cottonwood County) and 9 (Watonwan and Martin Counties). Region 8 had an annual average labor force count of 63,606 workers through 2018[389], and Region 9 had an average annual average labor force count of over 133,200 workers through 2020[390]. In line with the region's population decline, Region 8 has lost about 296.7 workers per year since 2010; and is down from a peak of over 68,000 workers in 2009. 12,116 job vacancies were posted by employers in Region 8 in the 2nd quarter of 2021 across a number of occupations and industries, indicates there is extensive opportunities for job seekers in the Region.[391] Region 9 has lost an average of 21 workers per year between 2010 and 2020. A growing

[389] MN Employment and Economic Development. Regional Profile – Region 8. November 15, 2021. https://mn.gov/deed/assets/111521_region8_tcm1045-133260.pdf.
[390] MN Employment and Economic Development. Regional Profile – Region 9. September 2021. https://mn.gov/deed/assets/2021_EDR9RP_MS_tcm1045-133261.pdf.
[391] MN Employment and Economic Development. Regional Profile – Region 8. November 15, 2021. https://mn.gov/deed/assets/111521_region8_tcm1045-133260.pdf.

scarcity of workers and an increasingly tight labor market has become a barrier to economic growth in the Region.[392]

Household incomes were significantly lower in Region 8 than the rest of the state. The median household income in Region 8 was $56,514 in 2019, compared to a $71,306 median throughout the State of Minnesota. Almost half (44.6 percent) of the households in the region had incomes below $50,000 in 2019, compared to just 34.8 percent statewide. Another 34.4 percent of households earned between $50,000 and $100,000 in the region. In contrast, only 21.1 percent of households in Region 8 earned over $100,000 per year, compared to 33.4 percent of households statewide.[393]

Household incomes were significantly lower in Region 9 than the rest of the state. The median household income in Region 9 was $58,487 in 2019, compared to a $71,306 median throughout the State of Minnesota. Almost half (41.4 percent) of the households in the region had incomes below $50,000 in 2019, compared to just 34.8 percent statewide. Another 34.2 percent of households earned between $50,000 and $100,000 in the region. In contrast, only 24.4 percent of households in Region 9 earned over $100,000 per year, compared to 33.4 percent of households statewide.[394]

The median hourly wage for all occupations in Region 8 was $18.79 in 2021, which was the third lowest wage level of the 13 economic development regions in the state. Region 8's median wage was $4.21 below the state's median hourly wage.[395] The median hourly wage for all occupations in Region 9 was $19.76 in 2021, which was the eighth highest wage level of the 13 economic development regions in the state. Region 9's median wage was $3.24 below the state's median hourly wage.[396]

The largest occupations in Region 8 include manufacturing, health care and social assistance, and retail trade. Average annual wages for health care and social assistance and retail trade are below the average annual wage in the Region, and manufacturing occupations tend to have higher average annual wages when compared to the Region average.[397] The three largest occupations in Region 9 are office and administration support, production, food preparation and serving related jobs. Those three

[392] MN Employment and Economic Development. Regional Profile – Region 9. September 2021. https://mn.gov/deed/assets/2021_EDR9RP_MS_tcm1045-133261.pdf.
[393] MN Employment and Economic Development. Regional Profile – Region 8. November 15, 2021. https://mn.gov/deed/assets/111521_region8_tcm1045-133260.pdf.
[394] MN Employment and Economic Development. Regional Profile – Region 9. September 2021. https://mn.gov/deed/assets/2021_EDR9RP_MS_tcm1045-133261.pdf.
[395] MN Employment and Economic Development. Regional Profile – Region 8. November 15, 2021. https://mn.gov/deed/assets/111521_region8_tcm1045-133260.pdf.
[396] MN Employment and Economic Development. Regional Profile – Region 9. September 2021. https://mn.gov/deed/assets/2021_EDR9RP_MS_tcm1045-133261.pdf.
[397] MN Employment and Economic Development. Regional Profile – Region 8. November 15, 2021. https://mn.gov/deed/assets/111521_region8_tcm1045-133260.pdf.

occupation groups also have lower median hourly wages than approximately half of the other occupation groups represented in the Region.[398]

Approximately 45 workers will be required for construction of the transmission project. These workers will be in the project area from approximately five months.[399] Construction personnel would likely commute to the HTVL Project Area on a daily or weekly basis instead of relocating to the area.

Table 6-10. Population and Economic Profile

Location	Total Population (2020)	Percent Persons of Color Population‡ (2019)	Median Household Income	Unemployment Rate
Minnesota	5,6,57,342	17.9%	$74,593	3.6%
Economic Development Region 9 (Including Watonwan and Martin Counties))	233,452 (Watonwan – 11,253 and Martin – 20,025)	6.9% (Watonwan – 14.2% and Martin – 3.7%)	$58,487 (Watonwan – $54,065 and Martin – $52,798)	3.7% (Watonwan – 2.9% and Martin – 4.0%)
Economic Development Region 8 (Including Cottonwood% County	117,437 (Cottonwood – 11,517)	11.6% (Cottonwood – 11%)	$56,514 (Cottonwood - $52,087)	2.6% (Cottonwood – 4.0%)

‡ Persons of color population includes all persons excluding those who self-identified as non-Hispanic white alone.

Potential Impacts

Positive economic impacts include increased expenditures, for example, food and fuel, at local businesses during construction. Big Bend indicates that some materials might be purchased locally depending on availability, terms, and conditions. These purchases could include fill, gravel, rock, concrete, rebar, fuel, and miscellaneous electrical equipment. Most of the workforce will be local. Step-up substation site grading will be completed by a local contractor, with the balance of step-up substation construction completed by local and non-local personnel, and selected contractors from Minnesota, North Dakota, or South Dakota. The transmission line will mostly be constructed by a

[398] MN Employment and Economic Development. Regional Profile – Region 9. September 2021. https://mn.gov/deed/assets/2021_EDR9RP_MS_tcm1045-133261.pdf.

[399] HVTL RPA – Section 5.2.6.1

Minnesota based contractor selected by Big Bend, and the use of local and non-local personnel. The HVTL Project will not disrupt local communities or businesses. Adverse impacts are not anticipated.

Mitigation

Adverse impacts are not expected; therefore, mitigation is not proposed.

6.5 Potential Impacts to Human Health and Safety

6.5.1 Electromagnetic Fields

The ROI for EMF is the anticipated ROW. Impacts to human health from possible exposure to EMFs are not anticipated. The HVTL will be constructed to maintain proper safety clearances. The step-up substation site will not be accessible to the public. EMFs associated with the project are below Commission permit requirements, and state and international guidelines. Potential impacts will be long-term and localized. These unavoidable impacts will be of a small size. Impacts can be mitigated.

EMFs are invisible forces that result from the presence of electricity. EMF occurs naturally and is caused by weather or the geomagnetic field. EMFs are also caused by all electrical devices and is found wherever people use electricity. EMFs are characterized and distinguished by their frequency, which is the rate at which the field changes direction each second. Electrical lines in the United States have a frequency of 60 cycles per second or 60 hertz. EMF at this frequency level is extremely low frequency EMF (ELF-EMF).

Voltage on a conductor creates an electric field that surrounds and extends from the wire. Using water moving through a pipe as an analogy, voltage is equivalent to the pressure of the water moving through the pipe. The strength of the electric field is measured in kilovolts per meter (kV/m). Electric fields decrease rapidly as they travel from the conductor, and are easily shielded or weakened by most objects and materials.

Current moving through a conductor creates a magnetic field that surrounds and extends from the wire. Using the same analogy, current is equivalent to the amount of water moving through the pipe. The strength of a magnetic field is measured in milliGauss (mG). Like electric fields, the strength of a magnetic field decreases rapidly as the distance from the source increases; however, unlike electric fields, magnetic fields are not easily shielded or weakened.

Table 6-11 provides examples of electric and magnetic fields associated with common household items. “The strongest . . . electric fields that are ordinarily encountered in the environment exist beneath high voltage transmission lines. In contrast, the strongest magnetic fields . . . are normally found very close to motors and other electrical appliances, as well as in specialized equipment….”[lxxxvi]

Table 6-11. Electric and Magnetic Field Strength of Common Household Items

Electric Field *		Magnetic Field **			
Appliance	kV/m	Appliance	mG		
	1 foot		1 inch	1 foot	3 feet
Stereo	0.18	Circular saw	2,100 to 10,000	9 to 210	0.2 to 10
Iron	0.12	Drill	4,000 to 8,000	22 to 31	0.8 to 2
Refrigerator	0.12	Microwave	750 to 2,000	40 to 80	3 to 8
Mixer	0.10	Blender	200 to 1,200	5.2 to 17	0.3 to 1.1
Toaster	0.08	Toaster	70 to 150	0.6 to 7	< 0.1 to 0.11
Hair Dryer	0.08	Hair dryer	60 to 200	< 0.1 to 1.5	< 0.1
Television	0.06	Television	25 to 500	0.4 to 20	< 0.1 to 1.5
Vacuum	0.05	Coffee maker	15 to 250	0.9 to 1.2	< 0.1

* German Federal Office for Radiation Safety

** Long Island Power Institute

Health Studies

In the late-1970s, epidemiological studies indicated a weak association between childhood leukemia and ELF-EMF levels.[lxxxvii] "Epidemiologists observe and compare groups of people who have had or have not had certain diseases and exposures to see if the risk of disease is different between the exposed and unexposed groups but does not control the exposure and cannot experimentally control all the factors that might affect the risk of disease."[lxxxviii]

Ever since, researchers have examined possible links between ELF-EMF exposure and health effects through epidemiological, animal, clinical, and cellular studies. To date, "no mechanism by which ELF-EMFs or radiofrequency radiation could cause cancer has been identified. Unlike high-energy (ionizing) radiation, EMFs in the non-ionizing part of the electromagnetic spectrum cannot damage DNA or cells directly," that is, the ELF-EMF that is emitted from HVTLs does not have the energy to ionize

molecules or to heat them.[lxxxix] Nevertheless, they are fields of energy and thus have the potential to produce effects.

"The few studies that have been conducted on adults show no evidence of a link between EMF exposure and adult cancers, such as leukemia, brain cancer, and breast cancer."[xc] "Overall there is no evidence that exposure to ELF magnetic fields alone causes tumors. The evidence that ELF magnetic field exposure can enhance tumor development in combination with carcinogens is inadequate."[xci]

"A number of scientific panels convened by national and international health agencies and the U.S. Congress have reviewed the research carried out to date. Most concluded that there is insufficient evidence to prove an association between EMF and health effects; however, many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe."[xcii]

The Minnesota State Interagency Working Group on EMF Issues, comprised of staff from state agencies, boards, and Commission, was tasked to study issues related to EMF. In 2002, the group published *A White Paper on Electric and Magnetic Field Policy and Mitigation Options*, and concluded the following:

> Some epidemiological results do show a weak but consistent association between childhood leukemia and increasing exposure to EMF…. However, epidemiological studies alone are considered insufficient for concluding that a cause and effect relationship exists, and the association must be supported by data from laboratory studies. Existing laboratory studies have not substantiated this relationship…, nor have scientists been able to understand the biological mechanism of how EMF could cause adverse effects. In addition, epidemiological studies of various other diseases, in both children and adults, have failed to show any consistent pattern of harm from EMF.
>
> The Department of Health concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of a health risk cannot be dismissed.[xciii]

Regulations and Guidelines

Currently, there are no federal regulations regarding allowable ELF-EMF produced by power lines in the United States; however, state governments have developed state-specific regulations. For example, Florida limits electric fields to 2.0 kV/m and magnetic fields to 150 mG at the edge of the ROW for 161 kV transmission lines.[xciv] Additionally, international organizations have adopted standards for exposure to electric and magnetic fields (Table 6-12).

Permits issued by the Commission limit the maximum electric field under HVTLs in Minnesota to 8.0 kV/m.[xcv] This condition was designed to prevent serious hazard from shocks when touching large objects, such as semi-trailers or large farm equipment under "extra" high voltage transmission lines of 500 kV or higher. The Commission has not adopted a standard for magnetic fields. EMF standards are shown in Table 6-12.

Table 6-12. International Electric and Magnetic Field Guidelines

Organization	Electric Field (kV/m)		Magnetic Field (mG)	
	Public	Occupational	Public	Occupational
Institute of Electrical and Electronics Engineers	5.0	20.0	9,040	27,100
International Commission on Non-Ionizing Radiation Protection	4.2	8.3	2,000	4,200
American Conference of Industrial Hygienists	—	25.0	—	10,000/ 1,000[a]
National Radiological Protection Board	4.2	—	830	4,200

[a] For persons with cardiac pacemakers or other medical electronic devices

Potential Impacts

In the route permit application, the applicant did not model electric fields associated with the Big Bend HVTL. Big Bend anticipates that the proposed 161 kV will have an electrical field of 1.0 Kv/m directly below the line, and will dissipate to 0.5 kv/m at 50 feet from the HVTL alignment. These field strengths are well below the Commission permit standard of 8.0 kV/m.[400]

In the route permit application, the applicant states they anticipate the Big Bend HVTL to have a magnetic field comparable to other 161 kV HVTLs. The magnetic field directly below the tansmission line will be 29.7 mG, and the magnetic field will be reduced to approximately 6.5 Mg at 50 feet from the line.

EMF fields for the step-up substation were not calculated; however, potential impacts are not anticipated as EMF is anticipated to be down to background levels by the boundary fencing.

This is consistent with the findings of the National Institute of Environmental Health Sciences.

In general, the strongest EMF around the outside of a step-up substation comes from the power lines entering and leaving the substation. The strength of the EMF from equipment within the step-up substation, such as transformers, reactors, and capacitor banks, decreases rapidly with increasing distance.

[400] Big Bend HVTL – Section 5.2.2

Beyond the substation fence or wall, the EMF produced by the substation equipment is typically indistinguishable from background levels.[xcvi]

Mitigation

No health impacts due to EMF are anticipated for any of the possible routing options; therefore, no mitigation is proposed. The HVTL will be constructed to maintain proper safety clearances, etc. The step-up substation site will not be accessible to the public.

Nevertheless, the Commission has adopted a prudent avoidance approach when routing HVTLs. Therefore, if warranted the Commission considers, and may require, mitigation strategies to minimize EMF exposure levels associated with HVTLs. Consistent with this, basic mitigation measures are prudent. EMF diminishes with distance; therefore, EMF exposure can be minimized by routing HVTLs away from residences and other locations where people congregate to the extent practicable.

6.5.2 Implantable Medical Devices

The ROI for implantable medical devices is the anticipated ROW. Magnetic fields produced by HVTLs are not high enough to interfere with these devices; however, electric fields potentially can. Electric field strengths associated with the project are below the 5.0 kV/m interaction level for modern, bipolar pacemakers, but might interact with older, unipolar pacemakers. Should interference occur moving away from the transmission line is a standard response. Electric fields are easily shielded. Potential impacts are expected to be minimal across routing options. Impacts to human health are not anticipated. Potential impacts, if they occur, would be short-term, intermittent, and localized. Impacts would affect a unique resource (people). Impacts can be mitigated.

EMF could interfere with implantable electromechanical medical devices, such as cardiac pacemakers, implantable cardioverter defibrillators, neurostimulators, and insulin pumps. Most research on electromagnetic interference and medical devices relates to pacemakers. Manufacturers' recommended threshold for magnetic fields is 1,000 mG.[xcvii] Laboratory tests indicate that interference from magnetic fields in pacemakers is not observed until 2,000 mG—a field strength much greater than that associated with transmission lines.[xcviii] As a result, research has focused on electric field impacts.

Electric fields can interfere with a pacemaker's ability to sense normal electrical activity in the heart. In the unlikely event a pacemaker is impacted, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker returns to its normal operation when the person moves away from the source of the interference.

"While the present-day units are better shielded against electromagnetic interference than their earlier counterparts, sensitivity to electric field exposure is inevitable."[xcix] Interference in unipolar pacemakers that results in asynchronous pacing may occur with electric fields ranging from 1.2 to 1.7 kV/m; however, other units are unaffected at 8.0 kV/m.[c] In general, electric interference must be at

levels above 5.0 kV/m to interfere with modern, bipolar pacemaker behavior.[ci] Some models appear unaffected at 20 kV/m.[cii]

There are no sensitive receptors such as hospitals or nursing homes located within the route width of any routing option. Therefore, once constructed, the regular presence of implantable medical devices within the ROW is not expected.

Potential Impacts

Negligible impacts would occur during construction. Construction equipment typically generates low levels of EMF. When EMF is generated, it is usually by the occasional use of electric devices. Potential electromagnetic interference to workers with implantable devices is expected to be known by the individual using the device—the public is not allowed within the work area. Any effects from electric devices during construction would be infrequent, and are expected to be within same range of typical EMF levels described previously.

The anticipated maximum electric field strength directly underneath the proposed 161 kV HVTL is 1.00 kV/m, and levels will dissipate to 0.50 kV/m within 50 feet of the HVTL. Field strengths associated with the project are below the 5.0 kV/m interaction level for modern, bipolar pacemakers, but might interact with older, unipolar pacemakers. Therefore, impacts to unipolar pacemakers might occur directly underneath the HVTL.

Mitigation

Impacts to implantable medical devices and persons using these devices might occur, but it is not expected. Patients are informed of potential problems associated with electromagnetic interference and their device. The device changes their behavior considerably. Transmission lines and step-up substations are only one of many sources of electromagnetic interference. “Moving away from a source is a standard response to the effects of exposure…. Patients can shield themselves from [electromagnetic interference] with a car, a building, or the enclosed cab of a truck.”[ciii] Mitigation is not proposed.

6.5.3 Public and Worker Safety

The ROI for public and worker safety is the anticipated ROW. Like any construction project, there are risks. These include potential injury from falls, equipment and vehicle use, electrical accidents, etc. Public risks involve electrocution. This risk is higher in low-voltage lines because the conductor is lower to the ground. Electrocution risks could also result from unauthorized entry into the step-up substation. Potential impacts are anticipated to be minimal for all routing options. Impacts would be short-and long-term, and can be minimized.

The most recent data available for injuries and fatalities associated with North American Industry Classification System Code No. 237130 *Power and Communication Line and Related Structures Construction* show that in 2019 there were 2,250 reported nonfatal occupational injuries and illnesses

involving days away from work.[civ] Of these, about four percent were considered traumatic. In 2019, 26 fatal injuries occurred to workers in this industry, most associated with transportation (roadway accident or being struck by a vehicle).[cv] In all industries, 166 fatal injuries occurred from either direct or indirect electrocution—the data did not specify whether these fatalities were a result from an overhead power line.[cvi]

Potential Impacts

The presence of workers will depend on the anticipated schedule for construction and future operation, maintenance, and repair of the project. Like any construction project, there are risks. These include potential injury from falls, equipment and vehicle use, electrical accidents, etc. Construction might disturb existing environmental hazards on-site, for example, contaminated soils. During operation and maintenance occupational risks like those associated with construction exist, but to a lesser degree.

Public risks involve electrocution. "The most significant risk of injury from any power line is the danger of electrical contact between an object on the ground and an energized conductor."[cvii] When working near power lines, for example, using heavy equipment, an electrical contact can occur "even if direct physical contact is not made, because electricity can arc across an air gap."[cviii] This risk is higher in low-voltage lines, such as distribution lines, because the conductor is lower to the ground. Electrocution risks could also result from unauthorized entry into the step-up substation. Potential impacts to emergency services is anticipated to be negligible.

Mitigation

The applicant pointed out that proper safeguards will be implemented for construction and operation of the transmission line and step-up substation. The project will be designed to meet or exceed local, state, and Big Bend's standards regarding clearance to the ground, clearance to crossing utilities, strength of materials, and ROW distances. The project must comply with the NESC.[cix]

The project would be required to comply with the Occupational Safety and Health Administration standards, "which (1) provide regulations for safety in the workplace, (2) regulate construction safety, and (3) require a Hazard Communication Plan to identify and inventory all hazardous materials for which material safety data sheets would be maintained."[cx] Construction crews and contract crews will comply with local, state, and NESC standards regarding installation and construction practices. Big Bend will use established safety procedures, as well as industry safety procedures, during and after installation of the transmission line and step-up substation, including appropriate signage during construction.

The HVTL will be designed to automatically trip out-of-service (become de-energized) if it falls or contacts trees resulting from a weather event (severe thunderstorm or tornado) or being struck by a vehicle (large truck). The HVTL will also be constructed with a grounded shield wire placed along the top of the structures, above the conductors. This protects the transmission line from a lightning strike.

"As a general precaution, no one should be on an object or in contact with an object that is taller than 15 to 17 feet while under a high-voltage electric line."[cxi]

The step-up substation will be fenced and locked. Appropriate signage will be posted that identifies the hazards associated with the substation.

6.5.4 Public Utilities and Infrastructure

The ROI for public utilities and infrastructure is the project area. Potential impacts to the electrical grid, roads and railroads, and other utilities are anticipated to be short-term, intermittent, and localized during construction. Impacts to water (wells and septic systems) and pipelines are not expected to occur. Construction impacts are expected to be minimal and are associated with possible traffic delays. Operation of the project will provide a more reliable electrical grid. Negative impacts, such as traffic delays, should be negligible. Impacts are unavoidable but can be minimized.

Public utilities in project area are as follows:

Electricity South Central Electric Association provides electrical service in the project area and has distribution lines located throughout the majority of the project area. Mountain Lake Municipal Utilities provides electrical services to residences within the City of Mountain Lake, and also serves residences within 0.5 miles of the Mountain Lake municipal boundary. A 345 kV transmission line is present in the Project Area and will be crossed by the Proposed Route in two different locations. Big Bend has been in communication with Xcel Energy regarding the 345 kV transmission line crossings.

Roads and Highways State routing policy indicates a preference for consolidating HVTLs with existing infrastructure, including transportation ROWs. Minnesota Statute 216E.03, subdivision 7, directs the Commission to "make specific findings that it has considered locating a route for a [HVTL] on an existing high-voltage transmission route and the use of parallel existing highway ROW and, to the extent those are not used for the route, the Commission must state the reasons."

The Proposed Route does not parallel any State highways, but it does cross State Highway 60 in one location approximately 1.5 miles east of Mountain Lake. Big Bend will have to acquire a Utility Permit from MnDOT for the Proposed Route crossing of State Highway 60. The Big Bend Wind HVTL will parallel a number of county and township roads, and the HVTL Project would also cross several local roads. The *Traffic Mapping Application*, maintained by MnDOT, provides average daily traffic counts.[cxii] State Highway 60, east of Butterfield and southwest of St. James (Sequence #9830), averaged 6,010 trips per day (2020). Average Daily Traffic (ADT) trip counts on other local CSAHs and County Roads range from 20 to 130. Counts done in 2010 on County Road 150 showed 130 ADTs. Counts done in 2014 showed the following; CSAH 8 (65 trips), County Road 128 (50 trips), County Road 134 (20 trips). Traffic counts in 2016 on CSAH 2 AND CSAH 21 showed, 80 and 410 ADTs respectively. Counts conducted in 2018 on Highway 60 were 5,881 trips and CSAH 9 were 90 trips. With the exception of State Highway 60, traffic volumes are relatively low on most of the roads crossed and paralleled by the Proposed Route.

Utilities It is assumed that local utilities such as natural gas, telephone, fiber optic cables, and cable television are buried in the project area along road ROWs. Thus, they might intersect the route width of any routing option.

Water The different routing options are outside of any municipal boundaries; therefore, it is assumed that residences within the route width are not serviced by city water supply or sanitary sewer; these services are provided by individual wells and septic systems. Red Rock Rural Water System does supply water to some residences within Cottonwood, Watonwan, and Martin counties.

Pipelines There are no natural gas transmission pipelines or hazardous liquid (oil) pipelines crossed by the Proposed Route, alternative routes, or any of the route segment alternates.[cxiii]

Railroad The HVTL Project will cross a Chicago and Northwestern Railroad near the north end of the project. Because of the crossing location all possible routing options will cross the Chicago and Northwestern Railroad.

Potential Impacts

Power lines have the potential to damage or interfere with public utilities or preclude construction and operation of new utility infrastructure.

Electricity Big Bend has indicated that the Big Bend Wind Project has been designed to utilize co-location, and construction of the HVTL will not impact the safe operation and maintenance of utilities. Big Bend has designed the Project to cross over the 345 kV transmission line, as requested by Xcel, and there are no interruptions to service anticipated when the Big Bend Wind HVTL is constructed over the existing 345 kV transmission line. Big Bend has also indicated that there would be no interruption of service when the Big Bend HVTL is connected to the Crandall Substation.

Roads and Highways During construction short-term localized traffic delays and re-routes might occur. These delays, should they occur, would most likely be associated with material delivery and worker transportation. Road crossings might also necessitate short-term impacts to traffic when stringing conductors. Big Bend does not intend to locate structures within road ROW, though the HVTL ROW will overlap with road ROW. Because NESC clearances must be met, this will not affect the safety of the traveling public or road and highway operations. Additional costs to maintain road ROWs will not be incurred because of the project.

Impacts to the local roads will be repaired and returned to the condition, or better, than they were before project construction began. Big Bend will meet with local road authorities, cities, townships, and counties to address road issues that arise during construction.

Utilities The location of underground utilities can be identified using Gopher State One Call during engineering surveys once a route is selected. If a utility is identified within the ROW a structure or the utility itself might need to be relocated. Relocating a utility would need to be coordinated with the

affected utility company. Typically, these issues do not cause significant modifications to the HVTL or affected utility. Impacts to underground utilities, should they exist, are not expected.

Water Potential impacts to water utilities could occur if structures damage, or impede the use of, wells and septic systems. No residences are located within the ROW of any routing option; therefore, impacts to wells and septic systems are not expected to occur. Red Rock Rural Water System residential supply lines and any main waterlines serving residences are located underground and would be located during the Gopher State One Call utilities search. Once a route is selected the engineering project design can make necessary adjustments to make sure any ground disturbance or below grade work will avoid impacts to waterline. No long-term impacts are anticipated.

Pipelines Transmission pipelines are not located in the project area. Impacts will not occur. No long-term impacts are anticipated.

Railroad The HVTL Project will cross the railway, and require a crossing permit from Chicago and Northwestern Railroad. Given Big Bend must coordinate with railroad personnel and follow the terms and conditions established in the crossing permit developed by Chicago and Northwestern Railroad no impacts are expected.

Mitigation

Big Bend has indicated that electrical services will not be lost during HVTL Project construction or during connection into either of the POIs.

Section 5.3.13 of the sample permit addresses roads. Permittees are required to inform road authorities of roads that will be used during construction and acquire necessary permits and approvals for oversize and overweight loads. Additionally, the following practices can mitigate potential impacts:

- Pilot vehicles can accompany movement of heavy equipment (transformer).
- Deliveries can be timed to avoid traffic congestion and dangerous situations on the roadway.
- Traffic control barriers and warning devices can be used as necessary.
- Temporary guard structures should be used to support the conductor above vehicle traffic when stringing conductors over the roadway (or rail traffic when stringing conductors over the railway).

Potential impacts can be avoided by marking underground utilities prior to construction and avoiding these areas during construction. Also, the applicants can coordinate with landowners to identify the location of wells and septic systems to avoid potential impacts.

6.5.5 Stray Voltage

The ROI for stray voltage is the anticipated ROW. Potential impacts to residences or farming operations from neutral-to-earth stray voltage are not anticipated. HVTLs do not produce this type of

stray voltage because HVTLs do not directly connect to businesses, residences, or farms. Neutral-to-earth stray voltage is most associated with local distribution lines and electrical wiring within the affected building. Induced voltage is the result of an electric field from the HVTL extending to nearby conductive objects. Constructing the project to NESC standards and Commission route permit requirements mitigates this concern. Therefore, potential impacts from stray voltage are anticipated to be minimal for all routing options. Potential impacts can be mitigated.

In general terms, stray voltage is "voltage caused by an electric current in the earth, or in groundwater, resulting from the grounding of electrical equipment or an electrical distribution system."[cxiv] Stray voltage encompasses two phenomena: neutral-to-earth voltage (NEV) and induced voltage.

Neutral-to-Earth Voltage NEV is a type of stray voltage that can occur where distribution lines enter structures. "Electrical systems—farm systems and utility distribution systems—are grounded to the earth to ensure safety and reliability…. Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops."[cxv] This extraneous voltage appears on metal surfaces in buildings, barns, and other structures.

NEV is typically experienced by livestock that contact one or more metal objects on a farm, for example, feeders, waterers, or stalls. Metal objects on a farm are grounded to earth through electrical connections. Livestock, by virtue of standing on the ground, are also grounded to earth. If an animal touches two points at different voltages (one at neutral voltage and the other near true ground),[cxvi] a small current will flow through the livestock to the ground because the animal completes the electrical circuit.[cxvii]

Despite metal objects and livestock both being grounded to the earth many factors affect the effectiveness of their respective ground, that is, a good or poor ground. In metal objects these include wire size and length, quality of connections, number and resistance of ground rods, and electrical current being grounded.[cxviii] Likewise, a number of factors also determine the extent to which livestock are grounded, for example, if the animal is standing on wet or dry ground.[cxix] Stray voltage results from this difference in the effectiveness of grounding and on the resulting electrical currents. It can exist at any farm, house, or business that uses electricity, independent of a nearby transmission line.

If NEV is prevalent in an agricultural operation it can affect livestock health. This concern has primarily been raised on dairy farms because of its potential to affect milk production and quality. NEV is by and large an issue associated with distribution lines and electrical service at a residence or on a farm. Transmission lines do not create NEV stray voltage as they do not directly connect to businesses, residences, or farms.

Induced Voltage The electric field from a transmission line can extend to nearby conductive objects, for example, farm equipment, and induce a voltage upon them. This phenomenon is dependent on many factors, including the shape, size, orientation, capacitance, and location of the object. If these conductive objects are insulated or semi-insulated from the ground and a person touches them, a

small current will pass through the person's body to the ground. This may be accompanied by a spark discharge and mild shock like what can occur when an individual walks across a carpet and touches a grounded object or another person.

The primary concern with induced voltage is not the voltage, but rather the current that flows through a person to the ground when touching the object. To ensure safety in the proximity of transmission lines, the NESC requires that any discharge be less than five milliAmperes. In addition, the Commission's electric field limit of 8 kV/m is designed to prevent serious shock hazards due to induced voltage. Proper grounding of metal objects under and adjacent to HVTLs is the best method of avoiding these shocks.

Transmission lines may cause additional current to flow on distribution lines where these lines parallel. When distribution lines are properly wired and grounded, these additional currents are not significant. However, if distribution lines are not properly wired and grounded, these additional currents could create induced voltage impacts.

Potential Impacts

The proposed HVTL does not interconnect to businesses or residences within any routing option, and does not change local electrical service. As a result, impacts to residences or farming operations from NEV are not anticipated. The project might induce a voltage on insulated metal objects within the final ROW; however, the Commission requires that transmission lines be constructed and operated to meet NESC standards as well as the Commission's own electric field limit of 8 kV/m reducing these impacts.[cxx] As a result, impacts due to induced voltage are not anticipated to occur.

Mitigation

The sample route permit requires the project meet electrical performance standards. Thus, no additional mitigation is proposed.

Big Bend has committed to working with landowners to ground fences, gates, buildings, or other structures that may be subject to induced current from the HVTL. Big Bend has committed to thoroughly investigate landowner safety concerns and take corrective action as necessary.

6.6 Potential Impacts to Land Based Economies

6.6.1 Agriculture

The ROI for agriculture is the ROW. Potential impacts to agricultural producers are anticipated to be of small-size and minimal across all routing options. This is because HVTLs generally do not interfere with future farming or grazing operations. Potential on-the-ground impacts can be mitigated. Short- and long-term financial impacts, such as crop losses, can be mitigated through easement agreements.

In terms of agricultural land, all routing options will convert approximately the same amount of agricultural land to an industrial. This impact is minor in context of agricultural land in Cottonwood,

Watonwan, and Martin counties. These localized impacts will be of a small size and affect prime farmland—a unique resource that is common in the project area. Impacts can be mitigated. Conversion of agricultural land from siting the step-up substation will be mitigated by purchase or easement agreements.

Farming occurs in Cottonwood, Watonwan, and Martin counties; it constitutes a two, one, and three percent overall state agriculture sales, respectively.[cxxi] The following summary is based on information from the Census of Agriculture, which is conducted by the United States Department of Agriculture (USDA). The agricultural census is a complete count of farms and ranches and the people who operate them, including small plots with at least $1,000 in annual sales.[cxxii] In 2017 there were 774 individual farms using 370,389 acres of farmland in Cottonwood County, 911 individual farms using 449,064 acres of farmland in Martin County, and 497 individual farms using 252,417 acres of farmland in Watonwan County.[cxxiii]

Farmland Class There are differences in the quality and suitability of land for agricultural production. Over 95 percent of soils within the ROW of the routing options are considered prime farmland or prime farmland, when drained.[401] Federal regulation at 7 C.F.R. 657.5(a)(1) defines prime farmland, in part, as:

Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.

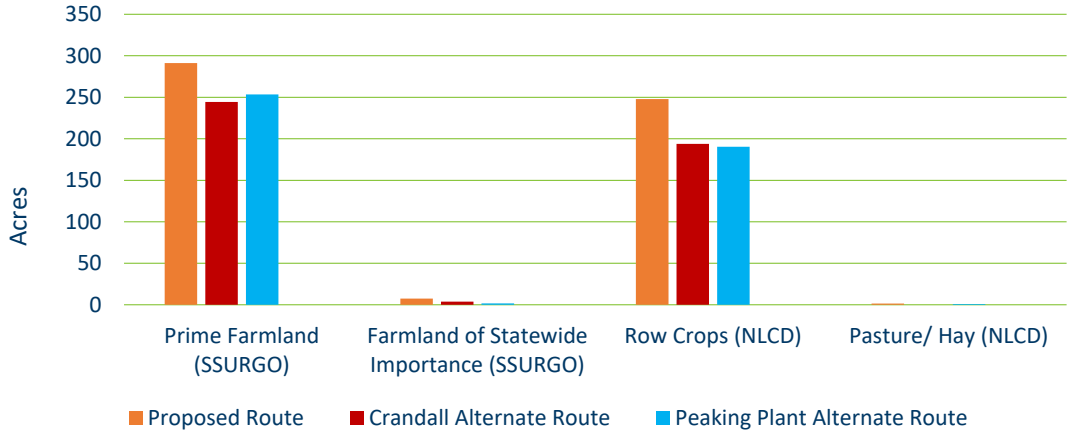
Although prime farmland characteristics are the same nationwide, certain soils that do not meet these specific characteristics are nevertheless important at a statewide level. Farmland of statewide importance is land, in addition to prime and unique farmlands, that is of statewide importance to produce food, feed, fiber, forage, and oil seed crops.[cxxiv]

Criteria for defining and delineating farmland of statewide importance are determined by the appropriate state agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some soils might produce as high a yield as prime farmlands if conditions are favorable. In some states, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by law.[cxxv]

[401] Big Bend HVTL RPA – Appendices D and E

The Soil Survey Geographic Database (SSURGO)[cxxvi] contains soil information collected by the USDA National Cooperative Soil Survey. Table 6-13 shows soils classified as either prime farmland or farmland of statewide importance, as well as NLCD agricultural cover types (cultivated crops and pasture/hay).

Table 6-13. Farmland Characteristics (SSURGO and NLCD)



Note: SSURGO data and NLCD data are unrelated—SSURGO data shows soil types; NLCD shows land use/cover types regardless of the underlying soil.

The comparison of Prime Farmland, Farmland of Statewide Importance, and the Number of Structures in Cultivated Cropland for the alternate route segments to the comparative segment of the Proposed Route or the Peaking Plant Alternate Route are detailed in Table 6-14.

Table 6-14. Prime Farmland, Farmland of Statewide Importance, and HVTL Pole Structures

	Route Segments							
	Alternate Red	Proposed Route (Comparative Segment)	Alternate Yellow	Proposed Route (Comparative Segment)	Alternate Purple	Proposed Route (Comparative Segment)	Alternate Blue	Peaking Plant Alternate Route (Comparative Segment)
Prime Farmland (acres)	37.5	34.8	14.9	21.5	36.8	29.9	12.1	12.1
Farmland of Statewide Importance (acres)	0	0	0.7	<0.1	0	2.2		
Pole Structures in Cultivated Cropland	23	24	12	13	19	19	7	7

Potential Impacts

Distinct impacts to agricultural lands and operations will occur during construction and operation of the project. Construction impacts are short-term and limit land use generally. These include soil rutting and compaction because of repeated access to the ROW—especially during spring or when wet conditions are present. Drain tile might be struck when auguring structure holes. Lands within the route width may not be available for agricultural use during construction; lands within any staging areas or areas of construction at the step-up substations will not be available for agricultural use during construction. The impacts above all have potential to result in crop losses.

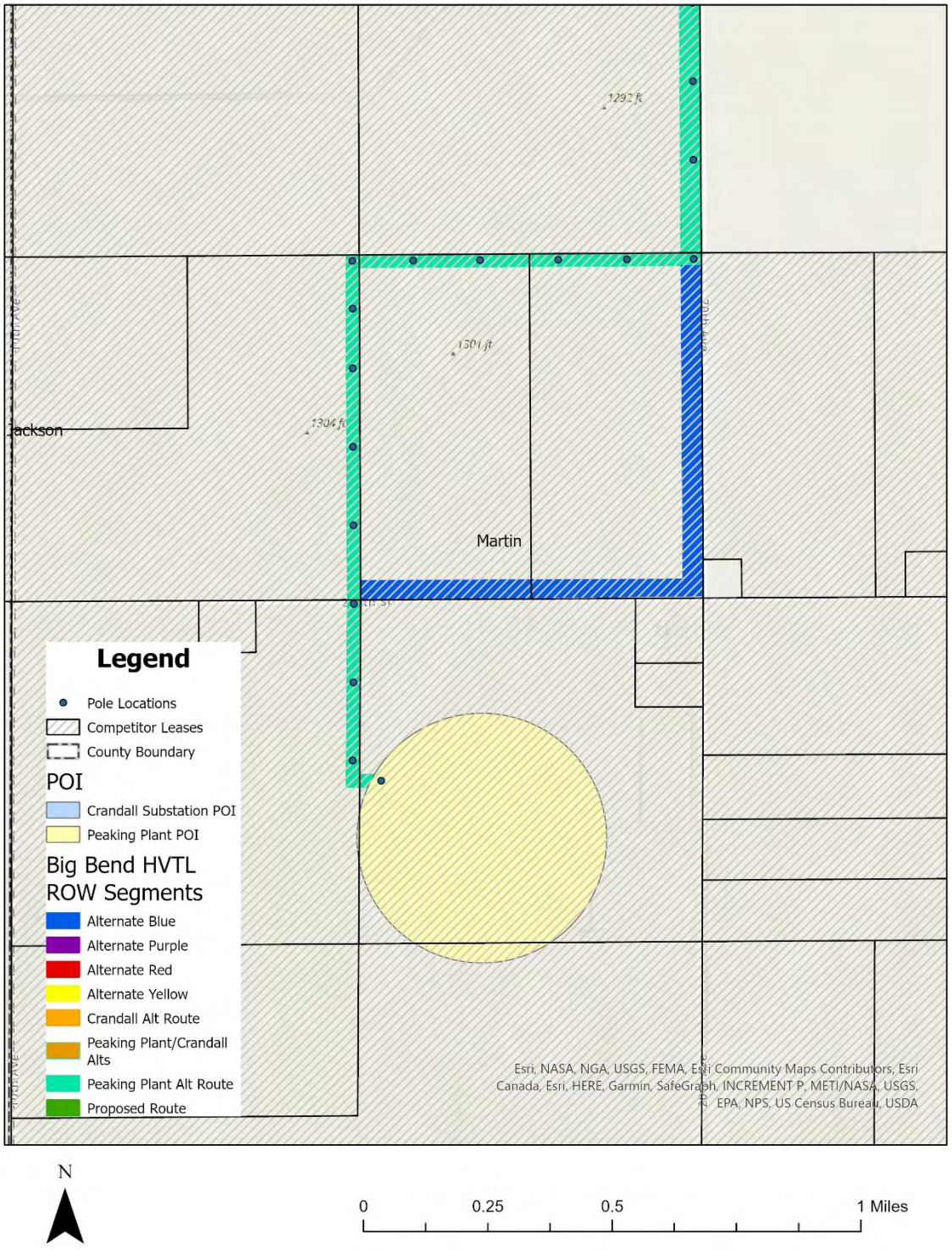
Impacts from the operation of a transmission line involve the long-term presence of structures and conductors. These impacts can remain within the immediate footprint, or may extend beyond it if the transmission line impedes the use of farm or irrigation equipment or interferes with aerial spraying. (Irrigation equipment is not present within the route width, during scoping no commentors raised potential impacts to aerial spraying.) Improper soil restoration practices could lead to drainage

concerns or topsoil erosion. Like construction impacts, these operational impacts have potential to result in crop losses.

Construction of the step-up substation will permanently convert agricultural land to an industrial use. The Proposed Route will intersect more prime farmland and agricultural lands than the Crandall Alternate Route or the Peaking Plant Alternate Route. When comparing the alternate route segments to their comparative segments of the Proposed Route and the Peaking Plant Alternate Route, the acres of prime farmland and pole structures placed in cultivated cropland are relatively similar, see Table 6-14. These permanent impacts are nonetheless minor when compared to the amount of agricultural land in Cottonwood, Watonwan, and Martin Counties.

When comparing the Peaking Plant Alternate Route and the Peaking Plant Alternate – Route Segment Alternative, the HVTL line placement could moderately impact farming activities if the proposed Peaking Plant Alternate Route is utilized. The Peaking Plant Alternate Route will turn west, off of County Road 2, and follow property lines in Section 18 of Cedar Township in Martin County as it travels west and ultimately turns and goes south the Lakefield Junction Station. The three agricultural fields adjacent (north, south, and west) to the HVTL Peaking Plant Alternate Route are all farmed as one large field, so placing a new HVTL along those property lines will place additional pole structures directly in the path of farming equipment as it works in those fields. The proposed Peaking Plant Alternate Route – Alternate Route Segment would take the Big Bend HVTL further south along Country Road 2 to 220th Street, where it would turn west and go to the proposed step-up substation at the Lakefield Junction Substation. The Alternate Blue Route Segment would reduce the placement of approximately nine pole structures in the active agricultural fields in Section 18 of Cedar Township in Martin County Figure 6-5.

Figure 6-5. Peaking Plant Alternate Route Pole Placement



The physical impacts described above can lead to financial impacts, for example, loss of farm revenue or decreases to farm value. While short-term impacts to farming operations will occur during

construction, long-term operational impacts are only anticipated for the fields crossed by the Peaking Plant Alternate Route.

Mitigation

Impacts to agricultural lands and operations can be avoided or minimized by prudent routing and placement of structures within the selected route. This includes selecting routes and structure placements that avoid agricultural fields; follow existing infrastructure or property lines; or parallel field lines. Underbuilding or paralleling immediately adjacent to existing ROWs mitigates impacts more so than following at a distance. Impacts can also be minimized through appropriate construction and remediation practices.

The following measures can mitigate impacts to agricultural soils and production:

- Limiting movement of crews and equipment to the ROW to the greatest extent possible.
- Identify agricultural drain tile in consultation with landowners prior to earth disturbing activities.
- Scheduling construction during periods when agricultural activities will be minimally affected.
- Compensating the landowner for any crop or property damage.
- Repairing ruts that are hazardous to agricultural operations.
- Alleviating soil compaction.
- Restoring the land and facilities as nearly as practicable to their original conditions.
- Promptly repairing or replacing fences, gates, and similar improvements that are removed or damaged.
- Constructing the project during winter months can reduce potential for soil rutting and compaction, crop losses, and spread of invasive species.

The applicant has committed to working with landowners to minimize impacts to all agricultural activities along the route and compensating landowners for any crop damage and soil compaction that may occur during construction and future inspections and maintenance activities.[402] Lastly individual easement or purchase agreements can compensate farmers for loss of agricultural production or lands. These agreements are outside the scope of this document.

6.7 Potential Impacts to Archaeological and Historic Architectural Resources

The ROI for archaeological and historic resources is the project area. Because the area is actively cultivated, impacts to archaeological resources are not anticipated. There are no archaeological resources crossed by any of the routing options. The St. Paul & Pacific Railroad is the only currently identified architectural resource within the Proposed Route, and it will be crossed by all routing options under consideration. The St. Paul & Pacific Railroad will be spanned by all routing options, so

[402] HVTL RPA – Section 5.3.1.1

no physical impacts to the resource are anticipated. Since impacts to archeological and historic resources are not anticipated mitigation is not proposed.

Archeological resources are locations where objects or other evidence of archaeological interest exist, and can include aboriginal mounds and earthworks, ancient burial grounds, prehistoric ruins, or historical remains.[cxxvii] Historic resources are sites, buildings, structures or other antiquities of state or national significance.[cxxviii]

Potential Impacts

The transmission line and step-up substation can potentially impact archeological and historic resources. Project construction can disrupt or remove archeological resources. The long-term presence of a transmission line or substation near historic resources has the potential to impair or decrease their value.

The applicant hired Quality Services Incorporated (QSI) to conduct a *Phase IA Cultural Resource Background Literature Review* for the project. This review covers an area within one mile of the Proposed Route. The Anticipated Alignment crosses one previously recorded historic architectural resources, the St. Paul & Pacific Railroad, just north of Highway 60. The St. Paul & Pacific Railroad is also recommended as eligible for listing in the National Register of Historic Places (NRHP). This architectural resource will be crossed by all routing options. All other identified cultural resources, 17 resources total, are within one mile of the Proposed Route, but not crossed by any of the routing options. The one previously recorded archaeological resource is the Mountain Lake Site, which is listed on the NRHP. The other 16 cultural resources are previously recorded architectural resources, including 12 farmsteads, two bridges, one church, and one town hall. Four of the previously recorded architectural resources have been evaluated and determined to not be eligible for the NRHP, and the other 12 architectural sites have not been evaluated for eligibility for listing on the NRHP. No impacts to any recorded archaeological or architectural resources are anticipated to result from any of the routing options or the step-up substations.[403]

Mitigation

Prudent routing can avoid impacts to archaeological and historic resources. This is the preferred mitigation. Section 5.3.13 of the sample route permit addresses archeological resources. If previously unidentified archaeological sites are found during construction, the applicant would be required to stop construction and contact SHPO to determine how best to proceed.[cxxix] Ground disturbing activity will stop and local law enforcement will be notified should human remains be discovered.[cxxx]

Because impacts to archeological and historic resources are not anticipated additional mitigation is not proposed.

[403] HVTL RPA – Section 5.4

6.8 Potential Impacts to the Natural Environment

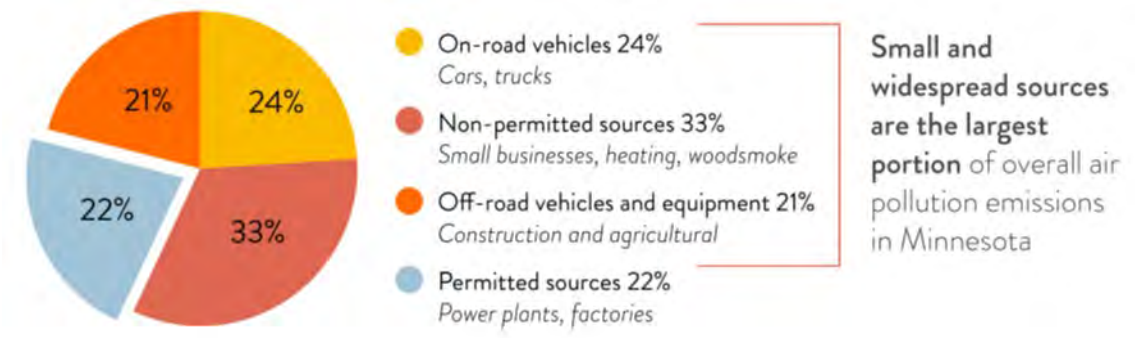
6.8.1 Air Quality and Climate Change

The ROI for air quality and climate change is the project area. Distinct impacts occur during construction and operation of a transmission line and step-up substation. Potential impacts to air quality during construction would be intermittent, localized, short-term, and minimal. Impacts are associated with fugitive dust and exhaust. Impacts can be mitigated. Long-term impacts to air quality will also be minimal and are associated with the creation of ozone and nitrous oxide emissions along the HVTL. These localized emissions will be below state and federal standards. Impacts are unavoidable and do not affect a unique resource.

Construction activities will result in short-term increases in GHG emissions because of the combustion of fossil fuels in construction equipment and vehicles. These emissions would be short-term and dispersed over the ROI; therefore, total emissions would be minimal and not result in a direct impact to any one location. Maintenance activities would result in impacts like construction, but to a much lesser extent. Operational impacts from formation of nitrous oxide and release of sulfur hexafluoride are minimal. Impacts are unavoidable, but can be minimized.

"In general, the state of Minnesota's air quality is improving. Levels of pollution in outdoor air have been going down for nearly all measured air pollutants. Since 1990, annual air pollution emissions in Minnesota have fallen by nearly half."[cxxxi] "Today, most . . . air pollution comes from smaller, widespread sources…. The rest comes from a wide variety of things we use in our daily lives: our vehicles, local businesses, heating and cooling, and yard and recreational equipment."[cxxxii]

Diagram 6-1. Air Pollution Sources by Type



According to the MnRiskS model developed by MPCA, cancer and non-cancer health risks from air pollutants released by permitted and non-permitted sources near the project are low.[cxxxiii] MnRiskS "compares air pollution levels against health benchmarks to estimate the potential for negative health effects."[cxxxiv] A health benchmark is a pollution concentration level in the air that is unlikely to result in

health effects after a lifetime of exposure; a pollution concentration to benchmark ratio less than one meets the health benchmark.

The benchmark ratios in the Big Bend HVTL Project Area range from 0.05 to 0.08. These ratios are in the lowest 20 percent of air scores meaning the air quality in the project area is better than 80 percent of Minnesota. Significant air emission contributors in the project area (reported by census tract) include agriculture equipment, agriculture and yard waste, permitted facilities, and traffic emissions.

Climate change refers to any significant change in measures of climate lasting for an extended period. Greenhouse gases (GHG) are gaseous emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The most common GHGs emitted from human activities include carbon dioxide, methane, and nitrous oxide.

Potential Impacts

Distinct impacts occur during construction and operation of a transmission line and step-up substation.

Air Quality Air emissions associated with construction are highly dependent upon weather conditions and the specific activity occurring. For example, traveling to a construction site on a dry gravel road will result in more fugitive dust than traveling the same road when wet.

All projects that involve movement of soil, or exposure of erodible surfaces, generate some type of fugitive dust emissions.[cxxxv] Construction activities will generate fugitive dust from travel on unpaved roads, grading, foundation excavation, and setting structures. Clearing vegetation might create exposed areas susceptible to wind erosion. Most of the fugitive dust emission associated with the project are expected to be along gravel roads during worker and material transport.

Fugitive dust is a particulate air pollutant. "The impact of a fugitive dust source on air pollution depends on the quantity and drift potential of the dust particles injected into the atmosphere. In addition to large dust particles that settle out near the source (often creating a local nuisance problem), considerable amounts of fine particles also are emitted and dispersed over much greater distances from the source."[cxxxvi]

During operation, power lines produce ozone and nitrous oxide through the corona effect—the ionization of air molecules surrounding the conductor. Ozone production from a conductor is proportional to temperature and sunlight and inversely proportional to humidity. These compounds contribute to smog and adverse health effects.[cxxxvii] Minnesota has an ozone standard of 70 parts per billion measured over a daily eight-hour average of the three-year average of the annual fourth-highest daily maximum.[cxxxviii] The national ozone standard is 0.070 parts per million over a 3-year average of the annual fourth-highest daily maximum eight-hour average concentration.[cxxxix] Ozone and nitrous oxide emissions are anticipated to be well below these limits.[cxl] Air emissions associated with

maintenance of the HVTL are, like construction emissions, dependent upon weather conditions and the specific activity occurring.

Climate Change Construction activities will result in short-term increases in GHG emissions because of the combustion of fossil fuels in construction equipment and vehicles. Sulfur hexafluoride will be used at the substation. Small releases will occur as part of regular breaker operation and maintenance. As a GHG, it has a global warming potential 22,800 times that of carbon dioxide.

The Proposed Route does not go through any forested areas, but there is 1.1 acres of forested land (deciduous/mixed forest) within the Crandall Alternate Route and the Peaking Plant Alternate Route that could require tree clearing. The Alternate Purple Route Segment has 0.8 acres of forest land (deciduous/mixed forest within its ROW. Deforestation is another source of carbon dioxide to the atmosphere, as trees and forest land act as a carbon sink, absorbing carbon dioxide from the atmosphere and storing it. Removing forests releases most of the stored carbon stock, either through burning or decay. In addition, deforestation eliminates future carbon dioxide capture.

Operational GHG emissions would occur from vehicle usage to and from the transmission line and step-up substation for regular maintenance activities as well as emergency maintenance. Operational emissions would be considerably less than construction.

A warming climate might cause increased flooding, storm, and heat wave events. These events, especially an increased number and intensity of storms, could increase risks to transmission lines and substations. More extreme storms also mean more frequent heavy rainfall events, which could lead to increased soil erosion. Heat wave events could change demands on the electrical transmission and generation systems, especially as more indoor space is equipped with cooling systems. Because the Big Bend HVTL Project is providing for the transmission of renewable energy generated at the proposed hybrid Big Bend Wind and Red Rock Solar Project, it will help to provide additional renewable energy to the grid and help reduce the demand for and use of energy generation that comes with a greater carbon footprint.

Mitigation

Watering exposed surfaces, covering disturbed areas, and reducing speed limits are all standard construction practices. The applicant indicated they will use appropriate measures to minimize fugitive dust emissions during construction. Control techniques for fugitive dust sources generally involve watering or chemical stabilization. Watering, the most common and, generally, least expensive method, provides only temporary dust control. The use of chemicals to treat exposed surfaces provides longer dust suppression, but may be costly, have adverse effects on plant and animal life, or contaminate the treated material."[cxli] The applicant did not propose other mitigative measures.

Direct impacts to soils can cause indirect impacts to air quality through erosion. Section 5.3.7 Soil Erosion and Sediment Control of the sample route permit requires the permittee to "implement reasonable measures to minimize erosion." This includes protecting exposed soils by promptly

planting and seeding, using erosion control blankets, protecting soil stockpiles, and controlling vehicle tracking.

Exhaust emissions can be minimized by keeping vehicles and equipment in good working order, not running equipment unless necessary, minimizing the number of driving trips, and restricting idling vehicles except during extreme cold weather. Additionally, utilizing existing power sources, for example, grid supplied-power, or cleaner fuel generators and vehicles rather than diesel-powered generators and vehicles, wherever practical could reduce emissions. Lastly, minimizing sulfur hexafluoride emissions through operational BMPs can reduce GHG. The applicant will monitor sulfur hexafluoride equipment leaks for reporting to the Environmental Protection Agency and to prioritize maintenance and replacement of any leaking equipment.

Increased chance of severe weather and heat wave events from a warming climate require adequate planning and preparation. Maintenance and repair plans should anticipate future changes to climate.

6.8.2 Floodplains

Floodplains prevent flood damage by detaining debris, sediment, water, and ice. The Federal Emergency Management Agency (FEMA) delineates floodplains and determines flood risks in areas susceptible to flooding. At the state level, the DNR oversees the administration of the state floodplain management program by promoting and ensuring sound land use development in floodplain areas in order to promote the health and safety of the public, minimize loss of life, and reduce economic losses caused by flood damages. The DNR also oversees the national flood insurance program for the state of Minnesota. Floodplains are also regulated at the local level.

Potential Impacts

The Proposed Route crosses floodplain and shoreland districts (or overly districts). Based on preliminary engineering design, the Proposed Route would be place 20 pole structures in FEMA designated 100-year floodplains along the anticipated alignment. The Crandall Alternate Route would place 25 pole structures in the FEMA designated 100 year floodplain, and the Peaking Plant Alternate Route would place 20 pole structures in the FEMA designated 100 year floodplain. Any pole structures placed within a floodplain or shoreland area for any routing option, will be placed in a manner that is consistent with all applicable zoning ordinances.

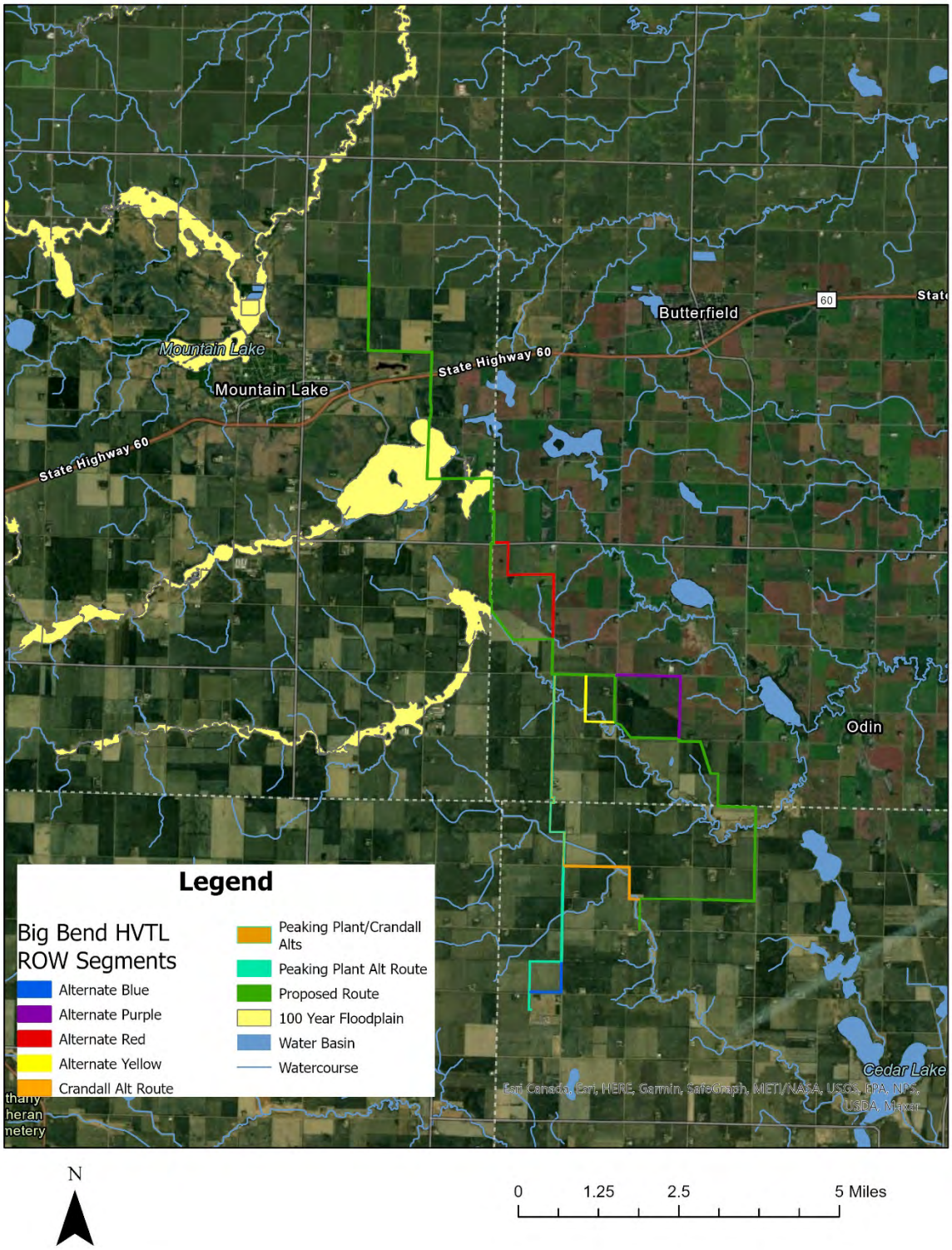
When looking at the various alternate route segments in comparison to the Proposed Route, Alternate Red does not cross any FEMA 100 year floodplain areas and no pole structures are placed in any designated FEMA 100 year floodplains. However, the comparative segment of the Proposed Route will cross 11.7 acres of FEMA 100 year floodplain and place five pole structures in the FEMA 100 year floodplain. Alternate Purple and the comparative portion of the Proposed Route do not cross any FEMA 100 year floodplain areas and no pole structures are placed in any designated FEMA 100 year floodplains. There are no 500-year floodplain areas crossed by the routing options. Floodplains are displayed on Figure 31.

Alternate Blue Route Segment and the comparative portion of the Peaking Plant Alternate Route do not cross any FEMA 100 year floodplain areas and no pole structures are placed in any designated FEMA 100 year floodplains.

Approximately, 0.9 acres of the step-up substation location adjacent to the Crandall Substation is within the 100 year floodplain associated with Cedar Creek.

Construction and maintenance vehicles and equipment may need to access areas designated 100-year flood plain during project construction and operation, but no vehicles or equipment would be permanently placed within the designated 100-year flood plain.

Figure 6-6. Floodplains in the HVTL Project Area



Mitigation

The primary means of mitigating potential impacts in Floodplains is through prudent routing and structure placement, and BMPs to prevent soil erosion. Any pole structures placed within FEMA 100 year floodplain areas will be placed to meet all local zoning ordinances and they will not alter the flood storage capacity of the floodplains. If the step-up substation adjacent to the Crandall Substation selected, facility structures will not be placed in the portion of the area within the 100 year floodplain.

6.8.3 Groundwater

The ROI for groundwater is the local vicinity. Potential impacts to domestic water supplies are not expected. There are 13 wells documented within 1,000 feet of all of the routing options, and none of those are located within ROW of any routing option. Subsurface activity would likely penetrate shallow water tables; however, subsurface disturbance is expected to be above well-depth used for potable water. Potential impacts for all routing options are anticipated to be minimal. Impacts will be short-term (years) and localized. Impacts can be mitigated in part.

The project is within the Western Groundwater Province, which is typically composed of fine-grained glacial sediments, and has only limited extents of surficial and buried sand aquifers. The bedrock throughout this region is commonly buried beneath very deep glacial sediment, and has limited use as an aquifer.[cxlii] Springs and karst are not present in the project area. The water table is high along portions of the project.

According to the Pollution Sensitivity of Near-Surface Materials,[cxliii] areas of both moderate and low sensitivity are present in the project area; however, most of the project is within areas of low sensitivity. The sensitivity to pollution of near-surface materials is an estimate of the time it takes for water to travel through the unsaturated zone to reach the water table, which for the purposes of the model is assumed to be 10 feet below the land surface.[cxliv] A rating was applied across the state, defined as the vertical travel time of water to reach a depth of 10 feet. Water travels through an area of "moderate" sensitivity to a depth of 10 feet in between 170 and 430 hours (a week to weeks), and 430 to 1,600 hours to reach that same depth in areas rated as "low" (weeks to months).[cxlv] These models do not provide the detail necessary for regulation or other activities but are useful for region-wide assessments.

Private Wells Domestic wells exist throughout the Big Bend HVTL Project Area. "The Minnesota Well Index provides basic information about location, depth, geology, construction and static water level, for many wells and borings drilled in Minnesota. It by no means contains information for all the wells and borings and the absence of information about a well on a property does not mean there is no well on that property."[cxlvi] 10 wells are within the local vicinity of the Proposed Route and vary in depth from 154 to 275 feet deep, two wells are within the local vicinity of the Crandall Alternate Route with a depth of 175 feet deep, one well is within the local vicinity of the Peaking Plant Alternate Route, with

a depth of 175 feet, one well is within the local vicinity of the Alternate Red Route Segment with a depth of 196 feet and no wells are within the local vicinity of the other routing options. None of the identified private wells are within the ROW of any of the routing options.

Potential Impacts

Potential impacts to groundwater can occur directly or indirectly. Direct impacts are generally associated with construction, for example, construction may require "drilling to depths that can penetrate shallow water tables or open access channels to deeper aquifers."[cxlvii]

Wood structures will be imbedded directly into the ground to depths of 15 feet. Structures might come into direct contact with groundwater. Pentachlorophenol (penta), a common wood preservative used to treat power poles, might reach groundwater from direct contact or from the soil through runoff and leaching. Generally, leaching is greatest in the first year.[cxlviii] Penta is metabolized under both aerobic and anaerobic conditions, or is absorbed. It has low solubility in water. Although subsurface activity might disturb shallow groundwater resources, the disturbance area would be above well-depth used for potable water.

When concrete foundations are used some portion of the soluble components of the cement paste can leach into groundwater prior to the setting and hardening of the concrete. This will change the pH of groundwater around the surface of the concrete, but should not extend far from the concrete foundation.[cxlix]

Impacts to surface waters can lead to indirect impacts to groundwater. For example, construction activities can directly or indirectly lead to increased turbidity of surface waters through sedimentation. These contaminated surface waters might then flow to groundwater. Contamination is not limited to sediment, any surface water pollutant, such as oil, can reach groundwater. Potential impacts to surface waters are discussed in Section 6.8.6.

Mitigation

Indirect impacts to groundwater can be mitigated by avoiding or minimizing impacts to surface waters. Direct impacts to groundwater, that is, leaching from penta structure poles or concrete foundations where groundwater is present is difficult to mitigate. Should dewatering be used it should be directed away from wetlands and done in a manner to prevent erosion, that is, using an appropriately sized dewatering containment system that is carefully monitored.

6.8.4 Rare and Unique Resources

The ROI for rare and unique resources is one mile from the ROW. Rare and unique features were identified. The Proposed Route crosses a Minnesota Biological Survey (MBS) Site of Biodiversity Significance ranked "moderate", referred to as Cedar 2-3 Site. Impacts to this location are avoidable by avoiding placement of pole structures within the Cedar 2-3 Site, and by spanning the Site with Big Bend HVTL. No federal or state listed animal or plant species records were identified within any

routing options. Thus, potential impacts are anticipated to be minimal for all routing options. Potential impacts can be avoided.

DNR classifies rare plant or animal communities across the state. These include Scientific and Natural Areas, High Conservation Value Forest, MBS Native Plant Communities (NPC), including native prairie, and MBS Sites of Biodiversity Significance. A native prairie area, identified as a moderate ranked Site of Biological Signifcance, is crossed by the Proposed Route. There are no designated natural resource sites located within the Crandall Alternate Route or the Peaking Plant Alternate Route ROWs. The alternate route segment options do not cross any designated natural resource sites.

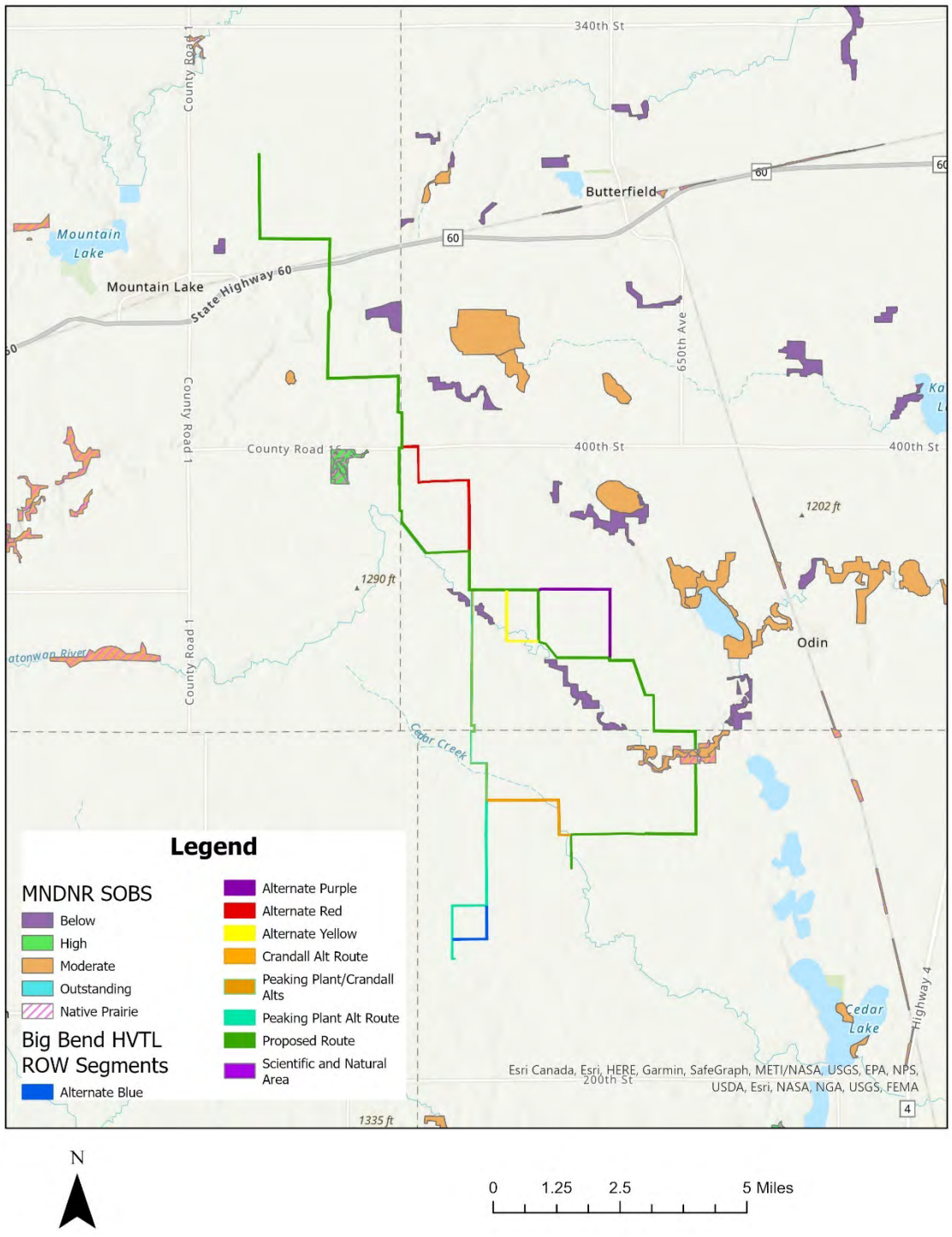
MBS Site of Biodiversity Significance intersected by the Proposed Route ROW is identified as the Cedar 2-3 site, with 3.69 acres within the Proposed Route ROW. This site has a biodiversity rank of "moderate." Sites ranked moderate "contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes." The Cedar 2-3 site contains two NPCs both Dry Hill Prairie (south) Type native prairie areas, with a total area of 2.8 acres within the Proposed Route ROW.

The Division of Ecological and Water Resources within DNR manages the Natural Heritage Information System (NHIS), which "provides information on Minnesota's rare plants, animals, native plant communities, and other rare features. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. Its purpose is to foster better understanding and conservation of these features."[cl]

NHIS data includes federally endangered, threatened, or candidate plant species, and endangered or threatened animal species. The system also includes state endangered, threatened, or special concern species. The NHIS database a source of information, but not the sole source for identifying these resources, as some areas surveys have not been conducted extensively or recently making.

Staff reviewed the NHIS and the USFWS Information for Planning and Consultation databases. The Northern long-eared Bat, prairie bush clover, abbreviated underwing, great plains toad, phlox moth, Poweshiek Skipperling, and Sullivant's milkweed are state listed species potential present within one mile of the routing options, but no records of these species were identified within any of the routing option ROWs. The Northern long-eared bat, prairie bush clover, and Poweshiek skipperling area federally-listed species potentially present within one mile of the routing option ROWs, but no records of these species were identified within any of the routing option ROWs.

Figure 6-7. HVTL Project Area Unique Natural Resources



Northern long-eared bats, a state-listed species of special concern and a federally listed threatened species can be found throughout Minnesota. During the winter this species hibernates in caves and mines, and during the active season (approximately April-October) it roosts underneath bark or in cavities or crevices of both live and dead trees. The spread of white-nose syndrome across the eastern

United States has become the major threat to the species. Activities that might impact this species include, but are not limited to, any disturbance to hibernacula and destruction or degradation of habitat (including tree removal). The NHIS database does not contain any known occurrence of Northern long-eared bat roosts within 150 feet of any of the routing options, or hibernacula within 0.25 miles of any of the routing options.[cli]

Poweshiek skipperling, a state-listed endangered species and a federally listed endangered species, are small butterflies that occur in native tallgrass prairie habitat. Approximately four percent of tallgrass prairie habitat remains in the United States, and the majority of remaining parcels are small and isolated.[404]

A review of the MNDNR's NHIS identified a 1974 record of the Poweshiek skipperling crossed by the Anticipated Alignment in Cottonwood County. However, this species was not identified as potentially occurring within the vicinity of the Proposed Route based on USFWS IPaC review. Based on the age of the record and the absence of the Poweshiek skipperling on the USFWS species list for the Project counties, the Poweshiek skipperling is not likely to occur along the Proposed Route. If individuals were present, they would be associated with the 2.8 acres of native prairie remnants within the Proposed Route in Martin County, nearly nine miles from the NHIS 1974 record in Cottonwood County. No suitable habitat for the Poweshiek skipperling is present within any of the other routing options.

Prairie Bush Clover, a state-listed threatened species and a federally listed threatened species, is a tallgrass prairie endemic native to the upper Mississippi River Valley. Its current range is limited to discrete locations in Minnesota, Illinois, Iowa, and Wisconsin.[405] Also known as slender-leaved bush clover, the prairie bush clover has a leaf like a clover leaf with three leaflets. The plant has one or more stems typically between 9 to 18 inches tall. The species flowers in mid-July to early August, producing pale-pink flowers arranged loosely on an open spike.[406] Prairie bush clover occurs on dry-mesic prairies on north-, northeast- or northwest-facing slopes in southwestern Minnesota. Remaining occurrences of the species are generally restricted to remnant prairies. In Minnesota, most populations occur in prairies that were formerly or are currently pasture. The primary threat to the species has been habitat loss and destruction.[407] Prairie bush clover is listed in the IPaC as potentially occurring in Cottonwood and Martin Counties.

There are no records of the prairie bush clover identified within the project area. The native prairie remnants found in the Cedar 2-3 MBS Site of Biological Significance are suitable habitat for the prairie bush clover. No suitable habitat for the prairie bush clover is present within any of the other routing options.

[404] (USFWS, 2014)
[405] (MNDNR, n.d.-d; USFWS, 2019)
[406] (MNDNR, n.d.-d; USFWS, 2019)
[407] (MNDNR, n.d.-d; USFWS, 2019)

Sullivant's milkweed, a state-listed threatened species, is a long-lived perennial. Flowers appear in mid-July and fruits mature in August. Flowers are modified for insect pollination, drawing a large array of pollinators to this plant including bees, wasps, flies, moths, skippers, butterflies, beetles, and plant bugs. In Minnesota, this species is restricted to undisturbed wet and mesic tallgrass prairie. Most of the surviving Sullivant's milkweed plants in Minnesota are confined to prairie remnants that occur on railroad rights-of-way.[408] The Proposed Route crosses two prairie habitats; however, both are classified as Dry Hill Prairie, and do not fit the preferred habitat requirements of the Sullivant's milkweed (i.e., wet and mesic prairie types), no suitable habitat areas are known to occur within any of the routing options.

Abbreviated underwing, a state-listed species of special concern, medium-large moth with a forewing length (base to apex) of approximately 0.8 to 0.9 inch. The species is restricted to dry and mesic prairie and savanna habitats where leadplant (*Amorpha canescens*) grows. Sites in western Minnesota are relatively level to gently hilly mesic to dry prairies.[409] If the native prairie areas crossed by the Proposed Route contains leadplant there is the potential that abbreviated underwing would be present. There are currently no records of the species within the native prairie areas within the Proposed Route. No suitable habitat for the abbreviated underwing is present within any of the other routing options.

Phlox moth, a state-listed species of concern, is a small moth with a forewing length (base to apex) of 0.31 to 0.39 inch. The forewings are gray-violet with a patch of crimson near the base and a broad crimson band near the margin. The phlox moth was first documented in Minnesota in 1976 and has been found at only four other locations since then. In Minnesota, the phlox moth has been observed only in native upland prairie habitat. The crucial habitat feature is the presence of prairie phlox, the larval food plant.[410] The native prairie areas crossed by the Proposed Route could potentially be suitable for the phlox moth, but there are no records of the species occurring within these native prairie areas. No suitable habitat for the phlox moth is present within any of the other routing options.

Great Plains toad, a state-listed species of special concern, is a large species of toad, measuring 4.5 inches for females and 3.7 inches for males. In western Minnesota, it formerly occurred in the extensive dry tallgrass prairie and open grasslands but is now found primarily in agricultural areas and in tiny remnant prairies and grasslands. Breeding sites consist of highly ephemeral shallow water-filled prairie depressions with little or no emergent vegetation. Open habitats, sometimes associated with sandy soils, are preferred for overwintering.[411] There is suitable habitat for the Great Plains toad available throughout all of the routing options.

[408] (MNDNR, n.d.-c)
[409] (MNDNR, 2018c)
[410] (MNDNR, n.d.-b)
[411] (MNDNR, 2018a

Power lines can impact rare and unique resources during construction and operation. Adverse impacts include the taking or displacement of individual plants or animals, invasive species introduction, habitat loss, reduced community size, and, for avian species, collision with conductors or electrocution. Impacts to rare and unique resources are not necessarily adverse. In some limited cases, power line ROWs can be managed to provide habitat, for example, nesting platforms can be built on top of transmission structures for use by rare avian species.

The EA does not map federal- or state-listed species found in the NHIS database, because DNR requires that public display of NHIS data either mask the identity or location of rare features due to the vulnerability of some species to exploitation. Moreover, the NHIS database masks the occurrence of rare species of by randomly incorporating their location into a larger polygon.

Under the USFWS Final 4(d) Rule for the Northern long-eared bat, purposeful take of the species is prohibited with limited exception. Incidental take from tree removal is also prohibited if it occurs within one-quarter mile of a known hibernacula; or cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot radius from a known maternity tree during the pup season (June 1 and July 31). These prohibitions focus on protecting the bat's sensitive life stages (that is, hibernation and raising young) in areas affected by white nose-syndrome.[clii] No hibernacula or maternity roosts trees are identified in the NHIS database within the project area.

Mitigation

Impacts to rare and unique resources can be avoided by selecting routes, alignments, and structure placements away from these resources and their habitats to the extent practicable. If these resources cannot be avoided, impacts can be minimized by routing alignments or placing structures away from rare and unique resources; spanning these resources; or using seasonal construction practices within the selected route. Upon determining a final route, biological surveys may be required as a permit condition should resource agencies deem it necessary.

The following mitigation measures can help to avoid or minimize impacts to rare and unique resources:

- Minimize tree felling and shrub removal that are important to local wildlife.
- For water dependent species, limit in-water work and disturbance to the greatest extent possible.
- Implement water and soil conservation practices to protect topsoil and adjacent water resources. Minimize soil erosion by containing excavated material, protecting exposed soil, and stabilizing restored soil.
- Re-vegetate disturbed areas with certified weed-free, native species that provide value to local wildlife species where applicable.

While rare plants are not expected in the ROW of any of the routing options, conducting surveys for rare plants during appropriate periods to properly identify their presence along the selected ROW

before clearing can help to minimize impacts to these species. If surveys identify these species individual avoidance and minimization measures can be developed in coordination with appropriate resource agencies. Development of a Vegetation Management Plan, in consultation with resources agencies, is a common special condition used by the Commission when issuing route permits.

Northern long-eared bat Any tree removal should avoid the active season (April 1-September 30) for the Northern long-eared bat. Ensuring construction and operation are consistent with USFWS guidance would minimize impacts to this species. Big Bend will minimize tree removal to the greatest extent possible and focus any necessary tree removal to the winter months if practicable.

MBS Site of Biological Significance The Cedar 2-3 site will be spanned, and pole structure placement within this site will be avoided. Implementing these mitigation measures will also avoid impacts to the NPC, Dry Hill Prairie (southern) type areas within the Cedar 2-3 MBS Site of Biological Significance.

The spanning and avoidance of the Cedar 2-3 MBS Site of Biological Significance would also avoid impacts to prairie bush clover, Poweshiek skipperling, abbreviated underwing, and phlox moth, if they were present within the suitable habitat with the Cedar 2-3 Site.

6.8.5 Soils

The ROI for soils is the ROW. Common soil impacts include rutting, compaction, and erosion. Potential impacts will be short-term and localized. Impacts can be minimized.

"Soils differ in size and shape of their areas, in degree of contrast with adjacent soils, and in geographic relationships."[cliii] A soil association consists of "two or more dissimilar components occurring in a regularly repeating pattern on the landscape."[cliv] Associations are named after their major soils.

Potential Impacts

Soil compaction and rutting will occur from movement of construction vehicles along the ROW and near the step-up substation. Installing structures requires removing and handling soils, which, along with vegetation clearing and grading, will expose soils to wind and water erosion. Topsoil could be lost to improper handling or erosion at the step-up substation location. Potential impacts to prime farmland and farmland of statewide importance were discussed in *Agriculture* in Section 5.6.1.

Structures will be imbedded directly into the ground or on concrete foundations. Penta reaches soils through leaching from the structure. Generally, leaching is greatest in the first year. Leached penta is metabolized under both aerobic and anaerobic conditions or is absorbed. It generally does not extend beyond one meter. Soluble components of concrete may leach into soils prior to the setting and hardening when drilled pier foundations are used.

Construction of the step-up substation will result in a small area of new impervious surface. Until permanent stormwater controls are in place, this could lead to increased erosion through stormwater runoff.

Mitigation

Potential impacts to soils can be mitigated by using BMPs and standard construction practices. A variety of methods can be used to minimize soil erosion. Common mitigation measure employed to minimize soil erosion include

- Promptly seeding to establish temporary or permanent vegetative cover on exposed soil.
- Using mulch to form a temporary and protective cover on exposed soils. Mulch can help retain moisture in the soil to promote vegetative growth, reduce evaporation, insulate the soil, and reduce erosion. A common mulch material used is certified weed free hay or straw.
- Erecting or using sediment control fences that are intended to slow water flow, filter runoff, and promote the settling of sediment out of runoff via ponding behind the sediment fence.
- Using erosion control blankets and turf reinforcement mats that are typically single or multiple layer sheets made of natural and/or synthetic materials that provide structural stability to bare surfaces and slopes.
- Separating topsoil and subsoil and covering stockpiled soils.
- Returning locations where grading or temporary access is required to their original contours and elevation to the greatest extent possible.
- Permanent stormwater controls, if necessary, will control runoff at the step-up substation.

Additionally, winter construction can reduce potential impacts such as rutting and compaction because soils are frozen. Winter construction makes handling topsoil more difficult. Mitigation associated with grading during frozen ground conditions include applying heating mats to warm the soil or using soil rippers to break frozen soil particles into more manageable sizes before grading.

6.8.6 Surface Water

The ROI for surface water is the local vicnity. Structures will not be placed in surface waters, so direct impacts are not expected. Direct impacts to other resource elements can cause indirect impacts to surface waters, for example, construction activities near surface waters could cause riparian vegetation disturbance and surface erosion. Petroleum-based fluid leaks or fuel spills from construction equipment in the ROW might reach surface waters. Potential impacts to surface waters are anticipated to be minimal for all routing options. The project does not cross any impaired waters; therefore, impacts to these resources will not occur. Potential impacts can be mitigated.

The project is within the Blue Earth River watershed, which is part of the Minnesota River Basin.[clv] "The Blue Earth River watershed encompasses 992,034 acres. The Blue Earth River is the largest tributary to the Minnesota River. Certain waters in Minnesota are classified as public waters under Minnesota Statute 103G.005. A public waters designation means that DNR has regulatory jurisdiction over use of the water, meaning waterbody (lakes, ponds, larger wetlands) and watercourse (rivers, streams, creeks, and drainage ditches), or public water wetlands. Utilities are required to obtain a license to cross state lands and waters.

Minnesota water quality standards protect lakes, rivers, streams, and wetlands by defining how much of a pollutant (bacteria, nutrients, turbidity, mercury, etc.) can be in the water before it is no longer drinkable, swimmable, fishable, or useable in other, designated ways. An impaired water fails to meet one or more water quality standards.

Potential Impacts

Potential impacts along all routing options are anticipated to be minimal to moderate. Indirect impacts to public waters might occur. Potential impacts can be mitigated.

All waterbodies and watercourses will be spanned. Because no structures or equipment will enter the water, no direct impacts to surface waters are anticipated. If equipment crosses a watercourse or inadvertently enters a waterbody, direct impacts, for example, bottom disturbance or petroleum-based products washing into the water would occur.

Direct impacts to other resource elements can cause indirect impacts to surface waters. Construction activities near surface waters could cause riparian vegetation disturbance and surface erosion. These activities can speed water flow and expose previously undisturbed soils, increasing erosion and the potential for sediment to reach surface waters. Disturbed soils will generally be limited to the area immediately adjacent to structure locations; however, areas outside these locations might also be disturbed, for example, moving construction equipment within the ROW. Petroleum-based fluid leaks or fuel spills from construction equipment in the ROW might reach surface waters.

The Proposed Route ROW has six stream and river crossings, and four of the water courses are identified on the PWI. The Crandall Alternate Route ROW has 10 stream and river crossings, and nine of those water courses are identified on the PWI. The Peaking Plant Alternate Route ROW will cross six streams and rivers, and five of the water courses are on the PWI. The Alternate Red Route Segment has one stream

and river crossing, and that water course is identified on the PWI. The Alternate Yellow Route Segment has two stream and river crossings, and both of those crossings are of the same water course that is identified on the PWI. The Alternate Purple Alternate Route Segment and the Peaking Plant Alternate Route – Alternate Route Segment do not cross any PWI streams or rivers.

Impaired waters are found throughout the project area, and the Proposed Route crosses five impaired waters, the Crandall Alternate Route crosses nine impaired waters, and the Peaking Plant Alternate Route crosses five impaired waters. The Alternate Yellow Route Segment has two crossings of an impaired water.[clvi] The Alternate Red Alternate Route Segment, Alternate Purple Alternate Route Segment and the Peaking Plant Alternate Route – Alternate Route Segment do not cross any impaired waters.

Neither of the step-up substation locations will directly impact any PWI waters or impaired waters.

Figure 6-8 highlights all the surface waters in relation to all the routing options. The various types of water crossings for all routing options are located in Table 44.

There are no PWI wetlands or basins crossed by the ROWs of any of the routing options.

Potential impacts to surface waters along these route segments are anticipated to be minimal.

If dewatering is necessary water removed from foundation locations could contain sediments or pollutants that might be introduced into surface waters. The applicant does not anticipate that dewatering will be necessary.

Figure 6-8. HVTL Project Area Surface Waters

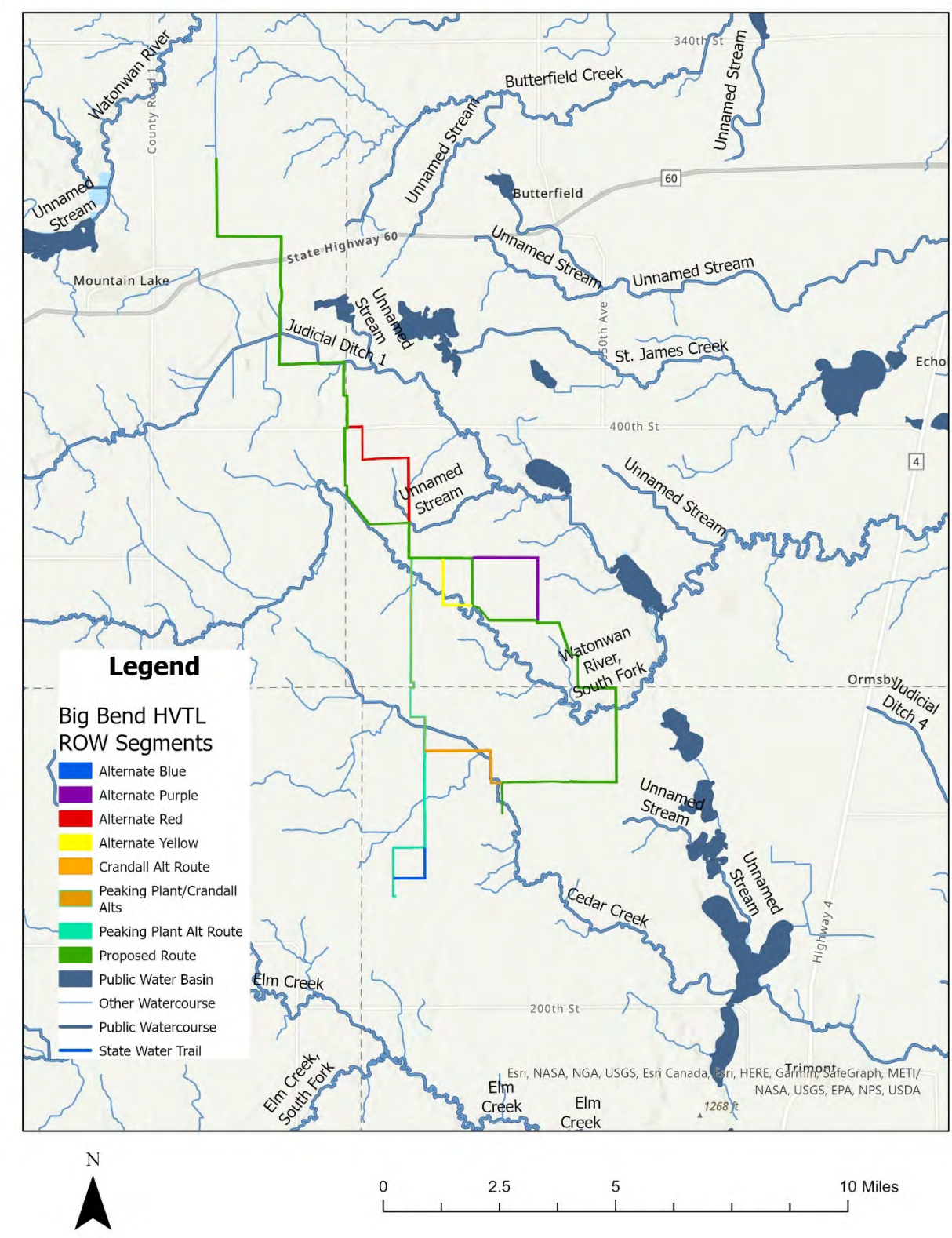


Table 6-15. Water Crossing of All Routing Options

Water Resources	Routes and Route Segments						
	Proposed Route	Crandall Alternate Route	Peaking Plant Alternate Route	Alternate Red	Alternate Yellow	Alternate Purple	Peaking Plant Alternate Segment
# of Stream and River Crossings	6	10	6	1	2	0	0
# of PWI Watercourse Crossings	4	9	5	1	2	0	0
# of Impaired Water Crossings	5	9	5	0	2	0	0
Streams and Rivers Crossed	Judicial Ditch 1, Unnamed Stream, South Fork of Watonwan River, Cedar Creek	Judicial Ditch 1, Unnamed Stream, South Fork of Watonwan River, Cedar Creek	Judicial Ditch 1, Unnamed Stream, South Fork of Watonwan River, Cedar Creek	Unnamed Stream	South Fork of Watonwan River	--	--

Mitigation

Potential impacts to surface waters can be avoided by selecting routes, alignments, and structure placements outside of surface waters. Additionally, spanning waterbodies avoids direct impacts to surface waters within the selected route. Other mitigation measures include using BMPs to reduce the potential for erosion and sedimentation. Commission route permits require that soil excavated from riparian areas not be placed back into the riparian area. Temporary bridges can be used to span watercourses, if necessary, to avoid driving vehicles in a stream bed. Construction and maintenance during frozen ground conditions would minimize impacts to surface waters.

6.8.7 Vegetation

The ROI for vegetation is the anticipated ROW. Potential impacts, such as clearing, compacting, or otherwise disturbing vegetation, are expected to be minimal for all routing options. Because a significant portion of all routing options are cultivated cropland. One segment of the Proposed Route will cross over a MBS Site of Biological Significance, moderate value, impacts to the MBS site are anticipated to be avoided by spanning the MBS Site, and not placing any pole structures in the MBS Site. Potential impacts

will be both short- and long-term. Impacts are localized, but unavoidable. Potential impacts can be minimized.

Prior to colonization, the project area was dominated by tallgrass prairie with islands of wet prairie and wetlands. Floodplain forests dominated by silver maple, elm, cottonwood, and willows grew along the rivers and streams. The soils throughout the area have been highly influenced by recent glaciation and is well to moderately well-drained loamy soils.

The current landscape is agricultural cultivated cropland. Land cover types within the project area are approximately 80 percent agricultural (row crops and pasture), 18 percent developed, 1 percent deciduous mixed forest, and 1 percent herbaceous or herbaceous wetland.

MDA administers the *Minnesota Noxious Weed Law*. Noxious weeds are defined as an annual, biennial, or perennial plants designated to be injurious to the environment, public health, public roads, crops, livestock, or other property. The purpose of the law is to protect residents of Minnesota from the injurious effects of these weeds.[clvii] MDA lists four categories of noxious weeds with differing levels of eradication, control, reporting, transport, sales, and propagation requirements. There are 14 weeds on the eradicate list and nine on the control list.[clviii] There are 15 restricted weeds.[clix] None of the weeds on these lists are to be transported, propagated, or sold in the state.

Potential Impacts

Construction activities will cause both short- and long-term impacts to vegetation. Short-term impacts will result from grading and other physical disturbances. Site preparation and structure installation might remove, disturb, or compact vegetation. Establishing and using access roads and staging and stringing areas will concentrate surface disturbance and equipment use causing short-term impacts to vegetation. Construction of the set-up substation will temporally remove approximately 5 acres of land from agricultural crop production, and within that 5 acres an area of 350 feet x 350 feet will be permanently removed.

Construction activities could introduce noxious weeds and invasive species, especially ground disturbance that leaves soils exposed for extended periods, introduction of topsoil contaminated with weed seeds, vehicles importing weed seed from a contaminated site to an uncontaminated site, and conversion of landscape types. Noxious weeds have potential to dominate and displace native plants and plant communities, permanently altering ecosystem functions.

Long-term impacts include removal of woody vegetation within the ROW, which will result in conversion to low-stature vegetation (shrubs and grasses) throughout its length. Big Bend would routinely clear woody vegetation from the ROW to ensure it does not interfere with the safe operation of the HVTL. Removal of woody vegetation will widen existing corridors through wooded areas or remove wooded areas from the landscape. Habitat fragmentation is discussed in more detail in *Wildlife and their Habitats* in Section 5.8.3. Conversion of wooded landscapes to open landscapes could indirectly affect native vegetation by increasing potential for spread of invasive and non-native species. The Crandall Alternate Route, Peaking Plant Alternate Route, and Alternate Purple Route Segment have deciduous/mixed forest habitat within their ROWs. These wooded areas are located near the edges of the ROWs, so construction activities and maintenance clearing activities will be limited to the edges of the forested areas.

Maintenance and emergency repair activities could result in direct impacts to vegetation from removal, disturbance, or compaction caused by these activities. Maintenance and emergency repair is expected to be infrequent throughout the life of the project, and potential impacts to vegetation would be short-term and more localized than construction-related impacts.

Mitigation

Impacts to vegetation, especially trees, can be avoided or minimized by selecting a route—or alignments within selected routes—that avoid important vegetation resources. Collocating with existing infrastructure ROW, for example, roadways or transmission lines, might limit tree removal. Plant communities can be spanned. Additionally, new plantings within the ROW of compatible cover types, or planting of tall-growing trees in areas outside the ROW can mitigate impacts.

Mitigation measures to reduce the spread of invasive and non-native plant species during construction include the regular and frequent cleaning of construction equipment and vehicles; minimizing ground disturbance to the greatest degree practicable; rapid revegetation of disturbed areas with native or appropriately certified weed-free seed mixes; conducting field surveys of the ROW prior to construction to identify areas containing noxious weed (weed surveys during construction would identify infestations of the ROW and staging areas); and eradicating new infestations as soon as practicable in conjunction with landowner input.

Lastly, impacts can be mitigated by compensating individual landowners through negotiated easement agreements. Mitigation and restoration measures for vegetation are standard Commission route permit conditions, with the development of a Vegetation Management Plan is required by the Commission issued route permit.

6.8.8 Wetlands

The ROI for wetlands is the ROW. Emergent herbaceous wetlands and forested wetlands are found within the routing option ROWs. Wetlands identified on the NWI within routing options ROWs, include the Proposed Route (3.4 acres emergent herbaceous), Crandall Alternate Route (3.7 acres emergent herbaceous and 0.2 forested), Peaking Plant Alternate Route (1.4 acres emergent herbaceous and 0.2 forested), the Alternate Red Routing Segment (0.2 acres emergent herbaceous), the Alternate Yellow Route Segment (1.3 acres emergent herbaceous), and the other routing options do not have any wetlands within the ROWs. Emergent wetlands are spanned to the greatest extent possible. Where structures are placed in wetlands, vegetation at these locations is expected to regenerate around the structure within a matter of years, thus, impacts to emergent wetlands are anticipated to be short-term, of a small size, and localized. Impacts can be mitigated.

Impacts to forested wetlands are permanent whether structures are located within the wetland or outside the wetland. This is because tall growing vegetation must be cleared to facilitate the safe operation of the transmission line. The Maroon and Pink route segments cross about twice as many acres of forested wetlands than the Teal route segment.

"Wetlands are areas where the frequent and prolonged presence of water at or near the soil surface drives the natural system meaning the kind of soils that form, the plants that grow, and the fish and/or wildlife communities that use the habitat. Swamps, marshes, and bogs are well-recognized types of

wetlands. However, many important specific wetland types have drier or more variable water systems…."[clx]

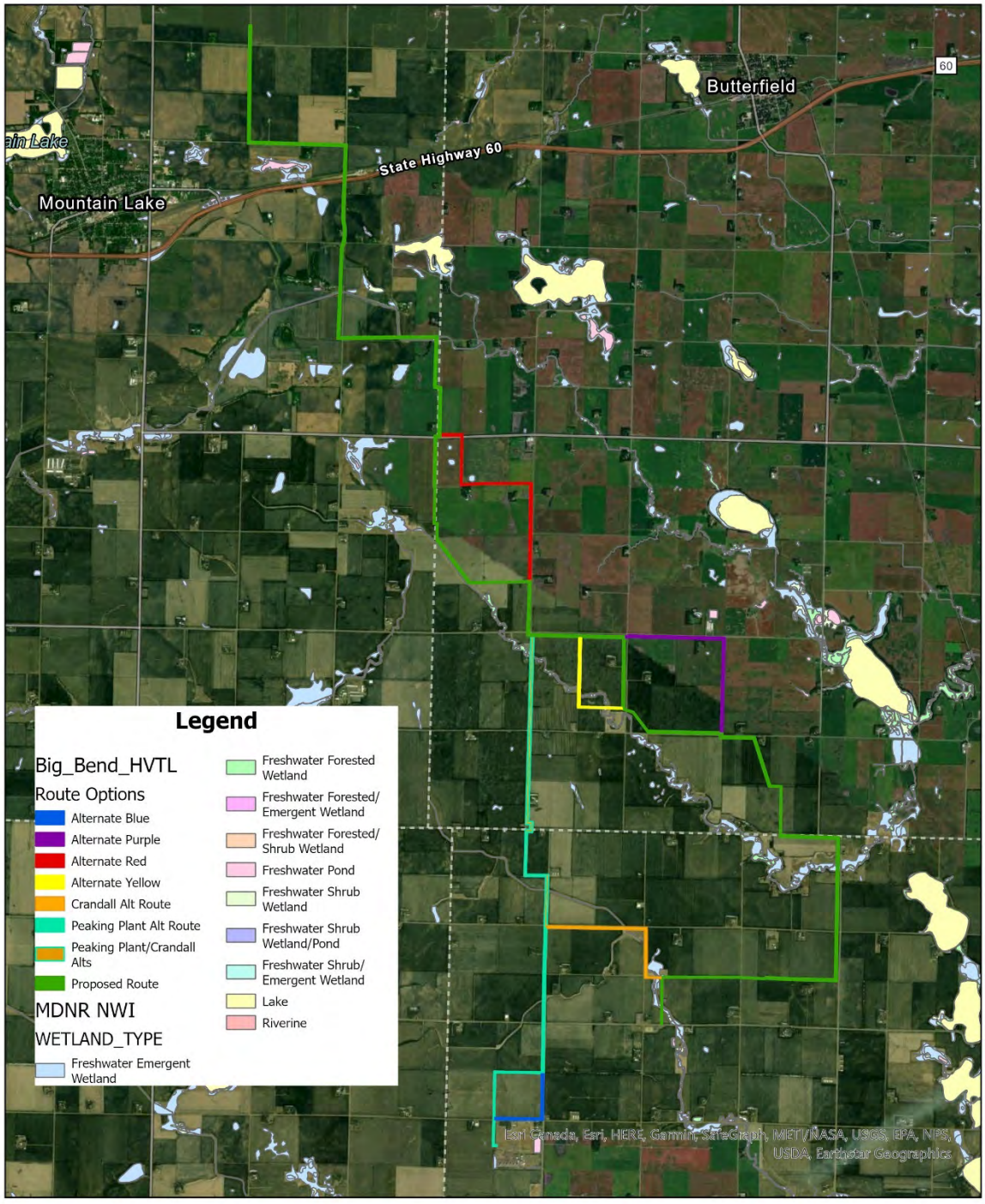
Wetlands provide many ecological benefits, such as erosion and flood control, fish and wildlife habitat, and groundwater recharge and discharge.[clxi] They also serve as a "natural filter" by trapping and absorbing sedimentation and some pollutants. Approximately 10.62 million acres of wetlands are found across Minnesota.[clxii] Wetlands vary by soil, hydrology, and vegetation, and are typically seasonal in their extent.

Certain wetlands are federally protected under Section 404 of the Clean Water Act. "Section 404 requires a permit before dredged or fill material may be discharged into waters of the United States," including wetlands.[clxiii] This permit is administered by USACE. Section 401 of the Clean Water Act requires any applicant for a federal license or permit to conduct an activity that may result in a discharge of a pollutant into waters of the United States to obtain a certification from the State in which the discharge originates that the discharge complies the applicable water quality standards.[clxiv] In Minnesota, the MPCA administers Section 401 on non-tribal lands and issues a Water Quality Certification that becomes a condition of the federal permit.

In Minnesota, wetlands are also protected under the WCA, which is administered by the BWSR. Cottonwood, Watonwan, and Martin counties oversee local implementation of the WCA in the project area. The WCA requires that any person "proposing to impact a wetland to first, attempt to avoid the impact; second, attempt to minimize the impact; and finally, replace any impacted area with another wetland of at least equal function and value."[clxv] There are no wetland banking easements within the project area.

USFWS began producing wetland maps, known as the National Wetland Inventory (NWI), based on aerial photographs and Natural Resources Conservation Service soil surveys starting in the 1970s. DNR led a multi-agency collaborative effort to update and replace the original 1980s NWI maps. The updated NWI data are primarily based on spring aerial imagery acquired in 2010 and 2011, elevation data, and other more modern data.

Figure 6-9. HVTL Project Area NWI



"It is important to remember that the NWI was never intended to serve as jurisdictional wetland delineation and should not be used as such. Wetland inventories determined from aerial photography and other remote sensing information cannot be expected to be able to precisely determine jurisdictional wetland boundaries for the purposes of wetland permitting. Qualified wetland professionals should perform wetland delineations for this purpose in the field."[clxvi] The NWI is nonetheless a useful planning tool that "indicates a high probability of the presence of wetlands in a location."[clxvii]

Potential Impacts

Wetlands consist of organic soils comprised of layers of decomposed plant material that formed very slowly; as a result, disturbed wetlands are not easily repaired.[clxviii] However, crossing a wetland does not necessarily mean it will be impacted; in some cases it can be spanned. Table 45 lists the potential number of structures that might be placed in wetlands by route segment.

Table 6-16. NWI Wetlands (acres) and Estimated Pole Structures

Route or Route Segment	Total Number of Poles	Wetland Type	
		Emergent (acres)	Forested (acres)
Proposed Route	2	3.4	0
Crandall Alternate Route	2	3.7	0.2
Peaking Plant Alternate Route	1	1.4	0.2
Alternate Red	0	0.2	0
Alternate Yellow	1	1.3	0
Alternate Purple	0	0	0
Peaking Plant Alternate Route Segment	0	0	0

The step-up substation location next to the Crandall Substation has 0.6 acres of emergent herbaceous wetland identified on the land cover data, but the NWI doesn't identify any wetlands within the area. Big Bend will conduct a wetland investigation throughout the step-up substation area to identify and delineate wetlands prior to final design and construction. The step-up substation location next to the Lakefield Peaking Plant Substation does not have any wetlands present within the area.

When a wetland cannot be spanned, construction must occur within the wetland. Commission route permits require use of construction mats when winter construction is not possible. Additionally, permits require that access to wetland and riparian areas be the shortest route possible to minimize travel through the wetland.

Temporary impacts are associated with access to wetlands with construction equipment. Construction mats can be positioned within the ROW to reduce construction equipment impacts to wetland areas. While construction mats reduce soil compaction, laying construction mats has potential to disturb or kill the underlying vegetation based on the amount of time these mats are in use. Vegetation would be

expected to regenerate relatively quickly; however, disturbed areas would be more susceptible to invasive plant species, which, if established, could lead to long-term adverse impacts to wetland function.

Additionally, equipment access can cause rutting, compaction, erosion, and sedimentation. Rutting and compaction can change water flow, whereas erosion and sedimentation can increase water turbidity levels. Impacts that influence the hydrology of the wetland—even small changes—might significantly impair the function of the wetland. Fuel or hazardous substances could spill over the wetland, which could lead to contamination.

Permanent impacts would involve structure placement or other project related fill material being placed within a wetland for the life of the project. Should dewatering occur it would temporarily lower groundwater to allow for excavation. Reduced groundwater can reduce standing water, decrease soil moisture, affect ground surface stability, and impact vegetation. Water discharge could lead to contamination and sedimentation.

Regardless of whether a power line can span a wetland, safe operation of the line will necessitate removal of woody vegetation. In areas where forested wetlands exist this will result in wetland conversion, that is, tree or shrub clearing will change the function of a forested wetland to a different wetland type within the ROW. Ongoing maintenance makes this conversion permanent. Consequently, the type and magnitude of wetland function would change, for example, wildlife habitat, flood flow attenuation, and sediment stabilization and retention. Forested wetlands are only present within the Crandall Alternate Route and the Peaking Plant Alternate Route, each having 0.2 acres.

Wetland impacts can also occur if disturbed soils are eroded by rain or snowmelt and transported into a wetland. The indirect filling of wetlands by up slope construction erosion and run-off could result in temporary or permanent impacts to the receiving wetland, depending on the timing of clean-up and restoration of the affected area.

Mitigation

Potential impacts to wetlands can be avoided by selecting routes, alignments, and structure placements outside of wetlands. When a wetland crossing is unavoidable spanning wetlands to the greatest extent possible is the preferred mitigation. If wetlands cannot be avoided, impacts can be minimized by a variety of strategies: use of construction mats and silt tubes; conducting construction and maintenance activities during winter months when the ground is frozen; spreading spoils from structure placement outside the wetland or disposing spoil off ROW; assembling structures on upland areas prior to installation; and transporting crews and equipment, to the greatest extent possible, over improved roads and via routes which minimize travel over wetlands.

Commission route permits require permittees to avoid and minimize wetland impacts. This includes requiring winter construction to the extent possible and requiring that soil excavated from wetland areas not be placed back into the wetland. [clxix]

Wetland impact avoidance measures that will be implemented during design and construction of the transmission lines include spacing and placing the power poles at variable distances to span and avoid wetlands, where possible. When it is not possible to span the wetland, several measures will be utilized to minimize impacts during construction.

Big Bend has committed to the following in Section 5.5.5.1 of the route permit application:

- When possible, construction will be scheduled during frozen ground conditions.
- When construction during winter is not possible, construction mats will be used to protect wetland vegetation.
- All-terrain construction vehicles may be used, which are designed to minimize impact to soils in damp areas.
- Construction crews will attempt to access the wetland with the least amount of physical impact to the wetlands.
- The structures will be assembled on upland areas before they are brought to the site for installation, when practicable.

6.8.9 Wildlife and Habitat

The ROI for wildlife is the ROW, except that the ROI for avian species is the local vicinity. Wildlife using the ROW are expected to be displaced during construction due to increased human activity. Most wildlife would return to the area after construction. Distinct impacts to terrestrial species, avian species, and habitat will occur.

Impacts to terrestrial species will be intermittent, temporary, and localized during construction. While direct significant impacts might occur to individuals, population level impacts are not anticipated. These short-term, localized impacts can be minimized. Operational impacts are expected from continued maintenance of the ROW. These intermittent but long-term impacts will be of a small size.

Potential impacts to avian species include those described above. Additionally, birds—especially large bodied birds—are susceptible to electrocution from, and collision with, HVTLs during operation. Potential impacts to avian species are expected to be minimal. These short- and long-term, localized impacts can be minimized.

Impacts to habitat are primarily associated with widening existing corridors. These long-term impacts are unavoidable. The Proposed Route crosses the MBS Site of Biological Significance (Cedar 2-3), which has moderate quality habitat and portions of the Site are native prairie areas. These types of areas provide higher quality habitat then what is typically available on the primarily agricultural landscape in the project area. Additionally, this type of habitat is much more limited in availability. The Cedar 2-3 Site will attract more specialized wildlife species, including species that don't tolerate human disturbance as well as generalist wildlife species more commonly found in agricultural dominated landscapes. Potential impacts to the wildlife utilizing the Cedar 2-3 Site of Biological Significance is expected to be minimal and

temporary, and these impacts can be avoided or minimized. Big Bend is not going to place any pole structures within the Cedar 2-3 Site, and the area will be spanned by the HVTL. Equipment and machinery will only access the Site if necessary, and disturbance to vegetation and the soil surface will be minimized to the greatest extent practicable.

Overall, potential impacts to wildlife and habitat are expected to be minimal for all routing options, as the primary land cover type being impacted by the Big Bend HVTL is cultivated cropland. Direct impacts to avian species, caused by direct line strikes and electrocutions, are more likely to occur where HVTLs are placed adjacent to larger tracts of habitat, water bodies, water courses, or if the HVTL divides an avian resting area and a feeding area. Bird diverters installed near these areas will help minimize the potential for strike. Potential impacts will be short- and long-term. These localized impacts can be minimized in part and are unavoidable in part.

Agricultural lands are the primary land cover type throughout the entire project area, with some scattered wetlands throughout the area, as is existing road and power line ROWs.

Species

Wildlife using the local vicinity are common species associated with disturbed habitats and are accustomed to human activities occurring in the area, for example, agriculture, roads, and rural homesteads. Wildlife species in the area include bald eagles, wild turkeys, songbirds, white-tailed deer, beaver, muskrat, rabbits, squirrels, red and gray fox, raccoon, migratory waterfowl (geese, ducks, trumpeter swans, herons), and various birds (meadowlarks, sparrows, thrushes, sparrows, Bobolink, Mourning dove, various woodpeckers, shore birds).[clxx] Other wildlife within the route width includes a variety of reptiles and amphibians, such as turtles, snakes, frogs and toads. Rare and unique wildlife species are discussed in Section 6.8.4.

"Minnesota defines Species in Greatest Conservation Need (SGCN) as native animals, nongame and game, whose populations are rare, declining, or vulnerable to decline and are below levels desirable to ensure their long-term health and stability. Also included are species for which Minnesota has a stewardship responsibility."[clxxi] The Wildlife Action Network is "mapped terrestrial and aquatic habitats, buffers, and connectors that represent a diversity of quality habitat . . . representing viable or persistent populations and 'richness hotspots' of SGCN."[clxxii] None of the routing options contain any areas identified in the Wildlife Action Network.

Table 6-17 identifies stressors that contribute to population declines in species of greatest conservation need. "Habitat-related stressors were considered a predominant stressor for 70 percent of SGCN (241 of 346 species), indicating that loss, degradation (including from contaminants), and fragmentation of habitats are the most serious challenges facing SGCN populations."[clxxiii]

Habitat

There are no DNR WMAs, SNAs, or Migratory Waterfowl Feeding and Resting Areas or National Audubon Society Important Bird Areas within the local vicinity of any routing option. Additionally, there are no

WPAs or National Wildlife Refuge lands within the local vicnity of any of the routing options. Potential wildlife habitat areas in the project area are shown on Figure 6-10.

The Reinvest in Minnesota Reserve program (RIM Reserve) is administered by BWSR and establishes conservation easements on private lands utilizing state funds. RIM Reserve easements are intended to provide wildlife habitat, soil conservation, and water quality benefits by establishing permanent habitat and removing marginal crop lands from agricultural production. There is one RIM Reserve easements along any of the routing options.

Figure 6-10. Potential Wildlife Habitat Areas

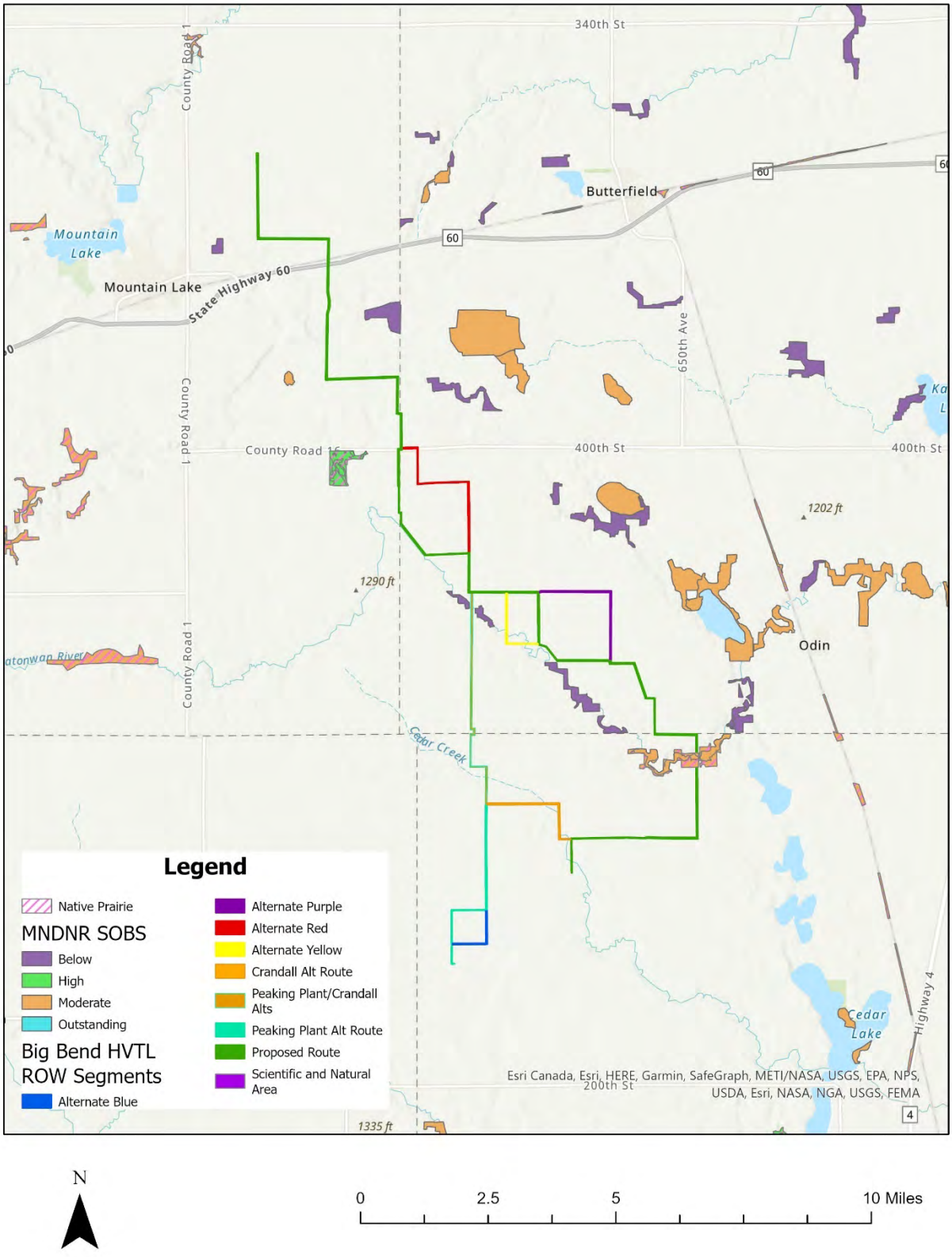


Table 6-17. Stressors Affecting SGCN Populations (statewide)

Stressors	% predominant factor*
Habitat Stressors	**70%**
Habitat degradation	38%
Habitat is rare, vulnerable, or declining	35%
Habitat loss	31%
Habitat fragmentation	23%
Depends on natural processes that are no longer within natural range of variation	10%
Contaminants	9%
Requires large home range or multiple habitats as part of their life cycle	4%
Depends on large habitat patch	4%
Other Stressors: Specific Threats	**13%**
Invasive animal species	9%
Disease	3%
Overexploitation, collecting, bounty killing	2%
Deliberate killing	1%

* The inverse of the percentages for each problem does not necessarily represent the percentage of SGCN for which the factor is not a problem, but instead might indicate that there is not sufficient information available to determine the level of influence the problem has on SGCN.

Source: DNR Minnesota's Wildlife Action Plan 2015-2025

There is one Conservation Reserve Enhancement Program (CREP) Easement within the local vicinity of the Proposed Route, and approximately 0.2 acres of the CREP Easement is crossed by the Proposed Route ROW. The Alternate Red Route Segment would move the HVTL away from the land under CREP Easement.

Habitats in the local vicinity consist of open land, wood land, and wetland habitats. Open land habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Woodland habitat consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wetland habitats consists of herbaceous and forested areas.[clxxiv]

Habitat fragmentation is "usually defined as a landscape-scale process involving both habitat loss and the breaking apart of habitat."[clxxv] This definition, however, does not isolate the impact of fragmentation independent of habitat loss. The potential impact from habitat fragmentation—when controlled for habitat loss—is "generally much weaker than the effects of habitat loss," and is "at least as likely to be positive as negative."[clxxvi] Negative impacts associated with habitat fragmentation include 1) an increased number of smaller habitat patches interspersed among larger areas of non-suitable habitat, and 2) increased "edge for a given amount of habitat."[clxxvii]

"An 'edge' is the boundary, or interface, between two biological communities or between different landscape elements."[clxxviii] Edge effects may alter habitats that are important to interior forest dwellers through microclimate changes to these areas. Additionally, increased predation, competition, and parasitism from plants and animals intruding on interior forest environments can become more prevalent, as well as interior forest species increasingly moving through and along edges, that is, habitat transition areas.[clxxix,clxxx] In locations where the proposed transmission line will parallel existing ROW, edge effects will be limited to one side of the ROW. As a result, edge effects are expected to intensify in locations where new ROW will be created and lessen where existing ROW is expanded, but this is also expected to be relative to the level of expansion.

Potential Impacts

Potential impacts will occur to terrestrial and aquatic species, avian species, and habitat.

Terrestrial and Aquatic Species Wildlife using the route width are expected to be displaced during construction due to increased human activity or other disturbance of habitat. The distance animals are displaced depends on the species and the tolerance level of each animal. Most wildlife would likely return to the area after construction; however, others might be permanently displaced. Because other suitable habitat is available in and near the project area, potential temporary impacts to wildlife are not expected to cause permanent changes to local populations. Since streams and ponds will be spanned, no structures are expected to directly impact fish or fish habitat.

Should winter construction occur, reptiles, such as snakes, move underground below the frost line and become inactive or hibernate over winter months.[clxxxi] Turtles and amphibians generally hibernate under pond bottoms, but will also hibernate on land underneath the frost line. "Insects may winter above or below ground as eggs, larvae, pupae, or adults, depending on the species" in areas like grass thatch, leaf litter, bunch grasses, tunnels in wood, etc. [clxxxii] Impacts to overwintering reptiles, amphibians, and insects (pollinators) might occur during transmission structure placement, that is, individuals might be inadvertently killed, should placement occur at their place of hibernation.

Potential long-term impacts to terrestrial and aquatic species are anticipated to be minimal along all route segments.

Avian Species Potential impacts to avian species (songbirds, raptors, and waterfowl) include those described above. Additionally, birds are susceptible to electrocution from, and collision with, HVTLs during operation.

Power lines electrocute all types of birds, including raptors, "because many designs of electric industry hardware place conductors and ground wires close enough together that raptors can touch them simultaneously with their wings or other body parts."[clxxxiii] Electrocution is more common in large bodied birds, but, again, any species can be electrocuted. Because of their smaller size, electrocution risk is greater with distribution lines,[clxxxiv] and is most prevalent when the power line structure is the tallest feature on the landscape, such as on a bluff or prairie.

Dry feathers provide insulation; therefore, "birds must typically contact electrical equipment with conductive fleshy parts for electrocution to occur. Fleshy parts include the feet, mouth, bill, and the wrists from which the primary feathers originate."[clxxxv] The most critical component of avian

electrocution is the "physical separation between energized and/or grounded structures, conductors, hardware, or equipment that can be bridged by birds to complete a circuit. Generally, electrocution can occur on structures with the following:

- Phase conductors separated by less than the wrist-to-wrist or head-to-toe distance of a bird;
- Distance between grounded hardware (for example, grounded wires, metal braces) and any energized phase conductor that is less than wrist-to-wrist or head-to-foot distance of a bird."[clxxxvi]

Independent of the risk of electrocution, birds might be injured or killed by colliding with transmission line structures and conductors. The risk of collision is influenced by several factors including habitat, flyways, foraging areas, and bird size. Waterfowl, especially larger waterfowl such as swans and geese, are more likely to collide with transmission lines. The frequency of collisions increases when a transmission line is placed between agricultural fields that serve as feeding areas and wetlands or open water, which serve as resting areas. In these areas, it is likely that waterfowl and other birds would be traveling between different habitats, increasing the likelihood of collision.

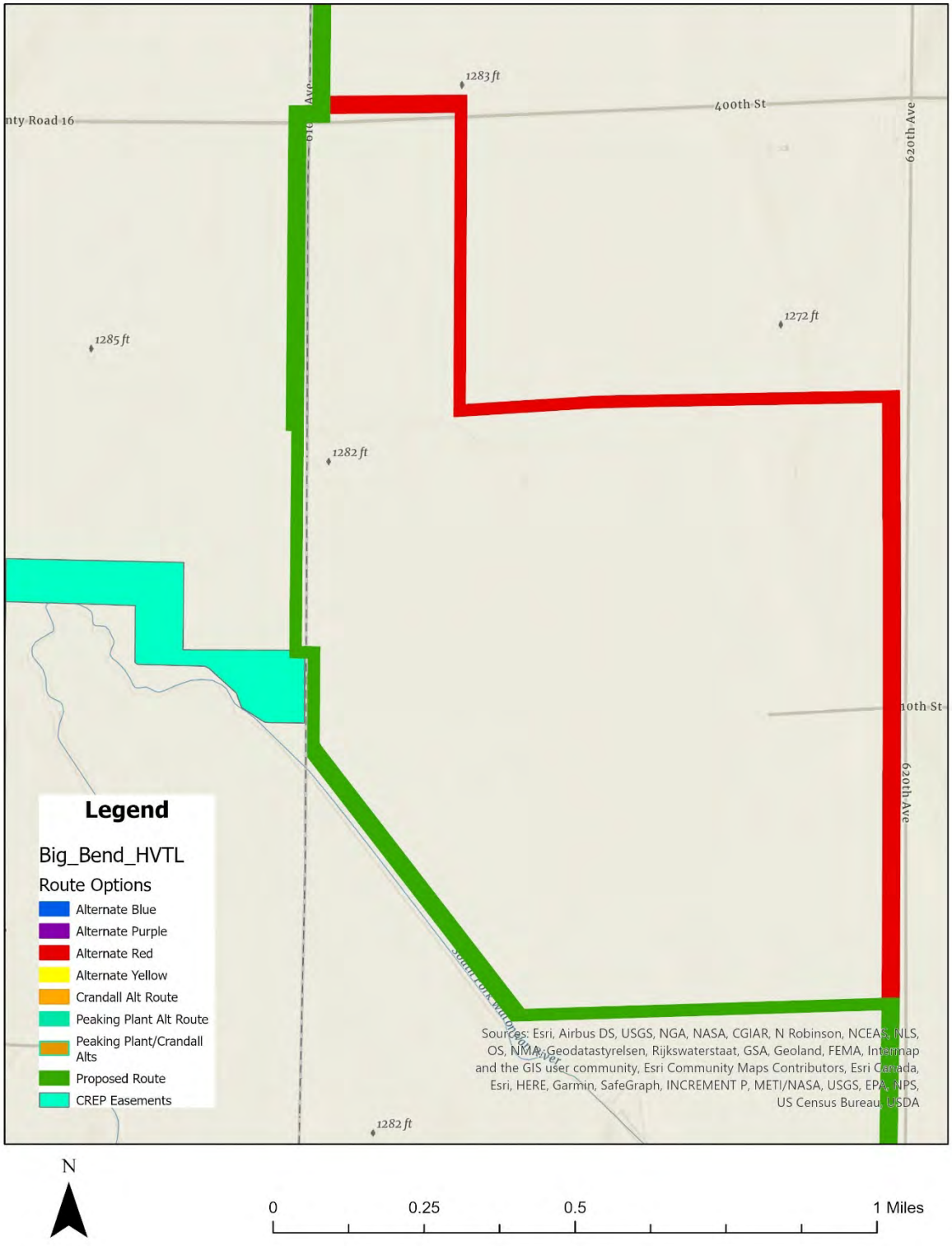
The incidence of birds colliding with transmission lines is also influenced by the number of horizontal planes in which the conductors are strung. Stringing the conductors in a single horizontal plane presents less of a barrier to birds crossing the transmission line ROW. A single horizontal plane, however, generally requires a wider structure (H-frame structure). Conversely, stringing the conductor wires in two or more planes creates a greater barrier to birds attempting to fly, not only across the lines, but over and potentially between them (monopole structure).

Habitat Vegetation clearing within the ROW will widen existing corridors to establish new ROW. These existing ROWs vary in width and are shown widest (state highway) to narrowest (distribution line) in the table above. For example, a state highway might have a 150-foot ROW, whereas a distribution line might have a 20-foot ROW. To the extent possible, transmission structures are placed just outside of road ROW. This means that one side of the 100-foot could essentially overlap an area already cleared, reducing on-the-ground impacts by about half. Vegetation clearing along power line ROW expands the ROW on both sides, meaning new 100-foot ROW would require about 40 feet of clearing on either side of an existing distribution line ROW.

The composition and structure of vegetation—and, as a result, wildlife habitat—will be altered in these areas. Habitat loss has a consistent negative affect on biodiversity and can adversely impact species richness, population growth rates, reductions in habitat specialist species, and breeding success, among other measures.[clxxxvii]

Easements Clearing along 610th Avenue for the Proposed Route will result in impacts to the CREP easement (**Figure 6-11**).

Figure 6-11. Potential Impacts to CREP Easement from Proposed Route



Mitigation

Potential impacts to wildlife can be avoided by routing power lines away from quality habitat or migratory corridors. Impacts can be minimized by spanning habitats and minimizing the number of structures to the extent practicable. Impacts to avian species can be mitigated by winter construction—nesting activities would not be occurring, and most species would have migrated out of the local vicinity.

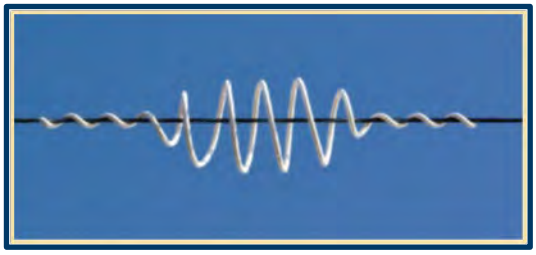
The Proposed Route crosses the Cedar 2-3 MBS Site of Biological Signficance in Martin County. The Cedar 2-3 partially consists of native prairie habitat. Big Bend will span the Cedar 2-3 Site with the HVTL alignment, and avoid pole structure placement within the Site. The Cedar 2-3 Site is currently bisected by 50th Avenue and the Anticipated Alignment would be co-located directly adjacent to the road ROW.

Clearing along 610th Avenue for the Proposed Route will result in impacts to the CREP easement. These impacts would be avoided if Alternate Red Route Segment was utilized, and the impacts to the CREP easement could be minimized with the Anticipated Alignment is shifted, within the Proposed Route ROW, away from the CREP easement.

Impacts to avian species can be minimized by diverting birds away from transmission lines using bird diverters placed on shield wires. Diverters are placed on the top shield wire because a of the natural tendency for birds to avoid obstacles in flight by increasing altitude. In select locations, however, bird diverters will be place on the conductors as well to further mitigate potential impacts. Conductor configuration can also mitigate potential impacts.

Additionally, Commission route permits require that permittees "incorporate adequate spacing of conductors and grounding devices in accordance with Avian Power Line Interaction Committee standards to eliminate the risk of electrocution to raptors with larger wingspans that may simultaneously come in contact with a conductor and grounding devices."

Diagram 6-2. Bird Diverter



7 Unavoidable, Irreversible, and Cumulative Impacts

Chapter 7 describes unavoidable impacts and irreversible and irretrievable commitments of resources, and summarizes the cumulative potential effects of the project and other projects.

7.1 Unavoidable Impacts

Resource impacts are unavoidable when an impact cannot be avoided even with mitigation strategies.

Transmission lines are infrastructure projects that have unavoidable adverse human and environmental impacts. These potential impacts and the possible ways to mitigate against them were discussed above. However, even with mitigation strategies, certain impacts cannot be avoided.

Unavoidable adverse impacts associated with construction of the proposed Big Bend HVTL include:

- Possible traffic delays and fugitive dust on roadways.
- Visual and noise disturbances.
- Potential impacts to agricultural operations, such as crop losses.
- Soil compaction and erosion.
- Vegetative clearing; changes to forested wetland type and function.
- Disturbance and temporary displacement of wildlife, as well as direct impacts to wildlife inadvertently struck or crushed during structure placement or other activities.
- Minor amounts of habitat loss.
- Converting the underlying land use to an industrial use (step – up substation location).
- GHG emissions.

Unavoidable adverse impacts associated with the operation of the proposed project include:

- Visual impact of structures, conductors, and step-up substation.
- Change in landscape character at the step-up substation location.
- Loss of land use for other purposes, such as agriculture, where structures and the step – up substation are placed.
- Injury or death of avian species that collide with, or are electrocuted by, conductors.
- Interference with AM radio signals.
- Potential decrease to property values.
- Continued maintenance of tall-growing vegetation.
- GHG emissions.
- Increased EMF on the landscape. (Potential impacts from EMF are minimal, and are not expected to impact human health.)

7.2 Irreversible and Irretrievable Commitments of Resources

Resource commitments are irreversible when it is impossible or very difficult to redirect that resource to a different future use; an irretrievable commitment of resources means the resource is not recoverable for later use by future generations.

Irreversible impacts include the land required to construct the transmission line. While it is possible that the structures, conductors, and substation could be removed and the ROW restored to previous conditions, this is unlikely to happen in the reasonably foreseeable future (~50 years). The loss of forested wetlands is considered irreversible, because replacing these wetlands would take a significant amount of time. Certain land uses within the ROW will no longer be able to occur, especially at the step-up substation.

An irretrievable commitment of resources means the resource is not recoverable for later use by future generations. These impacts are primarily related to project construction, including the use of water, aggregate, hydrocarbons, steel, concrete, wood, and other consumable resources. The commitment of labor and fiscal resources is also considered irretrievable.

7.3 Cumulative Impacts

Consideration of cumulative potential effects is intended to aid decision-makers so that they do not make decisions about a specific project in a vacuum. Effects that may be minimal in the context of a single project may accumulate and become significant when all projects are considered.

Cumulative potential effects are impacts to the environment that results from "the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects actually planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects."[clxxxviii]

The "environmentally relevant area" includes locations where the potential effects of the project coincide with the potential effects of other projects to impact the elements studied in this EA. Generally, this area includes the ROI for the different resource elements.

Cumulative effects are discussed here for projects that are foreseeable in the next five years in the project area. It is assumed that the construction-related impacts of these projects are short-term, for example, construction impacts will cause local disturbances, such as increased noise levels, and traffic delays/and reroutes. Thus, the discussion here is focused on the potential long-term impacts of these projects.

Local governments' websites were reviewed to identify foreseeable projects. This included the Cities of Mountain Lake and Butterfield and Cottonwood, Watonwan, and Martin counties. Staff reviewed the MISO Generator Interconnection Queue and found no interconnection requests in the project area. The Environmental Quality Board interactive project database was searched; and the Plum Creek

Wind Farm EIS was identified. Staff also reviewed funding recipient lists of various BWSR, DNR, and MPCA programs, and a general internet search was conducted.

Current and reasonably foreseeable future projects are summarized in Table 7-1. Most projects are transportation related and being completed by MnDOT. One is a recreational trail project, and one would construct and operate a large wind energy project and the associated HVTL to the west of the Big Bend HVTL Project.

Table 7-1 Current and Reasonably Foreseeable Future Projects

Project	Location	Description
Wolf Lake Connection Trail[412]	City of Windom/Wolf Lake (Cottonwood County	Proposed trail development, utilizing Federal Lands Access Program (FLAP). The City of Windom has begun the grant application process.
Plum Creek Wind Farm and HVTL Project[413]	Cottonwood, Murray, and Redwood Counties	Proposed construction and operation of a 414 MW wind farm, consisting of 74 to 110 wind turbines and associated infrastructure. Additionally, the construction and operation of an approximately 31 miles of 345 kV high voltage transmission line.
US Highway 14 Expansion	Between Nicollet and New Ulm	MnDOT project to expand US Highway 14 from two to four lanes between Nicollet and New Ulm.
US Highway 14 RCUT Construction	City of Eagle Lake	MnDOT project to construct a RCUT on US Highway 14 between CSAH 86 and CSAH 17 in Eagle Lake.
Interstate 90 Resurfacing	Between Sherburn and Fairmont	MnDOT project to resurface the eastbound lanes of Interstate 90 between Trunk Highway 4 near Sherburn and Trunk Highway near Fairmont.
Pavement Replacement and Bridge Rehab Trunk High 60/Trunk Highway 15	City of Madelia	MnDOT project to replacement pavement and rehabilitate bridges on eastbound and westbound lanes of Trunk Highway 60/Trunk Highway 15 between Madelia and south junction of Trunk Highway 60.

[412] Cottonwood County, Board Meeting Agenda and Minutes. Board Meeting Minutes December 8, 2021. https://cms5.revize.com/revize/cottonwoodmn/Document_Center/Commissioners%20Minutes/2021/1208.pdf
[413] MN Department of Commerce. Plum Creek Wind Farm and Associated 345 kV Transmission Line Project. https://apps.commerce.state.mn.us/eera/web/project/13894

US Highway 169 Resurfacing	Between Winnebago and Vernon Center and between Elmore and Blue Earth	MnDOT project to resurface portions of US Highway 169 between Winnebago and Vernon Center and between Elmore and Blue Earth.
US Highway 169 Bridge Replacements	Saint Peter	MnDOT project to replace bridges on US Highway 169 near Saint Peter.
Interstate 90 Concrete Overlay	Between South Dakota/Minnesota border and Beaver Creek	MnDOT project to complete a concrete overlay on both east and west bound Interstate 90 between the South Dakota/Minnesota state line and Beaver Creek.

When considering cumulative potential effects, none of the current and foreseeable future project are within the Big Bend HVTL Project Area. There is potential for impact to transportation routes Big Bend and their contractor will use for accessing the Project Area or getting equipment and materials to the Project Area. The Applicant has begun coordination with MnDOT staff and will continue to coordinate them to avoid transportation conflicts with current and future MnDOT projects.

Human Settlement

Cumulative potential effects on human settlements during construction are anticipated to be negligible or minimal. Future projects will result in long-term aesthetic impacts. Most will occur in developed areas, for example, in cities and along existing roads and highways. These impacts are anticipated to be both positive, for example, Wolf Lake Connection Trail, and negative, Plum Creek Wind Farm and associated HVTL. Increased recreational opportunities will occur from the Wolf Lake Connection Trail. These projects are also expected to benefit local economies. The Plum Creek Wind Farm and associated HVTL might negatively affect property values, and cause additional impacts to aesthetics and rural character.

Public Health and Safety

Cumulative potential effects to public health and safety are expected to be positive. Several of the projects considered here are road and highway related. They are undertaken to maintain and improve local roads to ensure their safe operation and the public's health and safety. The Plum Creek Wind Farm Project and associated HVTL are intended to bring additional renewable energy resources to the electrical grid.

Land Based Economies

Cumulative potential effects on land-based economies are anticipated to be minimal. Most projects are in cities or along existing roadways. It is expected that the Plum Creek Wind Project and associated HVTL might interfere with local agricultural activities. Should impacts occur, they could likely be mitigated through negotiated easement agreements.

Natural Environmental

Cumulative potential effects on the natural environment are anticipated to be minimal. Most projects are in well-developed areas in cities or along roadways. Impacts are limited along roadways by using existing infrastructure ROW. Avian species would be at greater risk to electrocution and collisions with the construction of the Plum Creek Wind Project and associated HVTL. Other impacts would be expected to be similar to the proposed project, perhaps to a larger scale because of the larger size of structures.

Rare and Unique Natural Resources

Cumulative potential effects on rare and unique natural resources are anticipated to be minimal. Certain projects might impact rare and unique resources during construction and operation. Impacts of the Plum Creek Wind Project and associated HVTL will be similar to the proposed project, but may be larger in scale because of the larger size of structures.

8 Application of Siting Factors and Routing Factors

8.1 Application of Siting Factors to the Red Rock Solar Project

The analysis that follows applies the information in the site permit application and this EA to the factors the commission must consider when making a site permit decision. Generally, EERA staff reviews these factors to help establish the relative merits of a proposed project against alternative power plant sites or transmission line routes studied in the environmental document. In this matter only one site was studied; therefore, the concept of relative merits is not applicable. However, because multiple electrical collection systems are proposed within the land control area the concept of relative merits applies to these systems.

The Minnesota Legislature directed the commission to select sites for large electric power generating plants that minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity. The site must be compatible with environmental preservation and the efficient use of resources while also ensuring electric energy needs are met and fulfilled in an orderly and timely fashion. Minnesota Statute 216E.03, subdivision 7(b) identifies 12 considerations that guide commission decisions when designating a site for a large electric power generating plant. These considerations are further clarified and expanded by Minnesota Rule 7850.4100, which identifies 14 factors the commission must consider when making a permit decision.

Some factors are described in just a few words, for example, effects on archaeological and historic resources. Other factors are more descriptive and include a list of elements that, when grouped, make up the factor. Finally, certain factors are relatively succinct, but the scoping process identified elements to be analyzed in this EA. For example, the public health and safety factor includes an EMF element.

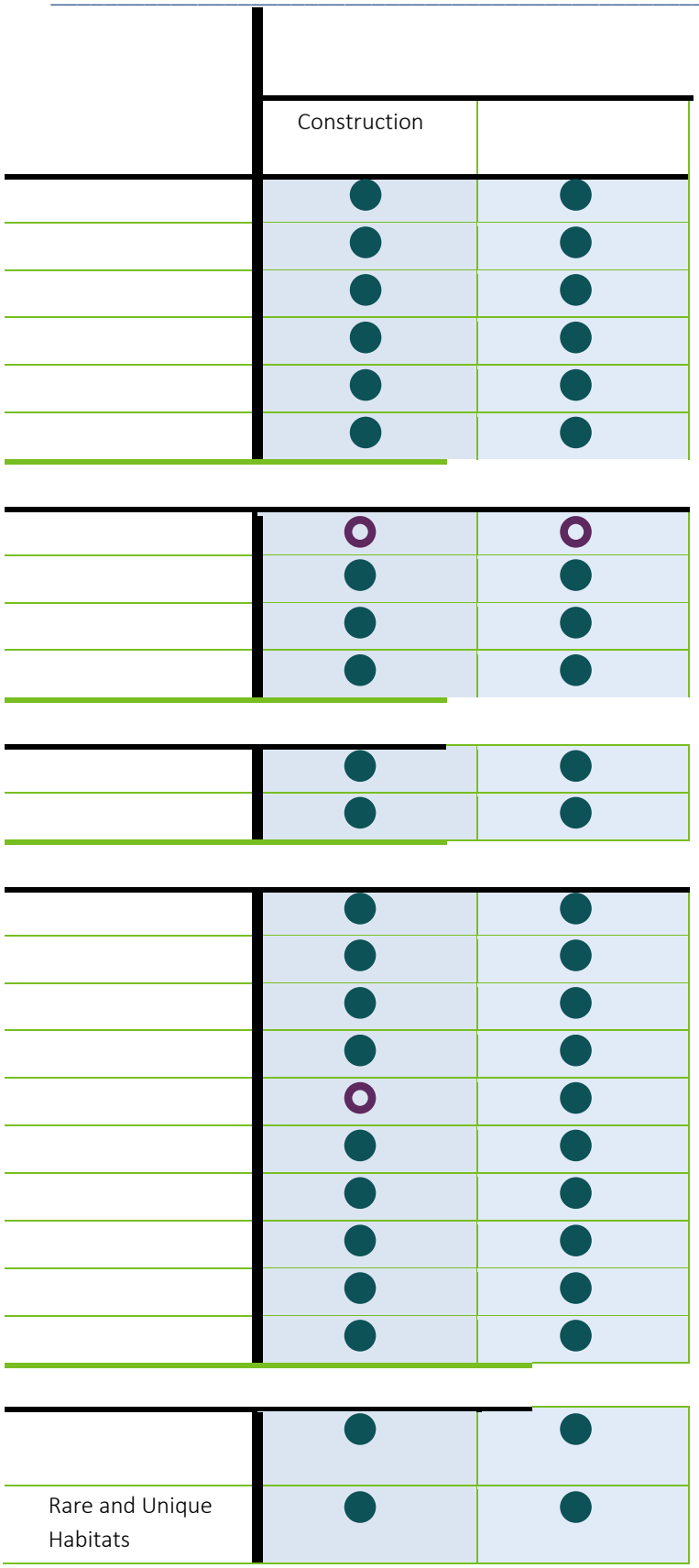
Factor M (unavoidable impacts) and Factor N (irreversible and irretrievable resource commitments) were discussed in the previous chapter. Factor H (use of existing rights-of-way) and Factor J (use of existing infrastructure rights-of-way) apply solely to high voltage transmission lines. Factor G (application of design options) and Factor L (costs dependent on design) do not apply as the design of the proposed project is the only design under consideration. Should the applicant receive a generation interconnection agreement from the Midcontinent Independent System Operator, Factor K (electrical reliability) will be met.

Other factors are ranked as follows:

●	Impacts are anticipated to be negligible to minimal
○	Impacts are anticipated to be minimal to moderate
⊘	Impacts are anticipated to be moderate to significant

Table 8-1 Application of Siting Factors/Relative Merits of the Proposed Red Rock Solar Project

Element	Application of Siting Factors	
	Construction	Operation
Factor A. Human Settlement		
	●	●
	●	●
	●	●
	●	●
	●	●
	●	●
	●	●
	●	●
	○	○
	●	●
	●	●
Factor A Public Services		
	●	●
	●	●
	●	●
Factor B Public Safety		
	●	●


Construction
Rare and Unique Habitats

8.2 Application of Routing Factors and Relative Merits for the Big Bend HVTL Project

The analysis that follows applies the information and data available in the route permit application and this EA to the factors the Commission must consider when making a route permit decision

The Minnesota Legislature has directed the Commission to select HVTL routes that minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity.[clxxxix] An HVTL route must be compatible with environmental preservation and the efficient use of resources while also insuring electric energy needs are met and fulfilled in an orderly and timely fashion.[cxc]

Minnesota Statute 216E.03, subdivision 7(b) identifies 12 considerations that the Commission must take into account when designating a route for a HVTL. These considerations are further clarified and expanded by Minnesota Rule 7850.4100, which identifies 14 factors the Commission must consider when making a permit decision.

A. effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services;
B. effects on public health and safety;
C. effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;
D. effects on archaeological and historic resources;
E. effects on the natural environment, including effects on air and water quality resources and flora and fauna;
F. effects on rare and unique natural resources;
G. application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity
H. use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries;
I. use of existing large electric power generating plant sites;
J. use of existing transportation, pipeline, and electrical transmission systems or rights-of-way;
K. electrical system reliability;
L. costs of constructing, operating, and maintaining the facility which are dependent on design and route;
M. adverse human and natural environmental effects which cannot be avoided; and
N. irreversible and irretrievable commitments of resources.

Some factors are described in just a few words, for example, effects on archaeological and historic resources. Other factors are more descriptive and include a list of elements that, when grouped, make up the factor. Finally, certain factors are relatively succinct, but the scoping process identified elements to be analyzed in this EA. For example, the public health and safety factor includes an EMF element.

Factor I (use of existing large electric power generating plant sites) does not apply to HVTLs. *It is assumed that all routing options maximize energy efficiencies and accommodate expansion of transmission capacity (**Factor G**), and all routing options are electrically reliable (**Factor K**). **Factor M*** (unavoidable impacts) and ***Factor N*** (irreversible and irretrievable resource commitments) were discussed in Chapter 7. Other factors are ranked as follows:

●	Route alternative is consistent with the routing factor OR Impacts are anticipated to be negligible to minimal
○	Route alternative is consistent with routing factor but less so than the other options OR Impacts are anticipated to be minimal but the potential for impacts is greater than the other options or require special permit conditions OR Impacts are anticipated to be moderate
⊘	Route alternative is not consistent with routing factor or consistent only in part OR Impacts might be moderate but the potential for impacts is greater than the other options or require special permit conditions OR Impacts are anticipated to be significant

This analysis applies the routing factors to the Proposed Route and discusses the relative merits of the Crandall Alternate Route, the Peaking Plant Alternate Route, and the relative merits of the four alternate route segments; Alternate Red, Alternate Yellow, Alternate Purple, and the Peaking Plant Alternate Route – Alternate Route Segment.

Graphics (described above) are used to illustrate the application of the routing factors outlined in Minnesota Rule 7850.4100 to the Proposed Route. These same graphics are used to explain the distinct impacts associated with the different routing options. A discussion highlighting differences follows.

Table 8-2 Application of Routing Factors/Relative Merits of the Proposed Route and Alternate Route Options

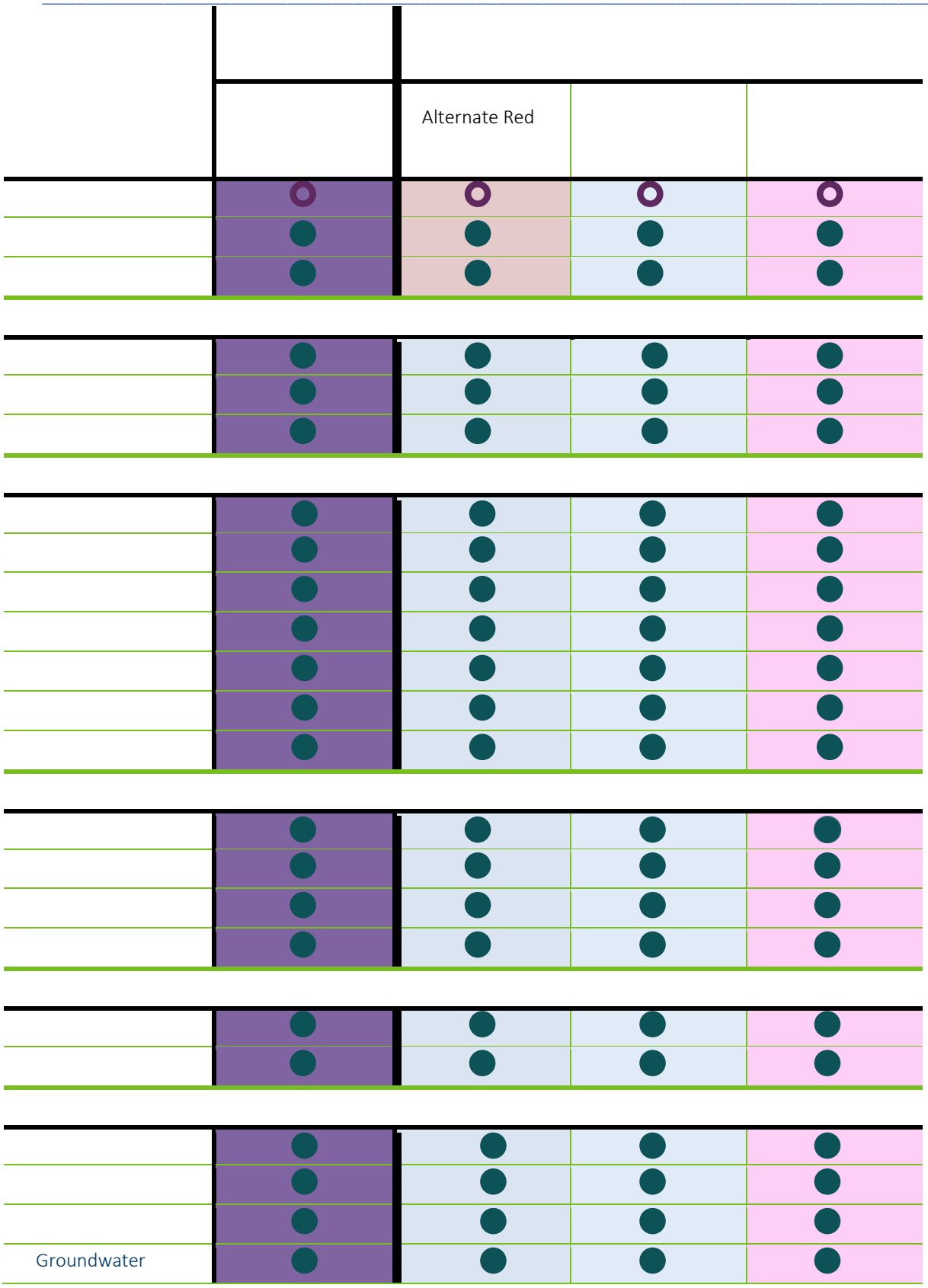
Element	Application of Routing Factor	Relative Merits of Routing Factor	
	Proposed Route	Crandall Alternate Route	Peaking Plant Alternate Route
Factor A Human			
	○	○	○
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	○	○	○
	●	●	●
	●	●	●
Factor A Public			
	●	●	●
	●	●	●
	●	●	●
Factor B Public Safety			
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	●	●	●
Factor C Land Based			
	●	●	○

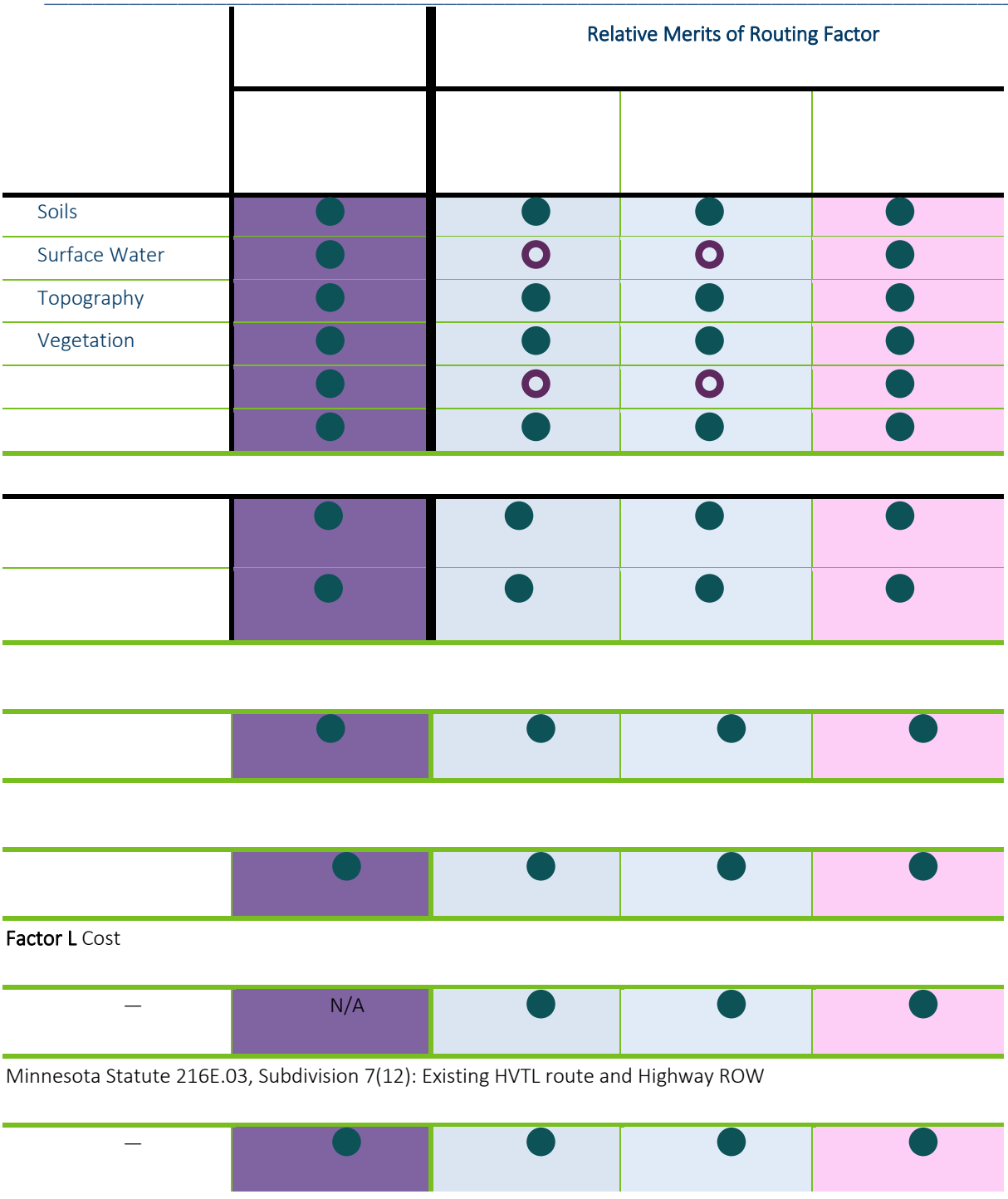
Element	Application of Routing Factor		
			Peaking Plant Alternate Route
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	●	●	●
	●	●	●
Geology	●	●	●
	●	●	●
	●	●	●
Surface Water	●	●	●
	●	●	●
Vegetation	●	●	●
Wetlands	●	●	●
Wildlife and Habitat	●	●	●
Factor F Rare and Unique Resources			
State and Federally Listed Species	●	●	●
Rare and Unique Habitats	○	●	●
Factor H Paralleling Existing ROW			
—	●	●	●
Factor J Use of Existing Infrastructure			

Element	Application of Routing Factor	Relative Merits of Routing Factor	
	Proposed Route	Crandall Alternate Route	Peaking Plant Alternate Route
—	●	●	●
Factor L Cost			
—	N/A	●	●
Minnesota Statute 216E.03, Subdivision 7(12): Existing HVTL route and Highway ROW			
—	●	●	●

Table 8-3. Application of Routing Factors/Relative Merits of Routing Options
Comparative Portion of the Proposed Route and Alternate Route Segments (Red, Yellow, and Purple)

Element	Application of Routing Factor	Relative Merits of Routing Factor		
	Comparative Portion of the Proposed Route	Alternate Red	Alternate Yellow	Alternate Purple
Factor A Human Settlement				
	○	○	●	○
	●	●	●	●
	●	●	●	●
	●	●	●	●
	●	●	●	●
	○	●	●	●
	●	●	●	●
	●	●	●	●


Alternate Red
Groundwater

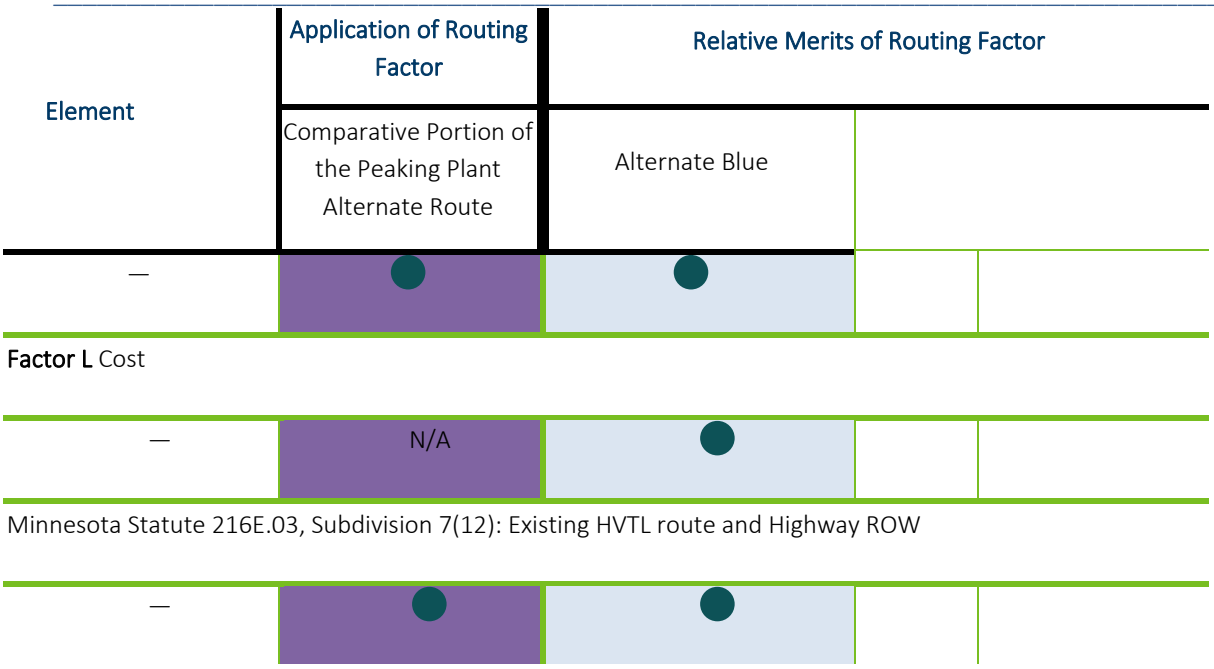


* Impacts to property values, on whole, are expected to be minimal to moderate and dissipate quickly at distances greater than 400 feet from the HVTL.

Table 8-4. Application of Routing Factors/Relative Merits of Routing Option
Comparative Portion of the Peaking Plant Alternate Route and Alternate Blue Route Segment

		Relative Merits of Routing Factor	
	Comparative Portion of the Peaking Plant Alternate Route		
Factor A Human Settlement			
Aesthetics	○	○	
Displacement	●	●	
Cultural Values	●	●	
Electric Interference	●	●	
Environmental	●	●	
Floodplains	●	●	
Land Use and Zoning	●	●	
	●	●	
	○	●	
Recreation	●	●	
Socioeconomics	●	●	
Airports	●	●	
Roads and Highways	●	●	
Utilities	●	●	
Factor B Public Safety			
EMF	●	●	
Emergency Services	●	●	
Induced Voltage	●	●	
Medical Devices	●	●	
Public Safety	●	●	
Stray Voltage	●	●	
Worker Safety	●	●	
Factor C Land Based Economies			

Element	Application of Routing Factor	Relative Merits of Routing Factor		
Agriculture	○	●		
Forestry	●	●		
Mining	●	●		
Tourism	●	●		
Factor D Archaeological and Historic Resources				
Archeological	●	●		
Historic	●	●		
Factor E Natural Resources				
Air Quality	●	●		
Climate Change	●	●		
Geology	●	●		
Groundwater	●	●		
Soils	○	●		
Surface Water	●	●		
Topography	●	●		
Vegetation	●	●		
Wetlands	●	●		
Wildlife and Habitat	●	●		
Factor F Rare and Unique Resources				
State and Federally Listed Species	●	●		
Rare and Unique Habitats	●	●		
Factor H Paralleling Existing ROW				
—	●	●		
Factor J Use of Existing Infrastructure				



8.3 Recommendations

The following summarizes mitigation techniques recommended by staff that are not part of the sample site permit or the sample route permit issued for the project. In addition to the techniques summarized below, the Commission could require that one third party agency monitor reporting directly to EERA staff monitor construction and restoration of the project. The costs for such a monitor could be borne by the applicant.

Agriculture

If the Peaking Plant Alternate Route is selected, the Alternate Blue Route will reduce pole structure placement through three parcels of land that currently farmed as one large tract. Alternate Blue Route would place the HVTL adjacent to an existing road road.

Rare and Unique Resources

If the applicant's proposed route is selected, the Commission could require construction and pole structure placement along 50th Avenue in Martin County avoid impacts to Cedar 2-3, a moderate ranked MBS Site of Biodiversity Significance, and the adjacent native prairie areas.

Any tree removal should avoid the active season (April 1-September 30) for the Northern long-eared bat. Ensuring construction and operation are consistent with USFWS guidance would minimize impacts to this species.

Wildlife Habitat

If the applicant's proposed route is selected, the Commission could require that construction and pole placement along the Cottonwood and Watonwan County borders avoid impacts to the existing CREP easement on the Cottonwood County side of the border.

8.4 Discussion

The following summarizes potential impacts to resource elements that are anticipated to vary across routing options, or those resource elements not previously discussed.

Aesthetics

All routing options will impact residences and recreational areas. The Alternate Yellow Route Segment will have reduced aesthetic impacts when compared to the associated segment of the applicant's proposed route.

Agriculture

Impacts to agriculture are expected to be minimal for all routing options; however, the Peaking Plant Alternate Route will have the most potential for disruption, due to the routing option cutting through large tract of farmland. Alternate Blue Route Segment would avoid this disruption of farming on multiple parcels of land.

Surface Waters

The comparative segments of the applicant's proposed route has less surface water crossings when compared to the Alternate Red and Alternate Yellow Route Segments.

Rare and Unique Natural Resources

The applicant's proposed route does cross a MNDNR SOBS of moderate value and associated native prairie areas. Construction and pole placement should be able to be completed in a manner that will avoid these habitats, but if not, the Crandall Alternate Route and Peaking Plant Alternate Route will avoid these habitat areas.

Floodplains

Alternate Red, Alternate Yellow, and Alternate Purple Route Segments all avoid crossing identified floodplains when compared to the comparative segment of the applicant's proposed route.

Property Values

The segment of the Peaking Plant Alternate Route that travels through the large tract of farmland north of 220th Street has the potential to impact property values, as the routing option could reduce the desirability of purchasing the land for farming. The Alternate Blue Route Segment could reduce the potential of these impacts.

Soils

The segment of the Peaking Plant Alternate Route that travels through the large tract of farmland north of 220th Street has the potential to impact soils, as the routing option would extend through lands currently used for agricultural production and there is no previous disturbance for construction activities. The Alternate Blue Route Segment could reduce the potential of these impacts, as it is located adjacent to an existing road ROW.

Paralleling

The applicant's proposed route, the Crandall Alternate Route, and Peaking Plant Alternate Route parallel existing infrastructure for the vast majority or all their length. All of Alternate Blue Route Segment parallels existing infrastructure. Alternate Red, Alternate Yellow, and Alternate Purple parallel less existing infrastructure than any of the comparative segments of the applicant's proposed route.

Use of existing infrastructures

The applicant's proposed route, the Crandall Alternate Route, and Peaking Plant Alternate Route parallel existing infrastructure for the vast majority or all their length. All of Alternate Blue Route Segment parallels existing infrastructure. Alternate Red, Alternate Yellow, and Alternate Purple parallel less existing infrastructure than any of the comparative segments of the applicant's proposed route.

Minnesota Statute 216E.03

The applicant's proposed route, the Crandall Alternate Route, and Peaking Plant Alternate Route parallel existing infrastructure for the vast majority or all their length. All of Alternate Blue Route Segment parallels existing infrastructure. Alternate Red, Alternate Yellow, and Alternate Purple parallel less existing infrastructure than any of the comparative segments of the applicant's proposed route.

No route segment follows an existing HVTL.

Notes

[i] Big Bend Wind, LLC. Initial Filing – Certificate of Need Application. November 9, 2020 eDocket ID# 202011-168164-03, 202011-168164-04, 202011-168164-05 [hereinafter Wind CN Application].

[ii] Big Bend Wind, LLC. Initial Filing – Site Permit Application and Appendices. November 9, 2020. eDocket ID# 202011-168170-02, 202011-168170-03, 202011-168170-04, 202011-168170-05, 202011-168170-06, 202011-168170-07, 202011-168170-08, 202011-168170-09, 202011-168170-10, 202011-168172-01, 202011-168172-02, 202011-68172-03, 202011-168172-04, 202011-168172-05, 202011-168172-06, 202011-168172-07, 202011-168172-08, 202011-168172-09, 202011-168173-01 [hereinafter Initial Wind SPA]

[iii] Big Bend Wind, LLC. Amended Site Permit Application and Appendices. September 20, 2021. eDocket ID# 20219-178365-02, 20219-178112-03, 20219-178112-04, 20219-178112-05, 20219-178112-06, 20219-178115-01, 20219-178115-02, 20219-178115-03, 20219-178115-04, 20219-178115-05, 20219-178115-06, 20219-178115-07, 20219-178117-01, 20219-178117-02, 20219-178117-03, 20219-178117-04, 20219-178117-05, 20219-178117-06, 20219-178117-07, 20219-178117-08, 20219-178117-09, 20219-178120-01, 20219-178120-02, 20219-178120-03, 20219-178120-04, 20219-178120-05, 20219-178120-06, 20219-178120-07, 20219-178125-07, 20219-178125-08, 20219-178125-09, 20219-178125-10, 20219-178127-01, 20219-178127-02 (hereinafter referred to as the Amended Wind SPA)

[iv] Big Bend Wind, LLC. Initial Filing – Route Permit Application and Appendices. November 9, 2020. eDocket ID# 202011-168176-02, 202011-168176-03, 202011-168176-04, 202011-168176-05, 202011-168176-06, 202011-168176-07, 202011-168176-10, 202011-168177-01, 202011-168177-02 and updated Appendix F. January 14, 2021 eDocket ID# 20211-169817-04 (hereinafter referred to as the RPA)

[v] Red Rock Solar, LLC. Initial Filing – Certificate of Need Application and Appendices. November 9, 2020. eDocket ID# 202011-168166-03, 202011-168166-04, 202011-168166-05

[vi] Red Rock Solar, LLC. Initial Filing – Site Permit Application and Appendices. November 9 and 10, 2020. eDocket ID# 202011-168174-02, 202011-168174-03, 202011-168174-04, 202011-168174-05, 202011-168174-06, 202011-168174-07, 202011-168174-08, 202011-168174-09, 202011-168174-10, 202011-168178-01, 202011-168178-03, 202011-168178-04 (hereinafter referred to as the Solar SPA)

[vii] Minn. Stat. 216E.03, subd. 7(a).
[viii] Minnesota Rule 7849.1200.
[ix] Minn. R. 7849.1500.
[x] Minn. Stat. 216E.03; Minn. R. 7850.1700-2700.
[xi] Minn. Stat. 216E.04; Minn. R. 7850.2800-3900.
[xii] Minn. Stat. 216E.04, subd. 2(8).
[xiii] Minn. Stat. 216E.04, subd. 5; Minn. R. 7850.3700, subp. 1.
[xiv] Applicants are free to elect the alternative process if their project qualifies for it.
[xv] Minn. Stat. 216E.04, subd. 5; Minn. R. 7850.3700, subp. 4.
[xvi] Minn. Stat. 216E.03; Minn. R. 7850.1700-2700.

[xvii] Minn. Stat. 216E.04; Minn. R. 7850.2800-3900.
[xviii] Minn. Stat. 216E.04, subd. 2(8).
[xix] Minn. Stat. 216E.04, subd. 5; Minn. R. 7850.3700, subp. 1.
[xx] Applicants are free to elect the alternative process if their project qualifies for it.
[xxi] Minn. Stat. 216E.04, subd. 5; Minn. R. 7850.3700, subp. 4.
[xxii] Minn. R. 7850.3800, subp. 4.
[xxiii] Why Treaties Matter (n.d.) *Relations: Dakota and Ojibwe Treaties*, retrieved from: http://treatiesmatter.org/relationships.
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projects.com/wp-content/uploads/2012/11/Chalmers-Appraisal-Journal-Article-Q2-2009-HVTLs-Proximity-Visibility-Encumbrance-Effects.pdf.

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[lxxv] See Jackson, Thomas and Pitts, Jennifer (2010) *The Effects of Electric Transmission Lines on Property Values: A Literature Review*, JOURNAL OF REAL ESTATE LITERATURE 18(2):239-259, retrieved from: http://www.real-analytics.com/Transmission%20Lines%20Lit%20Review.pdf; *see also* Kinnard and Dickey (1995).

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[lxxvii] *See* Electric Power Research Institute (November 2003), page 2-1 (stating "it is the nature of a questionnaire that by asking a question on a topic, the importance of that topic is highlighted").

[lxxviii] Chalmers and Voorvaart (2009), page 229-230.

[lxxix] Kinnard and Dickey (April 1995), page 25; Chalmers and Voorvaart (2009), page 228.

[lxxx] *See* Kinnard and Dickey (April 1995); *see also* Jackson and Pitts (2010).

[lxxxi] Chalmers and Voorvaart (2009) at page 228; Kinnard and Dickey (April 1995) at page 25 (a paired sales study involves an appraiser comparing the value of two similar properties, one of which is not impacted by an HVTL).

[lxxxii] Electric Power Research Institute (November 2003).

[lxxxiii] Chalmers and Voorvaart (2009).

[lxxxiv] Note: Count by distance; overlap exists. For example, if a residence is within 200 feet of all routing options it is counted four times—once for all segments. While duplicative, this eliminates potential for underestimating potential impacts.

[lxxxv] This paragraph is based, in part, on the following: Chalmers, James (October 30, 2019) *High Voltage Transmission Lines and Residential Property Values in New England PowerPoint Presentation*, retrieved from: https://www.nhmunicipal.org/sites/default/files/uploads/Annual_Conference/2019/Sessions/Wednesday/market_effects_of_utility_rows_presentation-1045am.pdf ; Department of Commerce (August 5, 2014) *Rights-of-way and Easements for Energy Facility Construction and Operation*, retrieved from: https://mn.gov/Commerce/energyfacilities/.

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[cxxv] *Id*., 48-49.

[cxxvi] Note: SSURGO data and NLCD data are unrelated. As used here, SSURGO data shows soil types; NLCD shows land cover types regardless of the underlying soil.

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