Public Utilities Commission
Route Permit Application for
a 345 kV Transmission Line

Plum Creek Wind Farm, LLC

Docket No. IP6997 / TL-18-701

GERONIMO® ENERGY

a nationalgrid company

PLUM CREEK WIND FARM

November 2019

Public Utilities Commission
Application for Route Permit for a
345 kV Transmission Line

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Cottonwood, Murray, and Redwood Counties, Minnesota

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Suite 725
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ACRONYM LIST

AADT	Annual Average Daily Traffic
ALJ	administrative law judge
AM	Amplitude Modulation
amp	ampere
Applicant	Plum Creek Wind Farm, LLC
Application	Route Permit Application
Application alignments	Proposed transmission line alignments within the Application segments.
Application segments	Four potential segments for the proposed 31-mile long 345 kV transmission line that are presented in Plum Creek Wind Farm, LLC's Route Permit Application.
AQI	Air Quality Index
ARMER	Allied Radio Matrix for Emergency Response
APLIC	Avian Power Line Interaction Committee
BMPs	best management practices
BWSR	Board of Soil and Water Resources
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	carbon monoxide
Commission	Minnesota Public Utilities Commission
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSAH	County State Aid Highway
CWA	Clean Water Act
CWI	County Well Index
dB	decibels
dBA	A-weighted decibels
DME Railroad	Dakota, Minnesota and Eastern Railroad
DOC-EERA	Department of Commerce, Energy and Environmental Review and Analysis
ECS	Ecological Classification System
EIS	environmental impact statement
EMF	electric and magnetic fields
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FM	Frequency Modulation
FPPA	Farmland Protection Policy Act
Geronimo	Geronimo Energy, LLC

GIS	Geographic Information System
GPS	Global Positioning System
HUC	Hydrologic Unit Code
HVTL Project	Plum Creek Wind Farm, LLC's proposed 345kV transmission line
IAAs	Impact assessment areas
IBA	Important Bird Area
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IPaC	Information for Planning and Conservation
ISD	Independent School District
kV	kilovolt
kV/m	kilovolts per meter
L_{10}	ten percent of an hour
L_{50}	fifty percent of an hour
LGU(s)	local government unit(s)
MBTA	Migratory Bird Treaty Act
MBS	Minnesota Biological Survey
mG	milliGauss
MDH	Minnesota Department of Health
MHz	megahertz
MNDNR	Minnesota Department of Natural Resources
MDA	Minnesota Department of Agriculture
MDPS	Minnesota Department of Public Safety
MNDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAC	noise area classifications
NAS	National Audubon Society
NESC	National Electric Safety Code
NHD	National Hydrography Dataset
NHIS	Natural Heritage Information System
NIEHS	National Institute of Environmental Health Sciences
NLCD	National Land Cover Database
NO_2	nitrogen dioxide
NPC	native plant community(ies)
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge

O_3	ozone
ORVW	outstanding resource value waters
OSA	Office of the State Archaeologist
Pb	lead
Plum Creek	Plum Creek Wind Farm, LLC
PM	particulate matter
PPSA	Power Plant Siting Act
PWI	Public Waters Inventory
RIM	Reinvest in Minnesota
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SOBS	Sites of Biodiversity Significance
SRDC	Southwest Regional Development Commission
SSA	sole source aquifer
SSI	Swedish Radiation Protection Authority
SSM	Swedish Radiation Safety Authority
SSURGO	U.S. Department of Agriculture Soil Survey Geographic Database
SWPPP	Stormwater Pollution Prevention Plan
TMDL	total maximum daily load
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USG	unhealthy for sensitive groups
USGS	U.S. Geological Survey
USC	U.S. Code
WEG	Wind Erodibility Group
WHO	World Health Organization
WHPA	Wellhead Protection Area
Wind Farm	Plum Creek Wind Farm
WMA	Wildlife Management Area
WNS	white-nose syndrome
WPA	Waterfowl Production Area

1.0 INTRODUCTION

Plum Creek Wind Farm, LLC (Plum Creek or Applicant), an affiliate of Geronimo Energy, LLC, a National Grid Company (Geronimo), is proposing the up-to-414 megawatt (MW) Plum Creek Wind Farm (Wind Farm) in Cottonwood, Murray, and Redwood Counties, Minnesota, and an associated 345 kilovolt (kV) high-voltage transmission line (the HVTL Project or Project). Plum Creek submits this application for a Route Permit (Application) to the Minnesota Public Utilities Commission (MPUC or Commission) pursuant to Minn. Stat. § 216E and Minn. R. Ch. 7850. The Route Permit Application Completeness Checklist is provided in Appendix A.

Plum Creek requests permission to construct and operate the HVTL Project, an approximately 31-mile-long 345-kV transmission line and associated facilities, to connect the Wind Farm to the existing Brookings-to-Hampton 345-kV transmission line in Redwood County, Minnesota. The transmission line will be single-circuit. The Project will also require a Switching Station to connect the proposed transmission line to the existing Brookings-to-Hampton 345-kV transmission line.

There are two route segment options, the Green and Yellow Segments, each approximately five miles in length, that connect the Wind Farm Collector 1 Substation and Wind Farm Collector 2 Substation. There are also two route segment options, the Blue and Red Segments, each approximately 26 miles in length, that connect the Wind Farm Collector 2 Substation and the proposed Switching Station. The four route segments presented in this Application are those Plum Creek has identified through a comprehensive review and analysis of engineering options, environmental conditions, and socioeconomic considerations, with an objective to minimize impacts on the environment and affected landowners while meeting the HVTL Project's requirements. For end-to-end routes, Plum Creek proposes the Green/Blue and Yellow/Red combinations. The comparative potential impacts of the Green/Blue and Yellow/Red Routes are provided in Appendix B.

1.1 HVTL Project Ownership

The HVTL Project will be owned by Plum Creek Wind Farm, LLC.

1.2 Permittee

The permittee for the HVTL Project will be:

Plum Creek Wind Farm, LLC
7650 Edinborough Way, Suite 725
Edina, MN 55435

The contact persons regarding the Application are:

Melissa Schmit and Jenny Monson-Miller
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1.3 Certificate of Need Process

Minnesota Statute section 216B.243 states that a Certificate of Need is required for a "large energy facility," defined in Minn. Stat. § 216B.2421 as "any electric power generating plant or combination of plants at a single site with a combined capacity of 50,000 kilowatts or more and transmission lines directly associated with the plant that are necessary to interconnect the plant to the transmission system;" and "any high-voltage transmission line with a capacity of 200 kilovolts or more and greater than 1,500 feet in length."[1] Plum Creek filed an application for a Certificate of Need to construct the Wind Farm and the HVTL Project on November 8, 2019. The application is available in Docket No. IP6997/CN-18-699.

1.4 State Routing Process

This Application is submitted under the full permitting process set forth by Minnesota law, specifically, Minn. Stat. § 216E.03 and Minn. R. Ch. 7850.1700 to 7850.2700 and 7850.4000 to 7850.4400. The applicable statutes and rules require, in addition to other information, that an applicant provide at least two proposed routes in its Application, and neither of the proposed routes may be designated as a preferred route and all must be designated as alternatives.[2] A "route" is defined in Minnesota statutes as "the location of a high voltage transmission line between two end points . . . [with] a variable width of up to 1.25 miles."[3]

In this Route Permit proceeding, the Commission staff, the Department of Commerce, Energy and Environmental Review and Analysis (DOC-EERA) staff, and an administrative law judge (ALJ) will oversee evaluation and review of the proposed routes and the gathering of input from agencies, local government units (LGUs), and the public.

[1] Minn. Stat. § 216B.2421, subds. 2(1), and 2(2).
[2] Minn. Stat. § 216E.03, subd. 3; Minn. R. Ch. 7850.1900, subp. 2(C).
[3] Minn. Stat. § 216E.01, subd. 8; *see also* Minn. R. Ch. 7850.1000, subp. 16.

After the Commission finds the Application complete, the Commission and DOC-EERA will hold a public meeting during which members of the public may ask questions about the HVTL Project and comment on the scope of the environmental impact statement (EIS). Notice of the meeting will be published in the newspaper and will be provided to stakeholders in the HTVL Project Study Area and those on the HVTL Project Contact List. Interested parties may sign up for the HVTL Project Contact List by contacting the Commission at docketing.puc@state.mn.us or 651.201.2204 (1.800.657.3782).

At this public information/scoping meeting, and throughout a comment period after the meeting, DOC-EERA will gather information from stakeholders on potential routes, impacts and mitigation measures that should be evaluated in the EIS. DOC-EERA will recommend to the Commission those impacts and mitigation measures, including routes and route alternatives, that it believes should be evaluated in the EIS. The Commission will issue a "Scoping Decision" that identifies the routes, impacts and mitigation measures to be evaluated in the EIS. DOC-EERA will issue a Draft EIS and hold meetings in the HTVL Project Study Area to gather comments on the content of the Draft EIS. After these meetings, DOC-EERA will issue a Final EIS.

In addition to a Draft and Final EIS, public hearings on the HVTL Project will be held. The public will be invited to make comments on the HVTL Project at these hearings before an ALJ. After the hearings, the ALJ will provide a period during which stakeholders can submit written comments on the HVTL Project. Additionally, the ALJ will receive briefs from Plum Creek and other parties to the proceeding. The ALJ will review this Application, the EIS, briefs, and comments received during the public hearings and, following the comment period, will prepare findings of fact, conclusions of law, and recommendations for the Commission. During an open meeting, the Commission will deliberate and make a decision as to whether to grant a Certificate of Need for the Wind Farm and HVTL Project and, if granted, the route for the HVTL Project, using the criteria set forth in Minn. Stat. § 216E.03, subd. 7(b), and Minn. R. Ch. 7850.4100 to guide its decision.

1.5 Request for Joint Proceeding with Certificate of Need Application

As described above, Plum Creek has applied for a Certificate of Need for the Wind Farm and HVTL Project in Docket No. IP6997/CN-18-699. Minnesota Statute section 216B.243, subdivision 4 and Minnesota Rule 7849.1900, subpart 4 permit the Commission to hold joint proceedings for the Certificate of Need and Route Permit in circumstances where a joint hearing is feasible, more efficient, and may further the public interest.

Plum Creek respectfully requests that the Commission order a joint regulatory review process for the Route Permit, Site Permit, and Certificate of Need applications. Holding a joint proceeding is in the public interest because it will make it easier for members of the public to participate in the proceedings, provide a comprehensive record of all benefits, impacts and minimization measures related to the Wind Farm and HVTL Project and improve administrative efficiency.

2.0 HVTL PROJECT INFORMATION

2.1 HVTL Project Proposal

Plum Creek is currently developing an up-to-414-MW Wind Farm in Cottonwood, Murray, and Redwood Counties, Minnesota. Plum Creek is proposing to build a new 345 kV transmission line and associated facilities to connect the Wind Farm to the existing Brookings-to-Hampton 345-kV transmission line in Redwood County, Minnesota.

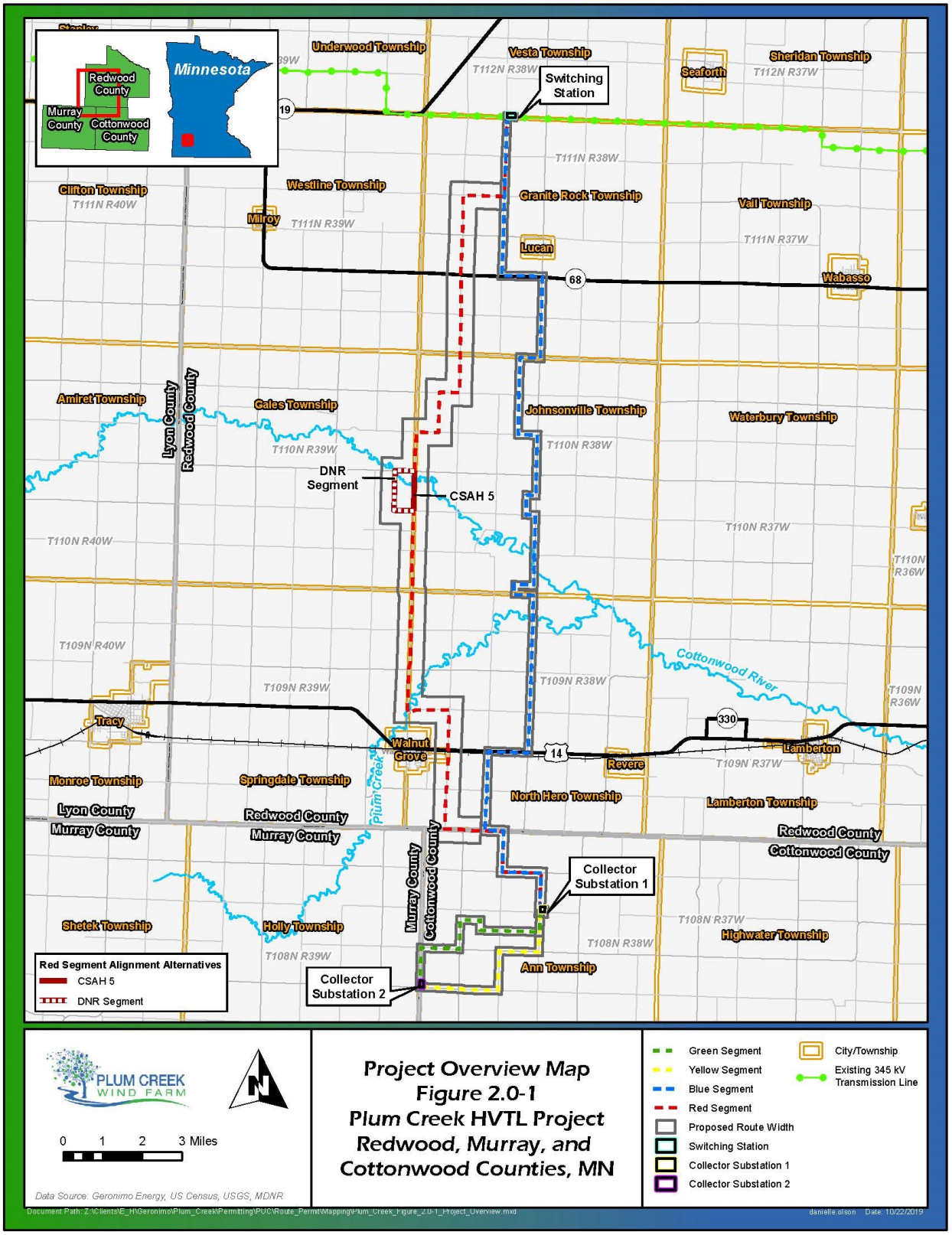
The HVTL Project will begin at a new Wind Farm collector substation (Collector Substation 2) to be constructed in Ann Township of northwestern Cottonwood County, then travel generally north and east for approximately five miles to connect to a second Wind Farm collector substation (Collector Substation 1) also in Ann Township. Details regarding the two Wind Farm collector substations is provided in Plum Creek's Wind Farm Site Permit Application, available in Docket No. IP6997/WS-18-700. The HVTL Project will then connect Collector Substation 1 to the proposed Switching Station approximately 26 miles to the north. The collector substations will be permitted with the Wind Farm because they are essential components to the wind facility; that is, the wind facility cannot operate without the collector substations. The Switching Station will be constructed by the transmission owner to connect the proposed transmission line to the existing Brookings to Hampton 345 kV transmission line. The transmission owner will be separately permitting the Switching Station through Redwood County.

Plum Creek identified two potential route segments between Collector Substation 2 and Collector Substation 1 (the Green and Yellow Segments) and two potential route segments between Collector Substation 1 and the Switching Station (the Blue and Red Segments); the four potential segments for the new 345-kV line are described below (refer to Figure 2.0-1). These proposed segments traverse Cottonwood, Murray, and Redwood Counties. The length of the HVTL Project will be approximately 31 miles, depending on which segments are selected by the Commission. As noted in Section 1.0, for end-to-end routes, Plum Creek proposes the Green/Blue and Yellow/Red combinations. Figure 2.0-1 shows an illustrative overview of the HVTL Project and Appendix C includes detailed aerial maps of the four segments described in this Application. The comparative potential impacts of the Green/Blue and Yellow/Red Routes are provided in Appendix B.

Each segment generally follows a unique corridor for the majority of its length. However, there are three shared corridors. Of the approximately 31 miles of total route length, approximately six miles are within shared corridors. One area is as segments enter and exit Collector Substation 1 and the Switching Station. Similarly, the Green and Yellow Segments share the same corridor for the last 0.5 mile of their path before connecting to Collector Substation 1. Additionally, the Blue and Red Segments use the same corridor as the transmission line exits Wind Farm Collector Substation 1 and heads west and north. These first 3.5 miles of the Blue and Red Segments are also within the Wind Farm boundary and Redwood County before they diverge and take separate paths. Lastly, two miles of the Blue and Red Segments follow a shared corridor prior to entering the proposed Switching Station near where the common segment intersects with the Brookings-to-Hampton 345-kV transmission line.

The four segments were developed based on the routing criteria and voluntary landowner participation in the HVTL Project. Where the Green and Yellow Segments do not share a corridor, they parallel each other running north and east at a distance of 0.5 to 1.0 miles apart. Where the Blue and Red Segments do not share a corridor, they parallel each other running generally north at a distance of one to 3.5 miles apart. All of the proposed segments traverse predominately cultivated crop lands in Cottonwood, Murray, and Redwood counties, utilizing roads and parcel lines and accounting for landowner preferences for the anticipated alignments. The Green Segment combined with the Blue Segment is slightly shorter and offers the most direct path between the Wind Farm collector substations and the Switching Station.

Refer to Section 4.0 for more detailed description of each proposed segment.


Minnesota
Redwood County
Murray County
Cottonwood County
Underwood Township
Vesta Township
Sheridan Township
Seaforth
Switching Station
T112N R38W
T112N R37W
T111N R38W
Clifton Township
T111N R40W
Westline Township
Milroy
T111N R39W
Granite Rock Township
Vail Township
T111N R37W
Lucan
Wabasso
Amiret Township
Lyon County
Redwood County
Gales Township
Johnsonville Township
Waterbury Township
T110N R39W
T110N R38W
DNR Segment
CSAH 5
T110N R40W
T110N R37W
T110N R36W
T109N R40W
Cottonwood River
T109N R39W
T109N R38W
T109N R36W
Tracy
Walnut Grove
Revere
Lamberton
T109N R37W
Monroe Township
Springdale Township
Plum Creek
North Hero Township
Lamberton Township
Lyon County
Murray County
Redwood County
Murray County
Redwood County
Cottonwood County
Collector Substation 1
Shetek Township
Holly Township
Murray County
Cottonwood County
T108N R37W
Highwater Township
T108N R39W
T108N R38W
Ann Township
Collector Substation 2
Red Segment Alignment Alternatives
CSAH 5
DNR Segment
PLUM CREEK WIND FARM
0 1 2 3 Miles
Data Source: Geronimo Energy, US Census, USGS, MDNR
Project Overview Map
Figure 2.0-1
Plum Creek HVTL Project
Redwood, Murray, and
Cottonwood Counties, MN
Green Segment
Yellow Segment
Blue Segment
Red Segment
Proposed Route Width
Switching Station
Collector Substation 1
Collector Substation 2
City/Township
Existing 345 kV Transmission Line
Document Path: Z:\Clients\E_H\Geronimo\Plum_Creek\Permitting\PUC\Route_Permit\Mapping\Plum_Creek_Figure_2.0-1_Project_Overview.mxd
danielle.olson Date: 10/22/2019

2.2 Route Width

The Power Plant Siting Act (PPSA), Minn. Stat. § 216E, directs the routing of transmission lines in a way that "minimize[s] adverse human and environmental impact while ensuring continuing electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion." The PPSA further authorizes the Commission to meet its routing responsibility by designating a "route" for a new transmission line when it issues a Route Permit. A "route" may have "a variable width of up to 1.25 miles," within which the right-of-way for the transmission facilities can be located.

A route should be wide enough to provide flexibility for the permittee to work with landowners to address concerns and to address engineering issues that may arise after a Route Permit is issued. Once a route is established by the Commission, the permittee then does more detailed engineering and survey work and obtains input from landowners to establish a final alignment and pole placement.

Once the permittee establishes a final alignment and structure placement, proposed construction drawings are provided to the Commission in the form of a "Plan and Profile" compliance filing so the Commission can confirm that the permittee's plans are consistent with the Route Permit.

Given the Commission's practice to identify an "anticipated alignment" in its Route Permit decisions, Plum Creek has developed what it currently believes to be the likely alignments within each route segment that minimize the overall potential impacts based on the routing factors identified in Minn. Stat. § 216E.03, subd. 7(b), and Minn. R. Ch. 7850.4100. These alignments are referred to as the "Application alignments." These Application alignments may require modifications after a Route Permit is issued due to limitations inherent in identifying an alignment absent detailed survey and engineering work, site review, and design. The Application alignments that were developed for purposes of evaluating the potential impacts of each segment are available on the detailed maps in Appendix C. Plum Creek completed a preliminary design for each segment based on the information known at the time of the filing of this Application.

After the Commission issues a Route Permit decision with an "anticipated alignment," a final alignment will be developed by reviewing that "anticipated alignment" with individual landowners and agencies with permitting responsibilities and performing detailed survey and engineering work, site review, and design. The final alignment will be provided to the Commission through the Plan and Profile submission and review process discussed above. As part of that submission, Plum Creek will inform the Commission as to where deviations in the final alignment from the "anticipated alignment" occur.

Existing transmission lines, roads, property boundaries, field lines, fence lines, and other routing opportunities are typically found in quarter-mile intervals in the land use settings in the HVTL Project Study Area (*see* Section 3.2.2 for a description of the HVTL Project Study Area). Plum Creek proposes the Green, Yellow, and Blue Segments to have a route width of 1,000 feet for their entire length. Plum Creek proposes a route width of two-thirds of a mile for the majority of the Red Segment. Plum Creek identified multiple alignment options within the Red Segment route width, such as those that run along field lines, roads, and property lines that could be used as part of a new transmission line corridor. Plum Creek generally requests a wider route width on

the Red Segment to increase flexibility in obtaining land rights for the HVTL Project. Where the proposed segments share a corridor, the route width is proposed at 1,000 feet. For the Green, Yellow, and Blue Segments, where the route follows a road, the Application alignment is indicative of voluntary easements on at least one side of a road; Plum Creek has not necessarily secured voluntary easements within the route width along both sides of a road. While the Red Segment has voluntary easements for approximately 70 percent of its length, Plum Creek requests the wider route width outside of shared corridors with the Blue Segment for routing flexibility leading up to and away from areas already signed.

Along the Red Segment, Plum Creek requests a wider route width of 6,250 feet (1.2 miles) for 1.7 miles near the intersection of County State Aid Highway (CSAH) 5 and CSAH 4 and the Cottonwood River to provide routing flexibility crossing the Cottonwood River and its associated floodplain and wetlands. The Red Segment alignment displayed on the detail map in Appendix C, Page 2 was requested by the MNDNR. Plum Creek has not, however, been able to secure voluntary easements along this alignment and therefore requests the wider route width that includes routing potential along CSAH 5 in this location. Plum Creek has met with Cottonwood and Murray Counties and MnDOT to review the Application Alignments.

Based on agency feedback, Plum Creek analyzed two potential alignments within this wider route width: the CSAH 5 Alignment Alternative and the MNDNR Alignment Alternative. The CSAH 5 Alignment Alternative is approximately one mile in length and parallels the western side of CSAH 5 between 180th Street and CSAH 4. The MNDNR Alignment Alternative is approximately two miles in length and parallels property lines and roads. A comparison of the CSAH 5 Alignment Alternative and the MNDNR Alignment Alternative along the Red Segment is presented in Appendix D. Throughout the rest of this Application, Plum Creek depicts the MNDNR Alignment Alternative as the Red Segment Alignment and right-of-way for analysis.

2.3 Transmission Structure and Conductor Design

The new 345 kV transmission line would be constructed of custom steel single-pole (monopole) structures. Plum Creek will implement four types of monopole structures: tangent, small angle, heavy angle, and dead end. These structures are typically used in the following situations:

- Tangent – structures that support straight or nearly straight runs of conductor;
- Small Angle – structures that turn the conductor approximately 2 to 30 degrees;
- Heavy Angle – structures that turn the conductor approximately 30 to 60 degrees; and
- Dead End – structures that turn the conductor approximately 60 to 90 degrees or take the full tension of the line in one direction.

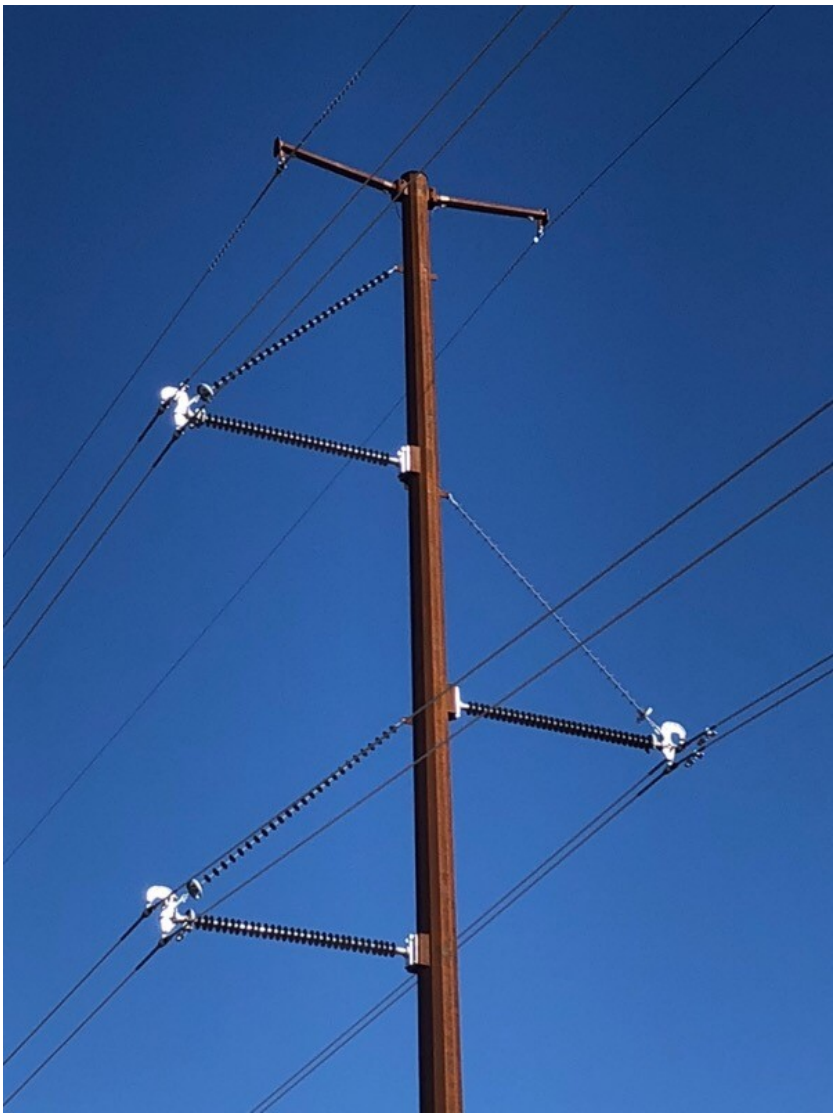
The proposed structures will range in height from approximately 110 feet to 125 feet tall. The typical spans between structures will be about 650 feet. Generally, tangent structures will be directly embedded; angled and dead-end structures will have concrete foundations between 18 and 45 feet deep, depending on soil conditions, geotechnical analysis, and the structures' function (i.e., heavy-angle and dead-end structures typically require deeper foundations). Table 2.3-1 summarizes the four typical monopole structure designs for the line. Specialty structures, such as H-frame structures, may be required in certain situations such as longer spans to avoid environmentally sensitive resources including wetlands complexes.

Table 2.3-1
Typical Structure Design Summary

Structure Type	Structure Material	Typical Right-of-way Width (feet)	Structure Height (feet)	Structure Base Diameter (inches)	Foundation Diameter (feet)	Average Span Between Structures (feet)
Tangent	Steel	150	125	80	N/A	650
Small Angle	Steel	150	120	80	8	650
Heavy Angle	Steel	150	115	80	9	650
Dead End	Steel	150	110	80	9	650

Figure 2.3-1 provide photos of typical single-circuit monopole structures that Plum Creek proposes to use for this HVTL Project. All four proposed structure types are monopole structures that differ in the conductor angles. Technical diagrams of these four proposed structure types are included in Appendix E.

Figure 2.3-1 Photo of Typical Single-Circuit Monopole 345 kV Structure



The conductors for the 345-kV transmission line will consist of either 2-bundled "Cardinal" (954 kcmil) or 2-bundled "Bittern" (1,272 kcmil) Aluminum Conductor Steel Reinforced cables, or cables with comparable capacity. The 345-kV conductors will have a capacity equal or greater to 1,992 amperes (amps).

The proposed transmission line will be designed to meet or surpass relevant local and state codes including the National Electric Safety Code (NESC) standards. Applicable standards will be met for construction and installation, and applicable safety procedures will be followed during design, construction, and after installation

2.4 Transmission Line Right-of-Way

Plum Creek anticipates constructing the new single-circuit 345-kV transmission line and structures using a design and span lengths that require a 150-foot-wide right-of-way. When

paralleling existing road rights-of-way, Plum Creek proposes to place poles on adjacent private property, within approximately 10 feet of the existing road right-of-way. These pole placements allow the transmission line right-of-way to share existing road rights-of-way to the greatest extent feasible and will reduce the overall size of the easement required from the private landowner along roads. Pole placement and offset distances may vary in areas such as highway interchanges due to county or state design requirements and in areas of planned future road expansion.

2.5 Switching Station

The interconnecting utility will construct a Switching Station that will tie-in the Plum Creek Wind Farm to the existing electrical grid (Figure 4.0-1). The Switching Station will require a construction workspace of approximately 15.0 acres, with the final fenced-in area anticipated to be approximately 500 feet by 500 feet. Because the Switching Station will be constructed by the interconnecting utility, the exact location and size of the fenced in area is pending. For the purposes of this Application, Plum Creek conservatively assumed permanent impacts to the 15.0-acre construction workspace. The Switching Station components will be mounted on concrete pads. For electrical and fire safety, the Switching Station will be graveled to maintain the area free of vegetation. The area will be fenced to prevent unauthorized entry by individuals and wildlife. Once construction is complete, the Switching Station will be maintained and operated by the interconnecting utility.

2.6 HVTL Project Schedule

An anticipated permitting and construction schedule for the HVTL Project is provided in Table 2.6-1. This schedule is based on information known as of the date of filing and may be subject to change as further information develops or if there are delays in obtaining the necessary federal, state, or local approvals that are required prior to construction.

Table 2.6-1
Anticipated HVTL Project Schedule

Activity	Estimated Activity Dates
Minnesota Certificate of Need and Route Permit Issued	Q1 2021
Survey and Transmission Line Design Begins	Q4 2020
Minnesota Certificate of Need and Route Permit Issued	Q1 2021
Other Federal, State, and Local Permits Issued	Q4 2020
Start Right-of-Way Clearing	Q1 2021
Start HVTL Project Construction	Q2 2021
HVTL Project In-Service	Q3 2022

2.7 HVTL Project Costs

For purposes of this Application, Plum Creek developed design-specific route and structure cost estimates for the HVTL Project.

Table 2.7-1 provides total HVTL Project costs for each of Plum Creek's proposed segment and design alternatives. These costs include all transmission line costs (including materials, associated construction, permitting and design costs, and risk assessment contingencies), and right-of-way costs. The costs in Table 2.7-1 include both 2019 dollar costs and costs escalated to the year a particular cost is anticipated to be incurred. Refer to Chapter 2 of the Certificate of Need application (Docket No. IP6997/CN-18-699) for more detailed information on the Plum Creek's cost analysis.

Table 2.7-1
Total HVTL Project Costs

Segment	Costs	
	2019$	$ escalated to anticipated year spend
Green Segment	$4,642,000	$5,060,000
Yellow Segment	$4,220,000	$4,600,000
Blue Segment	$23,000,000	$25,070,000
Red Segment	$23,300,000	$25,397,000

2.8 Design Options to Accommodate Future Expansion

The Wind Farm is proposed to be up to 414 MW and the outlet provided by the HVTL Project allows for future expansion of generation in the area. This allowance appropriately capitalizes on the construction of the HVTL Project and minimizes environmental impacts. Additionally, the HVTL Project would be added to the local and regional transmission network, potentially providing a more robust outlet to a broader geographic area.

3.0 ROUTE SELECTION PROCESS

Plum Creek conducted a thorough and systematic route selection process beginning in late 2017 and extending into 2019. This process included consideration of statutory and rule requirements, information gathering, landowner outreach and input, and comparison of route segments and alignments. Additionally, Plum Creek met with federal, state, and local agencies, including county departments, as part of the outreach program for the HVTL Project. Plum Creek developed a Geographic Information System (GIS) database that contained information gathered from publicly available data resources and from on-site field review efforts. Segments were iteratively refined based on agency and public input. This process resulted in the identification of the four segments presented in this Application.

3.1 Summary of Statutory and Rule Factors

The criteria for route development are set forth in Minn. Stat.§ 216E.03, subd. 7, and Minn. R. Ch. 7850.4100. These criteria directed Plum Creek's route development process in addition to landowner willingness to sign voluntary easements. These criteria guide the Commission's decision when selecting a route for a high voltage transmission line.

Minnesota Statutes section 216E.03, subdivision 7(a) provides that the Commission's route permit determinations "must be guided by the state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric energy security through efficient, cost-effective power supply and electric transmission infrastructure." Subdivision 7(e) of the same section requires the Commission to "make specific findings that it has considered locating a route for a high-voltage transmission line on an existing high-voltage transmission route and the use of parallel existing highway right-of-way and, to the extent those are not used for the route, the Commission must state the reasons."

In addition to the statutory criteria noted above, Minn. Stat. § 216E.03, subd. 7(b) and Minn. R. Ch. 7850.4100 provide a non-exclusive list of factors the Commission will consider in determining whether to issue a route permit for a high voltage transmission line. These factors are:

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.

Plum Creek was guided by the statutory and rule factors as well as landowner preference to develop the segments proposed in this Application. Plum Creek has been working to acquire voluntary easements for the Application segments since February 2018. Plum Creek has met with approximately 125 landowners across the HVTL Project Study Area. For the Green and Yellow Segments within the Wind Farm, Plum Creek has sited these segments on wind easements, which also allow for siting of transmission lines and poles. However, Plum Creek is currently coordinating with landowners to secure transmission-specific easements along these segments. At the time of this Application, Plum Creek has secured 100 percent of the total necessary private easements on the Blue Segment and 70 percent of the total necessary easements on the Red Segment. Plum Creek will continue to attempt to secure remaining voluntary easements for the Red Segment.

3.2 Route Development Process

Plum Creek utilized a year-long systematic process of identifying, refining, and comparing route options to arrive at the four proposed segments. The following steps were taken as part of this process:

- Identify Potential Termini for Segments
- Establish Boundaries for HVTL Project Study Area
- Identify Opportunities and Constraints
- Hold Public Open House and Individual Landowner Meetings
- Conduct Initial Agency Outreach
- Refine Segments

The following sections summarize the route development process.

3.2.1 HVTL Project Termini

As previously mentioned in Sections 1.0 and 2.1, the end-to-end Project termini are the Collector Substation 1 within the Wind Farm and the Switching Station approximately 22 miles north, with a connection to Collector Substation 2, also within the Wind Farm. The two Wind Farm collector substations will be permitted as part of the Site Permit Application for the Plum Creek Wind Farm (Docket No. IP6997/WS-18-700). Plum Creek selected the Project substation locations based on landowner willingness to host the facilities, access within the Wind Farm, facility constructability, environmental suitability, to minimize losses, and to optimize the electrical layout associated with the Wind Farm.

The Switching Station location was selected based on its proximity to the existing Brooking-to-Hampton 345-kV transmission line, landowner willingness to host the facility, constructability, and environmental suitability. The location was also selected to provide a direct route to connect the Wind Farm to the existing transmission system as the proposed Switching Station is directly north of the Wind Farm. Additionally, the Switching Station is sited to avoid Wildlife Management Areas (WMAs) along the Brookings-to-Hampton 345-kV transmission line approximately three to five miles east of its proposed location. To the west of the proposed Switching Station, the Brookings-to-Hampton line is further north, which would require a longer line and more impacts as a function of distance. More details on the Switching Station are provided in Section 2.5.

3.2.2 HVTL Project Study Area

The HVTL Project Study Area was developed to include an area large enough to accommodate a reasonable number of segment options to connect the proposed Plum Creek Wind Farm to the existing Brookings-to-Hampton 345-kV transmission line approximately 20 miles to the north. The HVTL Project Study Area is approximately 22 miles long (north-south) and up to six miles wide (east-west) and includes the three facilities for which the proposed transmission line would connect: Collector Substation 2, Collector Substation 1, and the Switching Station. The purpose of identifying a HVTL Project Study Area for the HVTL Project was to establish boundaries and limits for landowner outreach for voluntary easements, the information-gathering process (e.g., identifying environmental and land use resources, routing constraints, and routing opportunities), and the subsequent development of segment options for the HVTL Project.

The collector substations are located within the Wind Farm such that they optimize the electrical system connecting the wind turbines. The HVTL Project Study Area includes more than one mile on either side of Collector Substation 1 and Collector Substation 2 to allow routing flexibility exiting these substations. Because the proposed point of interconnection is on the north end of the proposed transmission line, Collector Substation 2, which is the southernmost point of the transmission line, forms the southern boundary of the Study Area. Similarly, the existing Brookings-to-Hampton 345-kV transmission line for which the Project will interconnect to, is the northern boundary of the HVTL Project Study Area. The HVTL Project Study Area is up to six miles wide to allow room for development of distinct segments that are efficient in length; that is, they are direct segments connecting the collector substations to the Switching Station without excessive mileage that inherently adds impacts. For example, the segments do not travel a few miles in one direction only to travel back in the original direction several miles

later. Additionally, the HVTL Project Study Area is not wider because this four- to six-mile width is sited such that it avoids a higher density of WMAs within 3.5 miles east of the HVTL Project Study Area and higher densities of MNDNR-mapped native prairie and sites of biodiversity significance within four miles on the west side of the HVTL Project Study Area (*see* Figure 3.2-1).

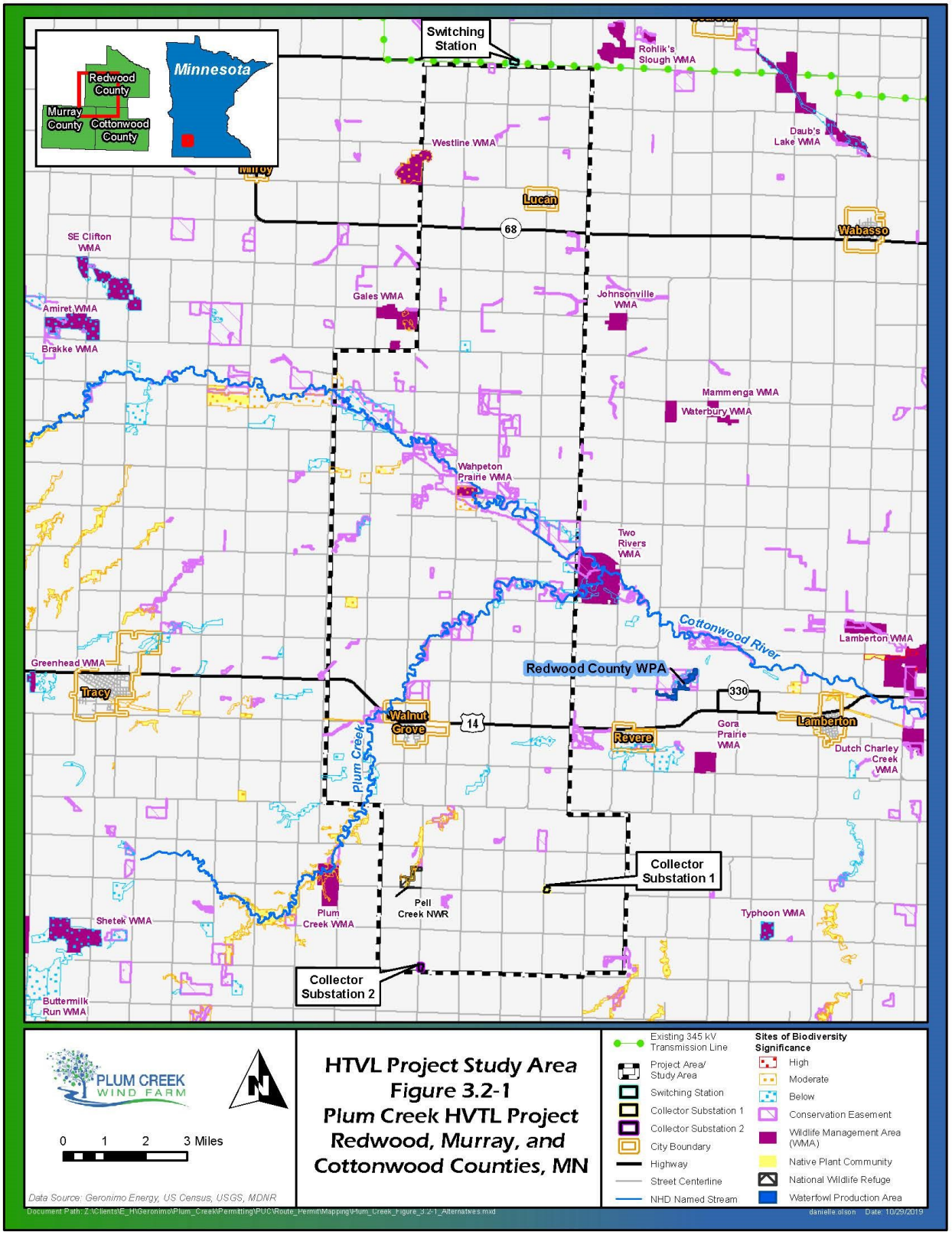
The HVTL Project Study Area became the HVTL Project Notice Area for the Certificate of Need process.

3.2.1 Routing Opportunities and Constraints

After establishing a HVTL Project Study Area, the next step was to identify potential routes and route segments. To identify route segments that minimized impacts to humans and the environment, Plum Creek identified routing opportunities and constraints within the HVTL Project Study Area. To minimize impacts on the environment and affected landowners, Plum Creek looked for routing opportunities that would share existing rights-of-way along road and railroad rights-of-way and field and section lines.

Plum Creek also examined the HVTL Project Study Area to identify routing constraints that should be avoided as practicable (e.g., airports, WMAs, Waterfowl Production Areas (WPAs), cities and towns, and lakes). Where these features were present, Plum Creek did not propose route segments. Furthermore, Plum Creek prioritized crossing the Cottonwood River and its associated floodplain and wetlands with an existing road so as not to create a new greenfield corridor. Within the HVTL Project Study Area, only two roads cross the Cottonwood River in a north-south direction, CSAHs 10 and 5, along both of which Plum Creek has proposed Blue and Red Segment alternatives. This routing factor alone helped drive initial segment placement within the 3 to 5 miles leading up to and away from the Cottonwood River. Beyond this waterbody crossing, the landscape is relatively homogeneous with agricultural lands and rural farmsteads.

After initial high-level routing opportunities and constraints were identified, Plum Creek hosted an open house to inform landowners about the HVTL Project, obtain potential routing concerns from landowners based on their knowledge of the area, and gauge landowner interest in signing a voluntary easement.


Switching Station
Rohlik's Slough WMA
Daub's Lake WMA
Westline WMA
Murray
Lucan
68
Wabasso
SE Clifton WMA
Amiret WMA
Brakke WMA
Gales WMA
Johnsonville WMA
Mammenga WMA
Waterbury WMA
Wahpeton Prairie WMA
Two Rivers WMA
Cottonwood River
Lamberton WMA
Greenhead WMA
Tracy
Redwood County WPA
330
Walnut Grove
14
Revere
Gora Prairie WMA
Lamberton
Dutch Charley Creek WMA
Plum Creek
Collector Substation 1
Pell Creek NWR
Plum Creek WMA
Shetek WMA
Typhoon WMA
Collector Substation 2
Buttermilk Run WMA
Redwood County
Murray County
Cottonwood County
Minnesota
PLUM CREEK WIND FARM
N
0 1 2 3 Miles
HTVL Project Study Area
Figure 3.2-1
Plum Creek HVTL Project
Redwood, Murray, and
Cottonwood Counties, MN
Existing 345 kV Transmission Line
Project Area/ Study Area
Switching Station
Collector Substation 1
Collector Substation 2
City Boundary
Highway
Street Centerline
NHD Named Stream
Sites of Biodiversity Significance
High
Moderate
Below
Conservation Easement
Wildlife Management Area (WMA)
Native Plant Community
National Wildlife Refuge
Waterfowl Production Area
Data Source: Geronimo Energy, US Census, USGS, MDNR
Document Path: Z:\Clients\E_H\Geronimo\Plum_Creek\Permitting\PUC\Route_Permit\Mapping\Plum_Creek_Figure_3.2-1_Alternatives.mxd
danielle.olson Date: 10/23/2019

3.2.2 Public Open House Meetings

Plum Creek hosted an initial open house to inform landowners and initiate the route acquisition process for the transmission line on February 15, 2018. The meeting was attended by approximately 45 people. The response from landowners was positive or neutral with discussion focused on the easement acquisition process, the location of the route, pole structure type and sizing, and minimizing human and environmental impacts.

At the initial open house, landowners identified one avoidance area along the Cottonwood River. This avoidance area covers approximately 850 acres and is used by local families for recreation (i.e., camping, fishing, and four-wheeling). Plum Creek added this constraint to its mapping and routed potential routes around this feature. More information on this local recreation area is described in Section 6.2.8.

An additional open house for LGUs and landowners within the HVTL Project Study Area was held on May 23, 2019. Approximately 50 people from the HVTL Project Study Area attended the event. Comments from the public were generally positive or neutral. Most questions were focused on the routes the transmission line could take, and what that meant for a given person's ability to participate in the HVTL Project, viewshed, community, etc.

3.2.3 Initial Agency Outreach

Following development of the HVTL Project Study Area, identifying routing opportunities and constraints, and soliciting landowner input, Plum Creek held meetings with various federal, state, county, and local agencies (e.g., MNDNR, U.S. Fish and Wildlife Service [USFWS], and various county and local administrators). The purpose of these meetings was to gather feedback on the initial routes and identify potential concerns. More details of the discussions with agency and county staff may be found in Section 7.0 of this Application.

3.3 Route Refinement and Route Adjustment Process

After the data was compiled and initial public and agency outreach was completed, Plum Creek continued to develop alternative segments between the Wind Farm collector substations and the Switching Station. Where constraints were identified by either agencies or landowners, segments were modified to avoid these features where possible. The modified segments developed required additional consultation with landowners throughout the HVTL Project Study Area to determine the availability of parcels whose owners would be interested in participating in the HVTL Project.

As previously indicated, securing voluntary easements along the segments is a key factor that drives the location of proposed route segments within the HVTL Project Study Area. However, as noted in Section 3.2.3, Plum Creek did not propose route segments in areas that had environmental constraints. In addition, each new alternative segment or potential alignment modification was continually assessed according to the routing criteria in Minn. Stat. § 216E.03, subd. 7 and Minn. R. Ch. 7850.4100.

Throughout the land acquisition process, Plum Creek continually assessed new segments and potential alignments proposed by landowners. The development of the Application segments was heavily influenced by the availability of willing landowners to support the HVTL Project. As voluntary easements were signed, Plum Creek developed priority tracts to be able to connect the four distinct segments. Where landowners or agencies requested alternative route segments, Plum Creek reviewed the new or adjusted segments with engineers and O&M staff to ensure constructability and safe operation of the line. If deemed constructible, Plum Creek reviewed the potential new or adjusted segment for consistency with the routing criteria in Minn. Stat. § 216E.03, subd. 7 and Minn. R. Ch. 7850.4100 and any information gained from agency coordination. Plum Creek then re-visited the landowner to discuss any limitations on the location in relation to constructability and environmental and/or routing constraints. If acceptable to the landowner, the new or adjusted route segment was carried forward in this Application. If unacceptable to the landowner, the process began again for a new or adjusted route segment.

Examples of this iterative process are demonstrated on portions of the Green and Blue Segments. On the Green Segment, Plum Creek initially proposed a shorter crossing of an agricultural field between CSAH 7 and 330th Avenue. Working with the landowner, Plum Creek reviewed and revised this segment to address landowner concerns about bisecting the agricultural field not along a field edge. Similarly, on the Blue Segment along CSAH 10 in Redwood County, there are two locations that deviate from the highway, both of which were the result of landowner preference.

Using this iterative process for all segments, Plum Creek revised, eliminated, or created new route segments with the goal of developing segment alternatives that would connect the facilities of the Wind Farm to the transmission system in various segment combinations. These segments are consistent with the routing criteria and reflect the preferences of the landowners who provided a voluntary easement for the HVTL Project (*see* Appendix B). Segments considered but rejected are further described in Appendix F along with the reasons for rejection.

4.0 DESCRIPTION OF PROPOSED ROUTE SEGMENTS

The sections below provide a brief description of the proposed segments and Figure 4.0-1 depicts these segments. Refer to Appendix C for detailed route maps. Wind Farm Collector Substation 2 is located on the northeast corner of the intersection of 300th Avenue and CSAH 11 in northwest Cottonwood County. Wind Farm Collector Substation 1 is located on the northeast corner of the intersection of 220th Street and 340th Avenue in northwest Cottonwood County. The Switching Station is located at the northeast corner of the intersection of Eagle Avenue and CSAH 12 in Redwood County.

The Green and Yellow Segments connect the proposed 345 kV line between the Wind Farm Collector Substation 1 and Wind Farm Collector Substation 2. The Blue and Red Segments connect the 345 kV line between Collector Substation 1 and the Switching Substation. For end-to-end routes, Plum Creek proposes the Green/Blue and Yellow/Red combinations. The comparative potential impacts of the Green/Blue and Yellow/Red Routes are provided in Appendix B.

4.1 Green Segment

The Green Segment is approximately 5.5 miles and connects Wind Farm Collector Substation 2 to Wind Farm Collector Substation 1. It begins at Wind Farm Collector Substation 2 in Ann Township, Cottonwood County before traveling north and east through Ann Township, along road and parcel boundaries before reaching Wind Farm Collector Substation 1.

From Collector Substation 2 the segment travels north along 300th Avenue for one mile before turning east along 230th Street for one mile. The Green Segment then turns north along CSAH 7 for about 0.75 mile before turning east for 0.5 mile, then south again for 0.25 mile along the field edge. The route then turns east again and follows parcel boundaries for 1.5 miles. At this point, the segment crosses 340th Avenue, turns north, and parallels the east side of the road for 0.5 mile before reaching Collector Substation 1.

4.2 Yellow Segment

The Yellow Segment is approximately 5.0 miles and also connects Wind Farm Collector Substation 2 and Wind Farm Collector Substation 1. It begins at Wind Farm Collector Substation 2 in Ann Township, Cottonwood County before traveling east and north through Ann Township, along roads before reaching Wind Farm Collector Substation 1.

From Collector Substation 2, the Yellow Segment travels east along CSAH 11 for one mile before CSAH 11 turns to the north. The Yellow Segment continues traveling east, now along 240th Street, for one mile before turning north along 330th Avenue for one mile. At the intersection of 330th Avenue and CSAH 11, the segment turns east for one mile, crosses 340th Avenue, then turns north again and parallels 340th Avenue on the east side of the road for one mile before reaching Collector Substation 1.

4.3 Blue Segment

The Blue Segment is approximately 26.1 miles long and connects Wind Farm Collector Substation 1 to the Switching Station. The Blue Segment begins at Wind Farm Collector Substation 1 in Ann Township, Cottonwood County. The segment runs north through North Hero, Johnsonville, and Granite Rock Townships before reaching the Switching Station in southern Vesta Township in Redwood County. In general, much of the Blue Segment is sited along CSAH 10 in Redwood County. Where the Blue Segment deviates from CSAH 10, it is due to landowner preference (i.e., siting the transmission line along the back of the house versus the front and/or field edges) and to skirt around the town of Lucan. Approximately 84 percent of the Blue Segment is co-located with roads; the other 14 percent of the Blue Segment is located along property lines and field edges (see Section 3.4).

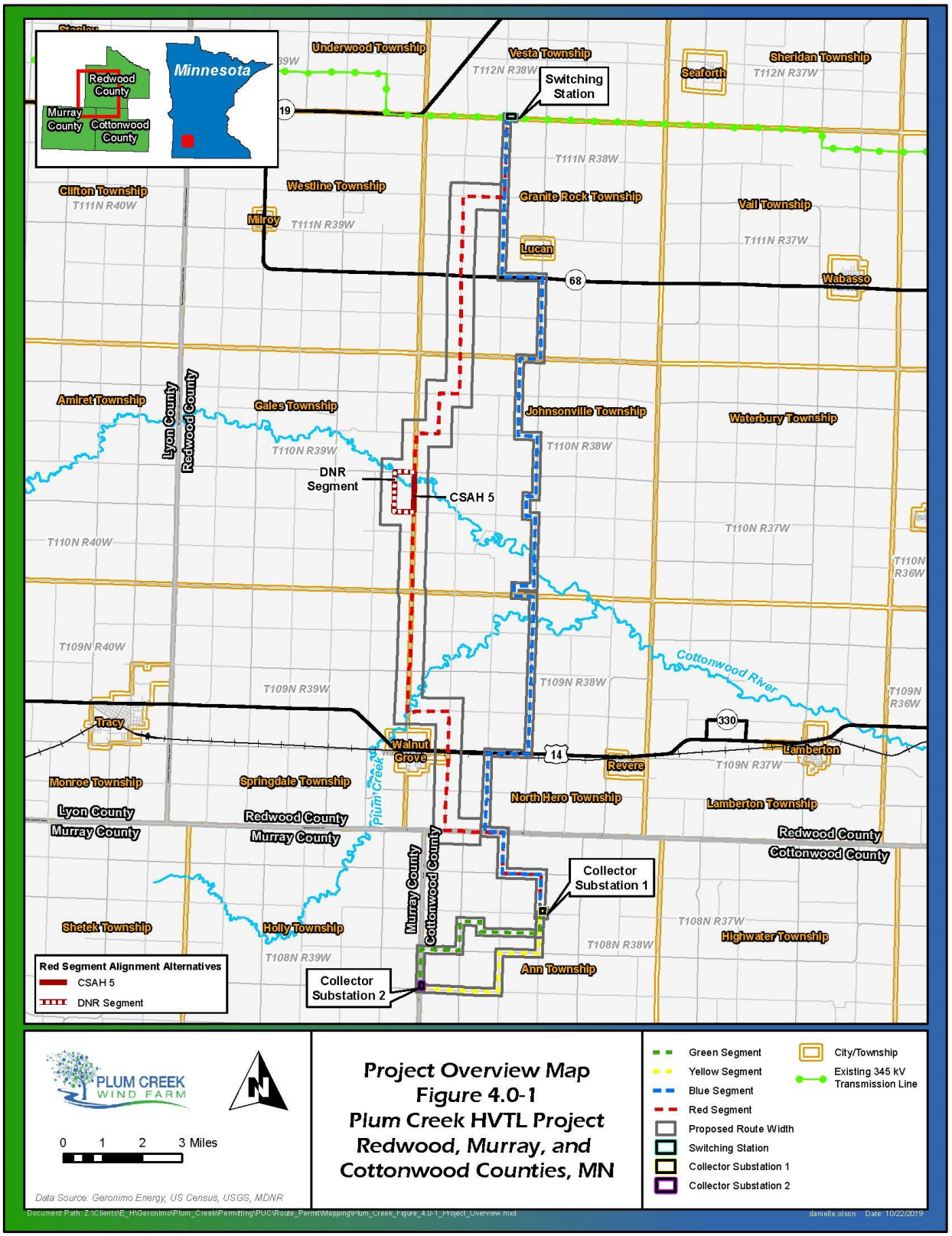
From Wind Farm Collector Substation 1, the Blue Segment follows 340th Avenue north for one mile before turning west on 210th Street for one mile. The segment turns north again at 330th Avenue for one mile before turning west for half mile to Eagle Avenue. The Blue Segment follows Eagle Avenue north for two miles to U.S. Highway 14 and then turns east for one mile to CSAH 10. The Blue Segment turns north on CSAH 10 for four miles to 160th Street where the segment turns west for half mile to a private driveway on the north side of the road. The segment then follows the private driveway for one quarter of a mile before turning back east along the field edge for half mile to CSAH 10. The Blue Segment follows CSAH 1 north for 1.75 miles to 180th Street. At 180th Street, the Blue Segment turns west for one quarter of a mile, then north along a parcel line for half mile, before turning back east for one quarter of a mile to CSAH 10. At CSAH 10, the Blue Segment turns north again for 1.5 miles to 200th Street where the segment turns west for half mile before following a parcel line/field edge north for two miles (220th Street). The Blue Segment turns east for half mile back to CSAH 10 and continues north for two more miles to Minnesota Highway 68 where the segment turns west for one mile. The Blue Segment then turns north along Eagle Avenue for the final four miles before reaching the Switching Station.

4.4 Red Segment

The Red Segment is approximately 26.8 miles long and connects Wind Farm Collector Substation 1 to the Switching Station. The Red Segment begins at Wind Farm Collector Substation 1 in Ann Township of Cottonwood County. The segment continues north and slightly west through North Hero Township, on the border of Springdale Township, and through portions of Johnsonville, Gales, and Granite Rock Townships prior to connecting to the Switching Station in southern Vesta Township, all within Redwood County. The Red Segment is heavily co-located with roads, as approximately 92 percent of the Route parallels roads. The other eight percent (2.2 miles) follow property lines and/or field edges (*see* Section 3.4).

From Wind Farm Collector Substation 1, the Blue Segment follows 340th Avenue north for one mile before turning west on 210 Street for one mile. The Route turns north again at 330th Avenue for one mile before turning west for 1.5 miles to Duncan Avenue. The Red Segment turns north on Duncan Avenue for three miles before turning west on 130th Street for one mile and north again on CSAH 5 for five miles. At the intersection of CSAH 5 and 180th Street, the Red Segment turns west for half mile before turning north along the property line for one mile to

CSAH 4. The Route turns east for half mile to CSAH 5 and turns north again for one mile to 200th Street. At 200th Street, the Red Segment turns east for half mile before following a parcel line north for one mile and turning east along 210th Street to Duncan Avenue. The Red Segment follows Duncan Avenue north for five miles to 260th Street before turning east for one mile to Eagle Avenue. The Red Segment then turns north along Eagle Avenue for the final two miles before reaching the Switching Station.


Minnesota
Redwood County
Murray County
Cottonwood County
Underwood Township
Vesta Township
Sheridan Township
Seaforth
Switching Station
Clifton Township
T111N R40W
Westline Township
Milroy
T111N R39W
Granite Rock Township
Vail Township
T111N R38W
T111N R37W
Lucan
Wabasso
Amiret Township
Lyon County
Redwood County
Gales Township
Johnsonville Township
Waterbury Township
T110N R39W
T110N R38W
DNR Segment
CSAH 5
T110N R40W
T110N R37W
T110N R36W
T109N R40W
Cottonwood River
T109N R39W
T109N R38W
T109N R36W
Tracy
Walnut Grove
Revere
Lamberton
T109N R37W
Monroe Township
Springdale Township
North Hero Township
Lamberton Township
Lyon County
Murray County
Redwood County
Murray County
Redwood County
Cottonwood County
Plum Creek
Collector Substation 1
Shetek Township
Holly Township
Murray County
Cottonwood County
T108N R37W
Highwater Township
T108N R38W
T108N R39W
Ann Township
Collector Substation 2
Red Segment Alignment Alternatives
CSAH 5
DNR Segment
PLUM CREEK WIND FARM
0 1 2 3 Miles
Data Source: Geronimo Energy, US Census, USGS, MDNR
Project Overview Map
Figure 4.0-1
Plum Creek HVTL Project
Redwood, Murray, and
Cottonwood Counties, MN
Green Segment
Yellow Segment
Blue Segment
Red Segment
Proposed Route Width
Switching Station
Collector Substation 1
Collector Substation 2
City/Township
Existing 345 kV Transmission Line
danielle.olson Date: 10/22/2019

5.0 RIGHT-OF-WAY ACQUISITION, CONSTRUCTION, RESTORATION, AND MAINTENANCE PROCEDURES

Plum Creek developed right-of-way acquisition, construction, restoration, and maintenance procedures for the HVTL Project. Although certain procedures will be site-specific based upon the final route design, general procedures are discussed in some detail in this Application.

5.1 Right-of-Way Acquisition

Plum Creek has secured all necessary easements for the Green, Yellow, and Blue Segments, and, 70 percent of the easements for the Red Segment. Additional details about Plum Creek's acquisition process are provided below.

The right-of-way evaluation and acquisition process began early in the planning and design process for the HVTL Project. The evaluation and acquisition process included environmental and cultural reviews (including the built environment of homes and other infrastructure), a title examination, initial owner contacts, survey work, document preparation, and easement payments. Each of these activities, particularly as it applies to easements for transmission line facilities, is described in more detail below.

Plum Creek began the right-of-way easement acquisition process by identifying all persons and entities that may have a legal interest in the real estate upon which facilities may be built. To compile this list, a representative of Plum Creek completed a public records search of the potential land involved in the HVTL Project. A deed search was then developed for each parcel to confirm the legal description of the property and the owner(s) of record.

After the Applicant identified the relevant owners, a Plum Creek representative personally contacted each property owner (or the property owner's representative) and described how the transmission line will serve the Wind Farm and how the HVTL Project may affect each parcel.

Prior to the acquisition of easements, Plum Creek collected land value data. The Applicant offered compensation for the fair market value of the easement for those who would potentially participate in the HVTL Project. Plum Creek also sought information from landowners about the details of their property and any potential construction concerns.

Following outreach and coordination meetings with the relevant owner parties for parcels along the proposed segments, final documents were prepared for the owner(s) to sign and participate in the HVTL Project. Plum Creek prepared a Transmission Easement Agreement for each parcel along the proposed segments, which includes a diagram showing the location and the dimensions of the easement for the HVTL Project. The acquisition process for the Wind Farm collector substations and Switching Station sites is also complete with executed purchase options, and the exact location of the Wind Farm collector substations and Switching Station within each site will be determined after final design is complete.

After the Route Permit is issued, the next step is a physical evaluation of each parcel included in the HVTL Project. For this work, Plum Creek will schedule survey crews to conduct preliminary survey work. A geotechnical company will take soil borings to assess the soil characteristics and

determine appropriate foundation design specifications. The soil analysis will be performed by an experienced geotechnical testing laboratory. Plum Creek may schedule and perform other surveys that will help to minimize potential impacts of the HVTL Project. The surveys identify right-of-way corridors, natural features, man-made features, and associated ground elevations that will be considered and included for the detailed engineering of the HVTL Project.

During the final evaluation process, the location of the right-of-way and its associated structures will be staked. During staking, the survey crew will mark the proposed location of the final structures or poles with a surveyor's stake. After the stakes are placed, Plum Creek will review the location of the structure with the landowner(s) and other interested parties to identify any concerns they may have about the structure locations or the construction process. Plum Creek will attempt to accommodate these landowner requests where practicable. The right-of-way agent will also provide maps of the boundary of the easement area required for safe operation of the lines and substations. The Applicant will continue to work with the landowners to explain the construction process and identify potential pole locations.

The HVTL Project may also require the preparation and execution of other documents, including but not limited to: purchase agreements or contracts and title curative documents (e.g. mortgage or easement subordinations). As part of the development process, the Applicant will continue to coordinate with the landowner(s) of each parcel regarding the construction schedule and requirements.

5.2 Construction Procedures

Construction will begin after applicable federal, state, and local approvals have been obtained, property and rights-of-way are acquired, soil conditions are established, and final design is completed. The precise timing of construction will take into account various requirements that may be in place due to permit conditions, system loading issues, weather, and available workforce and materials.

Plum Creek will work with an experienced contractor to construct and maintain the transmission line in conjunction with the construction and operation of the Wind Farm. Construction will follow industry best practices. These best practices address transmission specifics such as right-of-way clearing, staging, and erecting transmission line structures and stringing transmission lines. They also address general construction best practices, including but not limited to safety and stormwater pollution prevention planning. Plum Creek will consider the proposed schedule for activities, permit requirements, safety measures, prohibitions, maintenance guidelines, inspection procedures, and terrain characteristics throughout the HVTL Project's development, construction, and operations. In some cases, these activities, such as schedules, are modified to minimize impacts to sensitive animals or environments or to enhance safety.

Surveyors will stake the construction corridor within the approved right-of-way and the pole locations of the approved alignment in preparation for the construction crew arriving on site. Once the construction crew arrives, they will begin by clearing and grubbing out the right-of-way to ensure that vegetation meets the NESC standards and that the construction crew will have easy access to the construction site. Because a majority of the Blue and Red Segments are in crop land (i.e., row crops) or developed, this clearing will be minimal (up to 23 acres, pending

vegetation height/structure of grassland areas; *see* Section 6.2.9.1). Plum Creek will coordinate with landowners on clearing and grubbing to ensure minimal impact to wind breaks, landscaping, and other vegetative buffers. The crew will use chain saws, lifts, tractors, and bulldozers only where needed to clear vegetation. The crew will install temporary culverts and field approaches where needed to access the Route and to maintain adequate access and drainage throughout construction.

Transmission line structures are generally designed for installation at existing grades. Typically, structure sites with 10 percent or less slope will not be graded or leveled. Sites with more than 10 percent slope will have working areas graded level or fill brought in for working pads. Plum Creek anticipates that only minimal grading will be needed because the proposed segments have very little elevation change. If the landowner permits, it is preferred to leave the leveled areas and working pads in place for use in future maintenance activities. If permission is not obtained, the site will be graded back to as close to its original condition as possible, and all imported fill, including temporary culverts and road approaches, will be removed from the site and disturbed areas will be returned to pre-disturbance conditions.

Typical construction equipment used on a project consists of tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks, and various trailers. Many types of excavation equipment are set on wheel or track-driven vehicles. Poles are transported on tractor-trailers.

Staging areas are generally established while constructing a transmission project. Staging involves delivering the equipment and materials to construct the new transmission line facilities. Structures are delivered to staging areas, sorted, and loaded onto structure trailers for delivery to the staked location. The materials are stored until they are needed for the HVTL Project. In some cases, additional space (temporary laydown areas) may be required. These areas will be selected for their location, access, security, and ability to efficiently and safely warehouse supplies. The areas are chosen to minimize excavation and grading. Sufficient rights to use the temporary laydown areas outside of the transmission line right-of-way will be obtained from affected landowners through rental agreements. Insulators and other hardware are attached to the structure while it is on the ground adjacent to the location where the structure is to be placed.

When it is time to install the poles, structures are moved from the staging areas, delivered to the staked location, and placed within the right-of-way until the structure is set. Typically, access to the transmission line right-of-way corridor is made directly from existing roads or trails that run parallel or perpendicular to the transmission line right-of-way. In some situations, private field roads or trails are used. Permission from the property owner is obtained prior to accessing the transmission line corridor outside of public rights-of-way. Where necessary to accommodate the heavy equipment used in construction (including cranes, concrete cement trucks, and hole-drilling equipment), existing access roads may be upgraded or new roads may be constructed. Once construction is complete, the temporary field approaches and access roads installed for the HVTL Project will be removed and revegetated. Previously removed woody vegetation will be allowed to regrow so long as it does not encroach on NESC-prescribed clearances.

At this time, the Applicant anticipates the predominant method for securing the poles for the HVTL Project to be direct-embedment for tangent structures and concrete pier for angle and dead-end structures. To place direct-embedded single poles in the ground, the spoils are removed from the ground. Temporary casing may be required if the hole does not stay open during the excavation process. The pole is set and backfilled with crushed rock. The spoils will be removed from site unless other arrangements are made with the landowner. Plum Creek will not dispose of spoil materials within remnant prairie lands, areas restored to native plant communities, wetlands, protected water bodies, protected watercourses, floodplains, or in a manner that could impact these areas through erosion or transport of the spoil materials. Concrete foundations will be used when warranted by site-specific design criteria or circumstances. For concrete foundations, the excavation process will utilize temporary steel casing and rebar, concrete and anchor bolts will be placed in the hole. The standard projection of a concrete foundation is one foot above grade.

5.3 Restoration and Clean-up Procedures

The ground will be disturbed during the normal course of work (as is typical of most construction projects), which can take several weeks in any one location. Plum Creek will take the steps necessary to lessen the impact of the HVTL Project on the surrounding environment by restoring areas disturbed by construction in accordance with BMPs and the HVTL Project's permit conditions. This will begin with a pre-construction survey that will identify areas requiring special restoration procedures. During construction, crews will also attempt to limit ground disturbance wherever possible. As construction on each parcel of land is completed, disturbed areas will be restored to its original condition to the maximum extent practicable.

The Applicant or its contractor will contact each property owner after construction is completed to identify and address any damage that may have occurred as a result of the construction of the HVTL Project. If damage has occurred to crops, fences, or the property, the Applicant will fairly compensate the landowner for the damages sustained in accordance with the terms and conditions agreed upon in the Transmission Easement Agreement entered into by Plum Creek and the landowner.

In some cases, the Applicant may engage an outside contractor to restore the damaged property to its original condition to the extent practicable. Portions of permanent vegetation that are disturbed or removed during construction of transmission lines will be reestablished to pre-disturbance conditions. Resilient species of common grasses and shrubs typically reestablish naturally with few problems after disturbance. Areas with significant soil compaction and disturbance from construction activities along the approved route will require assistance in reestablishing the vegetation stratum and controlling soil erosion. Commonly used BMPs to control soil erosion and assist in reestablishing vegetation that may be used on the HVTL Project include, but are not limited to:

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

5.4 Maintenance Procedures

Transmission lines are designed to operate for decades. Typically, they require only moderate maintenance, particularly in the first few years of operation. The estimated service life of the proposed HVTL Project is approximately 40 years. However, high voltage transmission lines are seldom completely retired.

Transmission infrastructure is reliable because it includes very few mechanical elements. It is built to withstand weather extremes, with the exception of severe weather such as tornadoes and heavy ice storms. Transmission lines are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system. Such interruptions are usually momentary. Scheduled maintenance outages are also infrequent. As a result, the average annual availability of transmission infrastructure is very high, in excess of 99 percent.

The principal operating and maintenance cost for transmission facilities is the cost of inspections, which will be performed monthly by either truck or by air. Inspections will be conducted to ensure that the transmission line is fully functional and that no vegetation has encroached so as to violate NESC prescribed clearances. Annual operating and maintenance costs for 345 kV transmission lines in Minnesota and the surrounding states are expected to be approximately $500 per mile per year. Actual line-specific maintenance costs depend on the setting, the amount of vegetation management necessary, storm damage occurrences, structure types, materials used, and the age of the line.

6.0 ENVIRONMENTAL INFORMATION: ALL SEGMENTS

This section provides a general description of the environmental and human setting of Plum Creek's four proposed segments. Topics discussed in the following subsections include environmental setting, human settlement, land-based economies, archaeological and historical resources, hydrologic features, vegetation and wildlife, and rare and unique natural resources that are known to occur or may potentially occur along the four segments. Plum Creek has defined impacts by their duration, size, intensity, and location. This context is used to determine an overall resource-level impact. Impact levels are described using qualitative descriptors that are not intended as value judgement, but rather as a measure to ensure a common understanding among readers and to compare resource impacts between route segments.

- **Minimal** – Minimal impacts do not considerably alter an existing resource condition or function. Minimal impacts may, for some resources and at some locations, be noticeable to an average observer. These impacts generally affect common resources over the short term.
- **Moderate** – Moderate impacts alter an existing resource condition or function and are generally noticeable or predictable for the average observer. Effects may be spread out over a large area, making them difficult to observe, but they can be estimated by modeling or other means. Moderate impacts may be long term or permanent to common resources, but are generally short to long term for rare and unique resources.
- **Significant** – Significant impacts alter an existing resource or condition or function to the extent that the resource is severely impaired or cannot function. Significant impacts are likely noticeable or predictable for the average observer. Effects may 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 may affect common or rare and unique resources.

In addition to identifying existing resources and the potential effects on those resources, Plum Creek identified measures that can be used to avoid, minimize, or mitigate effects. These actions are collectively referred to as mitigation.

- **Avoid** – Avoiding an impact means that the impact is eliminated altogether by moving or not undertaking parts or all of a project.
- **Minimize** – Minimizing an impact means to limit its intensity by reducing the project size or moving a portion of the project from a given location.
- **Mitigate** – Impacts that cannot be avoided or minimized could be mitigated. Impacts can be mitigated by repairing, rehabilitating, or restoring the affected environment, or compensating for it by replacing or providing a substitute somewhere else.

Where specific, quantified impacts are discussed, Plum Creek quantified these based on the Application alignments shown in Appendix C. These Application alignments were identified based on the best data available at the time of this Application. Plum Creek anticipates that portions of the Application alignments will need to be modified either before a Route Permit is issued or before construction begins to address design, engineering, or stakeholder concerns, including those of agencies and landowners. Where Plum Creek describes impacts within or in

proximity to a particular segment (i.e., Green, Yellow, Blue, or Red), the segment includes the route width associated with that segment.

Plum Creek analyzed potential impacts to human and environmental resources based on specific impact assessment areas (IAAs). The IAAs for each resource is the geographic area within which the project may exert some influence. These impact assessment areas vary with the resource being analyzed and the potential impact and are summarized in Table 6.0-1.

The following IAAs will be used:

- **Seventy-five feet (Right-of-Way)**. A distance of 75 feet from each side of the segment alignments is used as the IAA for analyzing potential displacement impacts and impacts to land-based economies and natural resources. This distance from centerline captures the total 150-foot right-of-way for the Project.
- **One thousand feet**. A distance of 1,000 feet from each side of the segment alignments is used as the IAA for analyzing aesthetic and electronic interference impacts. Impacts may extend outside of this 1000-foot distance, but are anticipated to diminish relatively quickly with distance from the line such that potential impacts outside this distance would be minimal.
- **One mile**. A distance of one mile from segment route widths is used as the IAA for analyzing potential impacts to archaeological and historic resources, rare and unique species, and airports and airstrips.
- HVTL **Project Study Area**. The HVTL Project Study Area, defined generally as the townships and counties through which the Project passes, is used as the IAA for analyzing potential impacts to cultural values, socioeconomics, public utilities, land use, emergency services, air quality, and tourism and recreation. These are resources for which impacts may extend throughout communities in the HVTL Project Study Area.

Table 6.0-1
Impact Assessment Areas

Type of Resource	Specific Resource/Potential Impact to Resource	Impact Assessment Area
Human Settlement	Displacement, Electric and Magnetic Fields, Noise	Right-of-Way[1]
	Aesthetics and Electronic Interference	1,000 feet[2]
	Public Health and Safety, Socioeconomics, Cultural Values, Recreation, Public Services, Zoning and Land Use Compatibility, Transportation, Air Quality	HVTL Project Study Area
Land-Based Economies	Agriculture, Forestry, Mining	Right-of-Way[1]
	Tourism	HVTL Project Study Area
Archaeological and Historic Resources	-	One Mile
Natural Environment	Geology and Groundwater Resources, Soils, Water Resources, Flora, Fauna	Right-of-Way[1]
Rare and Unique Species	-	One mile

[1] The right-of-way is 150 feet wide
[2] On each side of the anticipated alignments, for a total 2,000-foot area of analysis.

6.1 Description of Environmental Setting

The MNDNR and the U.S. Forest Service have developed an Ecological Classification System (ECS) for ecological mapping and landscape classification in Minnesota that is used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features (Minnesota Department of Natural Resources [MNDNR], undated). Through the ECS, the State of Minnesota is split into ecological provinces, sections, and subsections. All of the Application segments are located entirely within the Prairie Parkland Province and the North Central Glaciated Plains section (251B). All four segments cross the Coteau Moraines ecological subsection in the southern portion of the HTVL Project Study Area, and the Blue and Red Segments cross into the Minnesota River Prairie ecological subsection as these segments move north.

The Coteau Moraines ecological subsection is characterized as a transition from shallow deposits of windblown silt (loess) over glacial till to deeper deposits of loess. A steep escarpment marks the northeast edge of the subsection. The depth to bedrock in this subsection is 600 to 800 feet through most of this area. Soils are loamy and well-drained with thick dark surface horizons. Annual precipitation in the Coteau Moraines subsection ranges from 24 inches in the west to 27 inches in the east and averages 145 to 150 days in length. Prior to Euro-American settlement, vegetation in this subsection was almost entirely tallgrass prairie. Wet prairies were restricted to narrow stream margins and forests were similarly restricted to ravines along a few streams, such as the Redwood River. Land in this subsection is currently used for agricultural activity and remnants of tallgrass prairie are rare (MNDNR, 2019a).

The Minnesota River Prairie ecological subsection is characterized by large till plains that are bisected by the broad valley of the Minnesota River (MNDNR, 2019b). The Minnesota River was formed by Glacial River Warren which drained Glacial Lake Agassiz. Topography outside of the river valley in this subsection consists of level to gently rolling ground moraine. Soils in this subsection are predominantly well-to-moderately well-drained loams formed in gray calcareous till of the Des Moines lobe with some localized inclusions of clayey, sandy, and gravelly soils. Annual precipitation in this subsection ranges from 25 inches in the west to 30 inches in the east and the growing season is approximately 147 to 152 days in length. Prior to Euro-American settlement, vegetation in this subsection was predominantly tallgrass prairie interspersed by many islands of wet prairie and areas of deciduous forest along the margins of the Minnesota River, floodplains, and other small streams. Current land use in the subsection is dominated by agricultural activity and remnants of tallgrass prairie are rarely found (MNDNR, 2019b).

Most of the area crossed by the segments is between 1,060 and 1,280 feet above mean sea level, with elevation gradually decreasing from south to north.

6.2 Human Settlement

Transmission lines have the potential to impact human settlements during construction and operation of the HVTL Project. Public health and safety issues during construction include injuries due to falls, equipment use, and electrocution. Health impact concerns related to the operation of the Project include health impacts from electric and magnetic fields (EMF), stray voltage, induced voltage, impaired air quality, and electrocution. Transmission lines and conductors also have the potential to displace homes or businesses, introduce new noise sources, affect the aesthetics and socioeconomics of the HVTL Project Study Area, be incompatible with local land use and zoning, interfere with electronic communications, and impact public services (i.e., transportation). Each of these resources related to human settlement and their potential impacts are discussed in more detail below.

Generally, the townships within the HVTL Project Study Area and crossed by the Application Segments are rural with farmsteads located along roads, and away from population centers. The Green and Yellow Segments are located two miles or more from municipalities. The municipalities nearest to the Blue and Red Segments are Walnut Grove and Lucan. The municipal boundary of Walnut Grove is crossed by the Red Segment and approximately 0.9 mile west of the Blue Segment. As described further in Section 6.2.6, at the time of the 2010 U.S. Census, the population of Walnut Grove was 871 persons (U.S. Census Bureau, 2010). The municipal boundary of Lucan is approximately 0.4 mile east of the Blue and Red Segments; the northern ends of both segments follow the same path, as described in Section 4.0. In 2010, the population of Lucan was 191 persons (U.S. Census Bureau, 2010).

Outside of Walnut Grove and Lucan, human settlements in the HTVL Project Study Area consist of geographically dispersed farmsteads along county roads. Figure 4.0-1 depicts the rural landscape along the Application segments.

6.2.1 Emergency Services and Public Health and Safety

Public emergency services within the HVTL Project Study Area are provided by local law enforcement and emergency response agencies located in nearby communities. The sheriff's offices of Cottonwood, Murray, and Redwood Counties provide law enforcement to communities in the HTVL Project Study Area. Fire safety services are provided by city and community fire departments, including Windom, Redwood Falls, Marshall, Lamberton, and Wabasso. Ambulance response in the HTVL Project Study Area is provided by local ambulance services in Windom, Marshall, and Wabasso. Additional details about emergency services within the HTVL Project Study Area are provided in Section 6.2.10.

There are eight towers that are a part of the Allied Radio Matrix for Emergency Response (ARMER) in Cottonwood, Murray, and Redwood Counties (Minnesota Department of Public Safety, [MDPS], 2018). These ARMER towers are part of Minnesota's Statewide Communication Interoperability Plan, which aims to improve communication for emergency responders. There are no ARMER towers within one mile of any of the Application segments; the nearest ARMER tower to Application segments is located in Vesta, which is 3.2 miles north of the northern end of the HVTL Project (MDPS, 2018). No impacts on ARMER towers are anticipated.

6.2.1.1 Impacts and Mitigation – All Segments

No impacts to emergency services are anticipated as a result of the HVTL Project. Any temporary road closures required during construction would be coordinated with local jurisdictions to provide safe access of police, fire, and other rescue vehicles. Local law enforcement resources may be utilized for traffic control and law enforcement during construction activities. In the event that emergency services are needed for local residents during the approximate 12 to 15 months of construction, construction will stop, and any impeding equipment will be relocated so that emergency vehicles may access the emergency site. Any accidents that might occur during construction of the HVTL Project would be handled through local emergency services. The influx of approximately 30 workers to construct the HVTL Project would not be expected to influence emergency or public health services. Once construction is complete, the HVTL Project will not impede emergency services. As such, construction and operation of the HVTL Project will have minimal impacts on the emergency services.

The HVTL Project will meet local, state, and NESC safety standards. The proposed transmission line will be equipped with protective devices to prevent damage from transmission line or pole falls or other potential accidents. The HVTL Project will be equipped with protective devices (circuit breakers and relays located in substations where transmission lines terminate) to safeguard the public in the event of an accident, or if a structure or conductor falls to the ground. The protective equipment will de-energize the transmission line should such an event occur. In addition, substation facilities will be fenced and accessible only by authorized personnel. Signage around the HVTL Project will warn the public of the safety risks associated with the energized equipment. The construction of the HVTL Project is not expected to have a negative impact on public health or safety. Construction crews will comply with Occupational Safety and Health Administration measures to ensure their own safety.

6.2.2 Electric and Magnetic Fields

This section discusses EMF and stray voltage with respect to the HVTL Project. The term EMF refers to electric and magnetic fields that arise from the electrical potential (voltage) and the movement of an electrical charge (current) associated with the transmission and use of electricity. Electric and magnetic fields are invisible just like radio, television, and cellular phone signals, all of which are part of the electromagnetic spectrum. The frequency of transmission line EMF in the United States is 60 hertz and falls in the extremely low frequency range of the electromagnetic spectrum (any frequency below 300 hertz). For the lower frequencies associated with power lines, the electric and magnetic fields are typically evaluated separately.

Electric fields on a transmission line are solely dependent upon the voltage of the line, not the current. Electric-field strength is measured in kilovolts per meter (kV/m), and the strength of an electric field decreases rapidly as the distance from the source increases. Electric fields are easily shielded or weakened by most objects and materials, such as trees or buildings.

There is no federal standard for transmission line electric fields. The Commission, however, has imposed a maximum electric field limit of 8 kV/m measured at one meter (3.28 feet) above the ground. *In the Matter of the Route Permit Application for a 345 kV Transmission Line from Brookings County, South Dakota to Hampton, Minnesota*, Docket No. ET-2/TL-08-1474, Order Granting Route Permit (*adopting* Administrative Law Judge Findings of Fact, Conclusions and Recommendation at Finding 194 [April 22, 2010 and amended April 30, 2010]) (September 14, 2010). The standard was designed to prevent serious hazards from shocks when touching large objects parked under alternating current transmission lines of 500 kV or greater. See "Public Health and Safety Effects of High Voltage Overhead Transmission Lines" prepared by Robert S. Banks, Minnesota Department of Health (MDH), 1977.

Magnetic fields are created by the electrical current (measures in amps) moving through a transmission line. The strength of a magnetic field is proportional to the electrical current and is typically measured in milliGauss (mG). As with electric fields, the strength of a magnetic field decreased rapidly as the distance from the source increases. Unlike electric fields, however, magnetic fields are not shielded or weakened by objects or materials.

There are presently no Minnesota regulations pertaining to magnetic field exposure.

6.2.2.1 Potential Impacts – Electric Fields

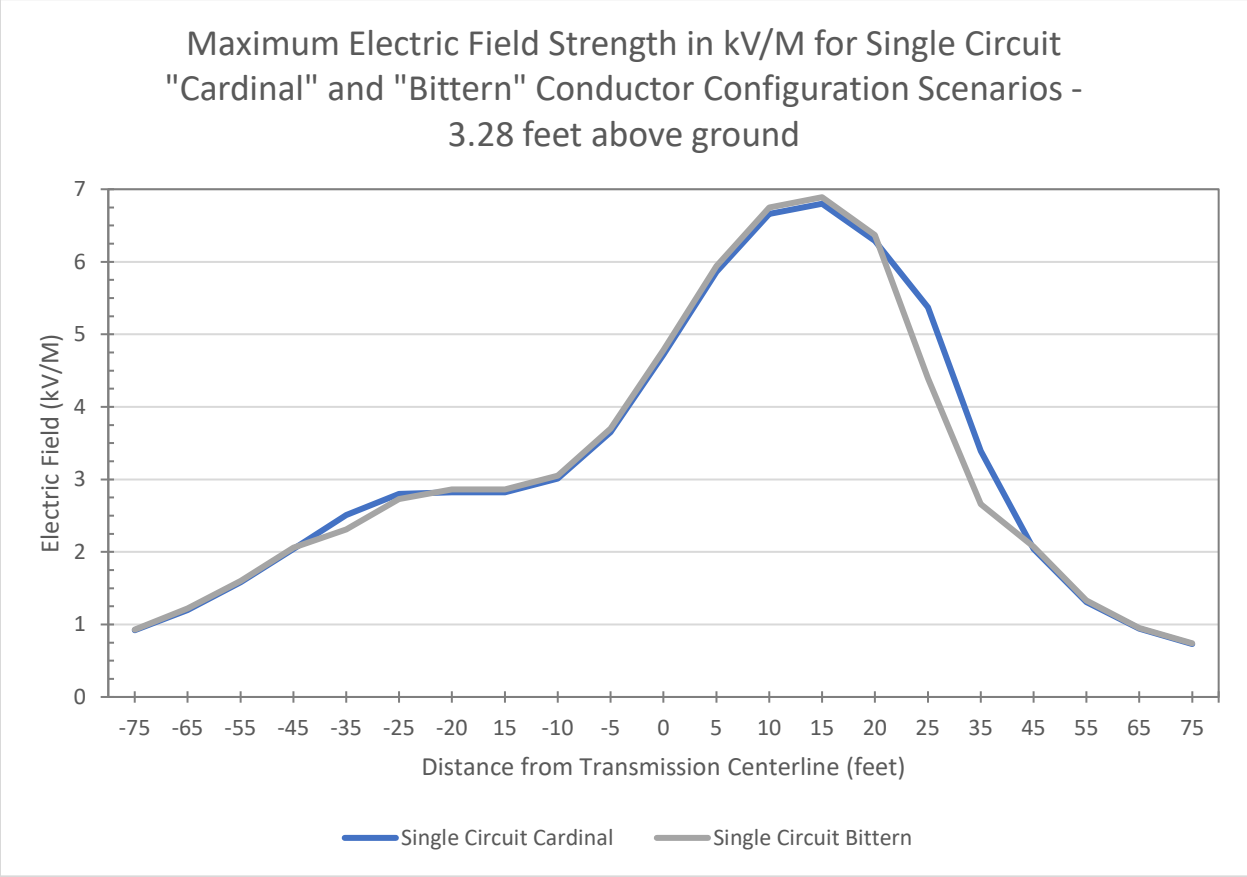
Electric field modeling for the HVTL Project was conducted based on the assumption of a 2-bundled 954 kcmil 54/7 "Cardinal" ACSR (1.196-inch diameter) or 1,272 kcmil 45/7 "Bittern" ACSR (1.345-inch diameter). Table 6.2.2-1 provides the maximum calculated electric fields for each scenario, and Figure 6.2.2-1 provides a graphic view of this information. The maximum calculated electric field for the single circuit "Cardinal" configuration is 6.80 kV/m at 15 feet from the centerline; for the "Bittern" configuration the maximum calculated electric field is 6.89 kV/m at 15 feet from the centerline. The EMF Reports for the HVTL Project are included in Appendix G and provide additional details about the assumptions used to calculate peak electric field strength for the Cardinal and Bittern configurations.

Table 6.2.2-1: Calculated Electric Fields – Positive and Negative Direction from Centerline for Cardinal and Bittern Configurations

	Electric Field Strength (kV/M)[1] Distance from Centerline (feet)																			
Configuration	-75	-65	-55	-45	-35	-25	-20	-15	-10	-5	0	5	10	15	20	25	35	45	55	65	75
Cardinal	0.92	1.2	1.58	2.04	2.51	2.8	2.82	2.82	3.01	3.65	4.72	5.86	6.66	6.8	6.29	5.37	3.39	2.04	1.31	0.94	0.73
Bittern	0.93	1.22	1.6	2.06	2.31	2.73	2.86	2.86	3.05	3.7	4.78	5.94	6.75	6.89	6.37	4.39	2.66	2.07	1.33	0.95	0.74

[1] Electric field values are the same for 207 MW and 414 MW loading

Figure 6.2.2-1: Maximum Electric Field Strength in kV/M for Single Circuit "Cardinal" and "Bittern" Conductor Configuration Scenarios – 345 kV Transmission Line (3.28 feet above ground)



Implantable Medical Devices

EMF may interfere with implantable electromechanical medical devices, such as pacemakers, defibrillators, neurostimulators, and insulin pumps. Most of the research on electromagnetic interference and medical devices relates to pacemakers. Laboratory tests indicate that interference from magnetic fields in pacemakers is not observed until 2,000 mG—a field strength significantly greater than predicted for this type of development, thus no impact is expected from magnetic fields. Electric fields may interfere with a pacemaker's ability to sense normal electrical activity in the heart. However, modern "bipolar" cardiac devices are much less susceptible to interactions with electric fields. Medtronic and Guidant, manufacturers of pacemakers and other implantable medical devices, have indicated that electric fields below 7 kV/m are unlikely to cause interactions affecting operation of most of their devices. The electric fields for the HVTL Project are well below levels at which modern bipolar devices are susceptible to interaction with the fields (Application to the Minnesota Utilities Commission for a Route Permit, Bull Moose 150 kV Project, Great River Energy, Docket No. ET2/TL-15-628. August 7, 2015.)

6.2.2.2 Potential Impacts – Magnetic Fields

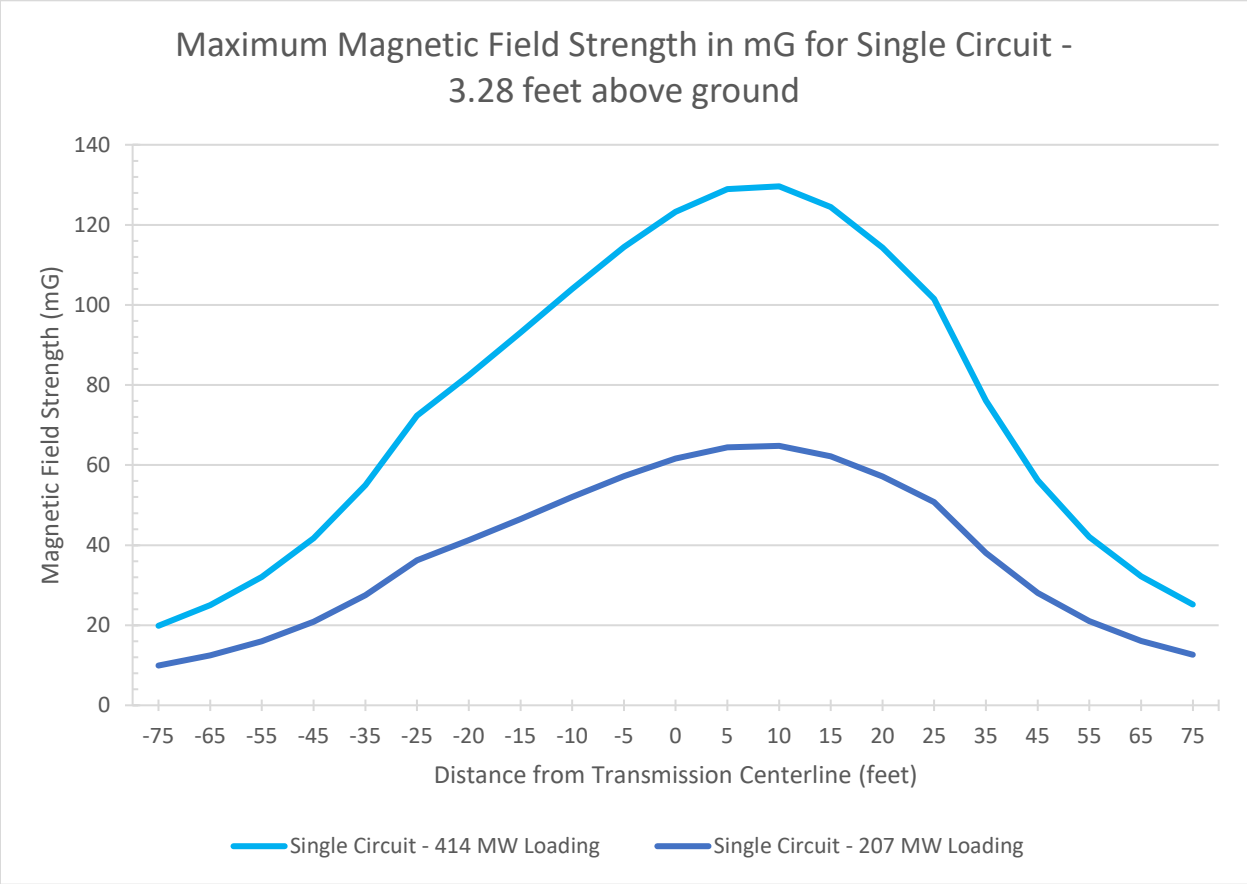
The magnetic field profiles for the single circuit scenarios are provided in Table 6.2.2-2, and Figure 6.2.2-2 provides a graphic representation of the information. Magnetic field values for the "Cardinal" or "Bittern" configurations would be the same; therefore, only one profile is presented.

The Yellow and Green Segments between Collector Substation 1 and Collector Substation 2 will have a maximum conductor loading of 207 MW. For 207 MW conductor loading (e.g., between Collector Substations 1 and 2), the peak magnetic field from the single circuit direct-embed steel poles in delta configuration is 64.8 mG at 10 feet from the centerline. At the edge of the right-of-way (i.e., 75 feet from the centerline), the peak magnetic field from the single circuit direct-embed steel poles in delta configuration is 12.60 mG.

The Blue and Red Segments between Collector Substation 1 and the Switching Station has a maximum conductor loading of 414 MW. For 414 MW conductor loading (e.g., between Collector Substation 1 and the Switching Station), the peak magnetic field from the single circuit direct-embed steel poles in delta configuration is 129.62 mG at 10 feet from the centerline At the edge of the right-of-way (i.e., 75 feet from the centerline), the peak magnetic field from the single circuit direct-embed steel poles in delta configuration is 25.19 mG. The EMF Reports for the HVTL Project are included in Appendix G and provide additional details about the assumptions used to calculate peak magnetic field.

Table 6.2.2-2: Calculated Magnetic Fields for Proposed 345 kV Transmission Line											
Magnetic Field Strength (mG) Negative Direction from Centerline (feet)											
	-75	**-65**	**-55**	**-45**	**-35**	**-25**	**-20**	**15**	**-10**	**-5**	**0**
Single Circuit – 207 MW (Green/Yellow Segments)	9.93	12.49	16.01	20.87	27.5	36.18	41.21	46.56	52.00	57.21	61.63
Single Circuit – 414 MW (Blue/Red Segments)	19.86	24.99	32.02	41.74	55.01	72.36	82.43	93.12	104.01	114.43	123.27
Magnetic Field Strength (mG) Positive Direction from Centerline (feet)											
	0	**5**	**10**	**15**	**20**	**25**	**35**	**45**	**55**	**65**	**75**
Single Circuit – 207 MW (Green/Yellow Segments)	61.63	64.46	64.8	62.21	57.16	50.77	38.03	28.08	21.03	16.1	12.6
Single Circuit – 414 MW (Blue/Red Segments)	123.27	128.94	129.62	124.44	114.32	101.54	76.07	56.18	42.07	32.2	25.19

Figure 6.2.2-2: Maximum Magnetic Field Strength in mG for Single Circuit 345 kV Transmission Line (3.28 feet above ground)



Research on the potential influence of EMFs on organisms and human health has been conducted over many decades to understand basic interactions of EMFs with biological organisms and cells, and to investigate potential therapeutic applications. In the 1970s, questions arose about potential adverse health effects from EMFs and health conditions, including cancer. Over the past 40 years, considerable additional research has been conducted to address uncertainties in those studies and to determine if there was any consistent pattern of results from human, animal, and cell studies that would support such an association[4,5,6,7]. The quantity and complexity of the

[4] The National Institute of Environmental Health Sciences (NIEHS) assembled a 30-person Working Group to review the cumulative body of epidemiologic and experimental data and provide conclusions and recommendations to the U.S. government (NIEHS, 1999).

[5] The International Agency for Research on Cancer (IARC) completed a full carcinogenic evaluation of EMF in 2002 (IARC, 2002).

[6] The International Commission on Non-Ionizing Radiation Protection (ICNIRP), the formally recognized organization for providing guidance on standards for non-ionizing radiation exposure for the World Health Organization, published a review of the cumulative body of epidemiologic and experimental data on EMF in 2003. The ICNIRP released exposure guidelines in 2010 that updated their 1998 exposure

research has led scientific and government health agencies to assemble multidisciplinary panels of scientists to conduct weight-of-evidence reviews and arrive at conclusions about the possible effects associated with EMFs.

Overall, the published conclusions of these scientific review panels have been consistent. None of the panels concluded that either electric fields or magnetic fields are a known or likely cause of any adverse health effect at the long-term, low exposure levels found in the environment. As a result, no standards or guidelines have been recommended to prevent this type of exposure; however, from all the research that has been conducted, it was confirmed that short-term exposure to higher intensities of EMF (above exposure levels of electrical and industrial workers) could produce adverse stimulation of nerves and muscles (World Health Organization [WHO], 2018). Although electric and magnetic fields induce voltages and currents in the body, the induced currents directly beneath high-voltage transmission lines are very small compared to thresholds for producing shock and other harmful electrical effects (WHO, 2018).

The Commission has repeatedly found that there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects. In the Huntley-Wilmarth 345 kV Transmission Line Project, for example, the Commission concluded that "No adverse health impacts from electronic and magnetic fields are anticipated for persons living or working near the Project." *In the Matter of the Application of Xcel Energy and ITC Midwest for a Certificate of Need for the Huntley-Wilmarth 345-kV Transmission Line Project; In the Matter of the Application of Xcel Energy and ITC Midwest for a Route Permit for the Huntley-Wilmarth 345-kV Transmission Line Project,* Order Finding Environmental Impact Statement Adequate, Granting Certificate of Need, Issuing Route Permit, and Requiring Additional Analysis (Aug. 5, 2019) at ALJ Report, Route Permit Finding No. 346. *See also*, *In the Matter of the Application for a HVTL Route Permit for the Tower Transmission Line Project*, Docket No. ET-2, E015/TL-06-1624, Findings of Fact, Conclusions of Law and Order Issuing a Route Permit to Minnesota Power and GRE for the Tower Transmission Line Project and Associated Facilities at p. 23 (Aug. 1, 2007) ("Currently, there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects.").

6.2.2.3 Stray Voltage and Induced Voltage

Stray voltage can occur with electrical distribution lines to residences and high voltage transmission lines that parallel them. Stray voltage flows through the ground between electrical systems that, by code, must be grounded (i.e. connected to the earth) to ensure safety. This voltage may be felt by animals standing on the ground.

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guidelines. For both guidelines, they relied heavily on previous reviews of the literature related to long-term exposure, but provided some relevant conclusions as part of their update process (ICNIRP, 2010).

[7] The Swedish Radiation Protection Authority (SSI), which became the Swedish Radiation Safety Authority (SSM) in 2009, evaluated current studies in several reports, using other major scientific reviews as a starting point (SSI, 2007 and 2008; SSM , 2009, 2010, 2013, 2014, 2015, 2018).

Impacts from stray voltage are typically related to improper grounding of electrical service to the farm (distribution lines) or on-farm electrical wiring. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences and they are typically grounded properly. However, transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line.

Appropriate measures, such as proper grounding, will be taken to prevent stray voltage problems. Plum Creek would be required to remedy any stray voltage issues caused by the HVTL Project as a condition of a Route Permit.

6.2.2.4 Farming Operations, Vehicle Use, and Metal Buildings near Power Lines

The power lines will be designed to meet or exceed minimum clearance requirements with respect to electric fencing as specified by the NESC. Nonetheless, insulated electric fences used in livestock operations can be instantly charged with an induced voltage from transmission lines. The induced charge may continuously drain to ground when the charger unit is connected to the fence. When the charger is disconnected either for maintenance or when the fence is being built, shocks may result. The local electrical utility can provide site specific information about how to prevent possible shocks when the charger is disconnected.

Farm equipment, passenger vehicles, and trucks may be safely used under and near power lines. The power line will be designed to meet or exceed minimum clearance requirements with respect to roads, driveways, cultivated fields, and grazing lands as specified by the NESC; recommended clearances within the NESC are designed to accommodate a relative vehicle height of 14 feet.

Vehicles, or any conductive body, under high voltage transmission lines will be immediately charged with an electric charge. Without a continuous grounding path, this charge can provide a nuisance shock. Such nuisance shocks are a rare event because generally vehicles are effectively grounded through tires. Modern tires provide an electrical path to ground because carbon black, a good conductor of electricity, is added when they are produced. Metal parts of farming equipment are frequently in contact with the ground when plowing or engaging in various other activities. Therefore, the induced charge on vehicles will normally be continually flowing to ground unless they have unusually old tires or are parked on dry rock, plastic, or other surfaces that insulate them from the ground.

Buildings are permitted near transmission lines but are generally discouraged within the right-of-way itself because a structure under a line may interfere with the safe operation of the transmission facilities. For example, a fire in a building within the right-of-way could damage a transmission line. The NESC establishes minimum electrical clearance zones from power lines for the safety of the general public and transmission owners often acquire easement rights that require clear areas in excess of these established zones. Transmission owners may permit encroachment into that easement for buildings and other activities when they can be deemed safe and still meet the NESC minimum requirements. Metal buildings may have unique issues due to induction concerns. For example, conductive buildings near power lines of 200 kV or greater must be properly grounded. There are no residences within the 150-foot-wide right-of-way for any of the four route segments (*see* Table 6.2.3-1), and there are no structures (barns, agricultural

buildings, sheds) within the 150-foot wide right-of-way for the Green, Yellow, Blue, and Red Segments. Plum Creek will work with landowners to ground fences, gates, buildings, or other structures that may be subject to induced current from the line and educate landowners on these concerns and protective measures. Should landowners identify safety concerns, Plum Creek will investigate and take corrective action.

6.2.3 Displacement

Displacement is defined as compelling a person or persons to leave their home. NESC standards require certain clearances between transmission line facilities and the ground, and between transmission line facilities and buildings for safe operation of the transmission line. To comply with NESC standards and allow sufficient space for transmission line maintenance, transmission lines are generally routed to avoid residences or other buildings within the right-of-way. Residences or other buildings located within a proposed right-of-way that cannot be avoided are generally removed or displaced. Displacements are relatively rare and are more likely to occur in heavily populated areas where avoiding all residences and businesses is not always feasible.

All of the segments presented in this Application cross sparsely populated rural areas that are used for agricultural production. To limit proximity to residences and other buildings, Plum Creek designed route segments and alignments that are co-located along existing roadways and property lines where residences are typically not present. All proposed routes allow for rights-of-way that would avoid residences and buildings, i.e., there would be no residence or building located within the proposed right-of-way for any segment.. Where the Application Alignments are sited near residences, Plum Creek has made every effort to site the transmission line on the opposite side of the road from the house or work with the landowner to route the alignment along property lines behind the house.

6.2.3.1 Impacts and Mitigation – All Segments

Displacement of residences or business properties is not anticipated if any of the segments are selected by the Commission because no home or building is located within the proposed transmission line right-of-way (i.e., within 75 feet of the Application alignments). Table 6.2.3-1 summarizes the closest residence to each of the Application Alignments.

Table 6.2.3-1
Proximity of Residences to the Application Alignments

	Green Segment Alignment	Yellow Segment Alignment	Blue Segment Alignment	Red Segment Alignment
Closest Residence (feet)	173	140	192	185

Residences in proximity to the Application alignments are displayed on the detailed maps in Appendix C.

6.2.4 Noise

Noise is defined as unwanted sound. It may be made up of a variety of sounds of different intensities, across the entire frequency spectrum. Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted scale (dB(A)) is used to reflect the selective sensitivity of human hearing. This scale puts more weight on the range of frequencies that the average human ear perceives, and less weight on those that people do not hear as well, such as very high and very low frequencies.

A transmission line can generate a small amount of sound due to corona activity. Corona is the manifestation of energy loss through the line, and this energy loss can produce sound, such as buzzing or crackling. This noise can be greater in rainy or foggy conditions. During heavy rains, the sound of the rain generally is greater than the noise emitted from the transmission line and thus the transmission line noise is not noticeable. Substation noise may result from the transformers, which may create a humming noise. Transformers and transmission lines are equipped with circuit breakers which open to de-energize the transformers and transmission lines for fault conditions and for maintenance. As such, the circuit breakers are rarely opened and closed, at which time there is sound associated with the mechanical operation of the breakers. Circuit breakers do not emit a humming noise.

The Minnesota Pollution Control Agency (MPCA) has promulgated noise standards in Minn. R. Ch. 7030. These standards limit the level of sound based on the noise area classifications (NAC) determined at the location of the person who hears the noise. Residences are in the most restrictive NAC and are classified as NAC 1, business areas are classified as NAC 2, and industrial/agricultural areas are classified as NAC 3. A fourth area, NAC 4, is defined as undeveloped and unused land, but no noise standards apply to this land class. The noise standards specify the maximum allowable noise levels at a receptor and cannot be exceeded for more than 10 percent of an hour (L_{10}) or 50 percent of an hour (L_{50}). The MPCA's noise standards for daytime hours and nighttime hours are shown in Table 6.2.4-2.

Table 6.2.4-2
MPCA State Noise - Standards Hourly A-Weighted Decibels

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

Source: Minn. R. Ch. 7030.0040

The HVTL Project is in a rural area. Ambient noise levels in these locations are generally between 35 and 40 dBA during daytime hours. Noise levels will increase sporadically with passing vehicle traffic, high winds, or use of farm equipment, all-terrain vehicles, or snowmobiles. The primary noise receptors within the local vicinity of the Project are residences and farmsteads. Residences are assigned to NAC 1.

6.2.4.1 Impacts and Mitigation – All Segments

Specific noise impacts are associated with construction and operation. Impacts are anticipated to be similar for all segments.

Construction

The overall impact intensity level is anticipated to be minimal for all segments. Potential impacts are anticipated to be short term; these unavoidable and localized impacts will affect residences and will be minimized.

During construction, noise will be emitted by the construction vehicles and equipment. The amount of noise will vary based on what type of construction is occurring at the Project on a given day. 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. Based on information from the U.S. Department of Transportation (2017), these major activities are anticipated to have the following noise, measured at 50 feet from the source:

- Clearing and grading: grader (85 dBA), chainsaw (84 dBA), and tractor (85 dBA);
- Material delivery: flatbed truck (74 dBA) and crane (81 dBA);
- Auguring foundation holes: augur drill rig (84 dBA); and
- Setting structures: crane (81 dBA).

Construction activity would only be present at a particular location for a few days at a time, but on multiple occasions throughout the period between right-of-way clearing and restoration. As such, construction noise would be highly localized, temporary, and minor. Additionally, construction will typically occur between 7 a.m. and 7 p.m. Construction will occur in accordance with Minn. R. Ch. 7030.

Plum Creek will use sound-control devices on vehicles and equipment (for example, mufflers), conduct construction activities during daylight hours, and not run vehicles and equipment unnecessarily.

Operation

During fair conditions, noise from the transmission line is anticipated to be inaudible. The transmission line may produce noise during rainy conditions due to the corona effect, a type of electrical conduction that occurs in the atmosphere near the conductor that may result in an audible hissing and cracking sound. It is likely, however, that most of the time when climatic conditions result in corona, the noise levels of falling rain would exceed the corona noise making the noise from the transmission line inaudible.

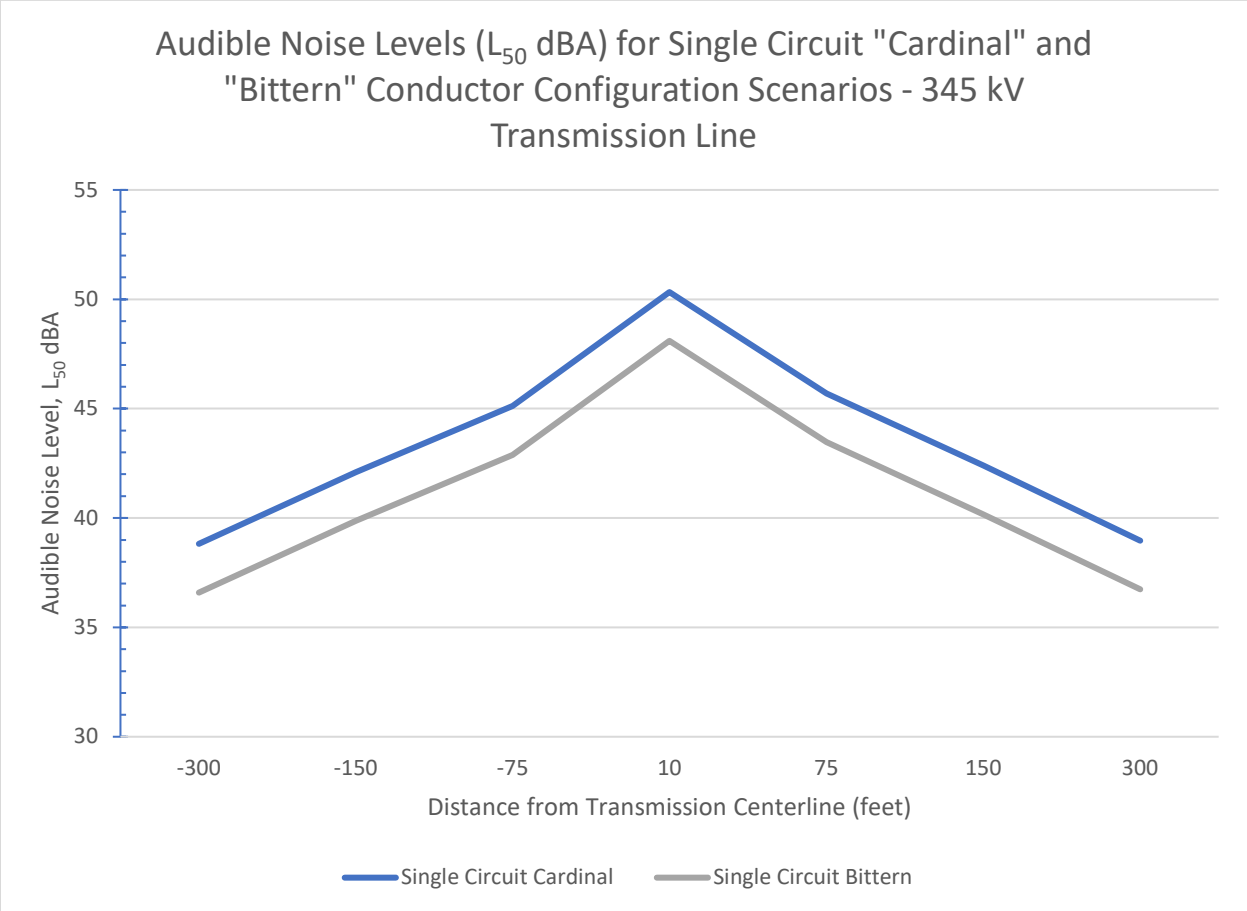
In its audible noise analysis for the HVTL Project, Plum Creek considered the potential noise generated by operation of single circuit configurations for the transmission line. Predictive modeling for the HVTL Project assumed a 2-bundled 954 kcmil 54/7 “Cardinal” ACSR (1.196-inch diameter) or 2-bundled 1,272 kcmil 45/7 “Bittern” ACSR (1.345-inch diameter)

configuration. Table 6.2.4-5 summarizes predicted noise levels at the closest receptor to each segment for each configuration. Table 6.2.4-6 presents predicted noise levels for each scenario, and Figure 6.2.4-1 provides a graphic representation of the data. Noise reports for single options are presented in Appendix H. Actual noise levels may vary during operation of the HVTL Project.

Table 6.2.4-5
Predicted Audible Noise Levels (L_{50} dBA) at Closest Receptors

	Segment			
	Green	Yellow	Blue	Red
Distance to nearest residence from alignment (ft)	173	140	192	185
Predicted audible noise level, L_{50} dBA at the nearest residence				
Single Circuit Cardinal	41.70	42.70	41.19	41.37
Single Circuit Bittern	38.48	40.52	38.95	39.14

Figure 6.2.4-1 Audible Noise Levels (L_{50} dBA) for Single Circuit "Cardinal" and "Bittern" Conductor Configuration Scenarios – 345 kV Transmission Line



Audible noise from the transmission line would only be expected during quiet, foggy, or rainy conditions and would be rare. Even in these rare cases, noise levels would be well below state

standards. Noise impacts resulting from the operation of the Green, Yellow, Blue or Red Segments would therefore not be expected and no mitigation is proposed.

Noise associated with substations includes the operation of transformers and switchgear. The transformers produce a constant low-frequency humming noise while the switchgear produces an impulsive or short duration noise during infrequent activation of the circuit breakers. Due to the infrequent operation of the switchgear, the noise generated would be considered temporary in nature and is not predicted to exceed MPCA noise limits. The two Wind Farm collector substations and Switching Station will be designed such that the MPCA noise limits identified above will be met at the edge of the boundaries of the substations and Switching Station. Accordingly, no mitigation will be required for the audible noise generated by the two collector substations or the Switching Station.

Table 6.2.4-6
Predicted Audible Noise Level Results, L_{50} [1] [dB(A)]

Configuration	Conductor Loading at Maximum Wind Farm Output (amps) [2]	Distance from Centerline (feet)						
		-300	-150	-75	10	75	150	300
Single Circuit – Cardinal	407.5 and 815.1	38.82	42.10	45.13	50.33	45.70	42.40	38.97
Single Circuit – Bittern	407.5 and 815.1	36.59	39.87	42.89	48.10	43.47	40.17	36.74

[1] L_{50} is defined as the noise level exceeded 50 percent of the time, or for 30 minutes in an hour.

[2] Maximum Wind Farm output would be 207 MW on the Green and Yellow Segments and 414 MW on the Blue and Red Segments. Noise is a function of voltage and conductor geometry; therefore, differences in loading do not influence noise levels.

6.2.5 Aesthetics

Topography along the Application segments is generally flat and the vegetation cover is uniformly low, making the topography vulnerable to visual disruptions. Viewsheds in this area are generally broad and uninterrupted, with only small scattered areas where they are defined by trees or topography. The settlements in the vicinity are residences and farm buildings (inhabited and uninhabited farmsteads) scattered along rural county roads. The area is also shaped by a built environment. Horizontal elements, such as highways and county roads, are consistent with the long and open viewsheds in the area. Vertical elements such as transmission lines and wind turbines are visible from considerable distances and are the tallest and often the most dominant visual feature on the landscape. There are two wind farms within 15 miles of the Application segments that may be visible depending on atmospheric conditions: the Jeffers Wind Project is located approximately 10 miles southeast of the HVTL Project Collector Substation 1 and the Marshall Wind Project is located approximately 14 miles west of the Red Segment. The proposed Plum Creek Wind Farm would be at the southern end of the HVTL Project. At the northern end of the HVTL Project near the Switching Station, the existing Brookings to Hampton 345 kV transmission line structures are focal points on the landscape.

6.2.5.1 Impacts and Mitigation Measures – All Segments

The HVTL Project's transmission line structures and conductors would create aesthetic impacts that are anticipated to be minimal to moderate. The degree of impact would be minimal for the Green, Yellow, and Red Segments and moderate for the Red Segment as it is immediately adjacent to the town of Walnut Grove. The HVTL Project will result in an alteration of the current landscape through construction of steel poles of 110 to 125 feet. Plum Creek has minimized aesthetic impacts by choosing routes where a transmission line is most harmonious with the landscape, such as along roads and field edges. Other minimization measures include crossing rivers and streams using the shortest distance possible (i.e., perpendicular to the waterbody) and with an existing road, avoiding placing structures directly in front of residences, and using construction methods that minimize damage to vegetation near the transmission line.

Construction of an up-to-15-acre Switching Station in an existing agricultural field will also present a new visual impact. The structures within the Switching Station will be 70-100 feet high at their highest for lighting protection, but will on average have the profile of a single-story building and will consist of high voltage electrical equipment. In addition, down-shielded lighting will help to maintain Switching Station security while minimizing lighting impacts.

6.2.6 Socioeconomics

Existing socioeconomic conditions within the HVTL Project Study Area are reported based on data from the U.S. Census Bureau's 2010 Census and 2013-2017 American Community Survey 5-Year Estimates for Cottonwood, Murray, and Redwood Counties. Data is provided for the counties, townships, and municipalities to characterize the socioeconomic conditions in the HVTL Project Study Area and at the state level for the purpose of comparison. Because the Green, Yellow, Blue, and Red Segments are fairly close to one another, the information provided for the HVTL Project Study Area is applicable to all segments.

The three counties in the HVTL Project Study Area have very small populations compared to the State of Minnesota as a whole, together comprising less than one percent of the state's total population. According to the 2013-2017 American Community Survey 5-Year Estimates, the total population in Minnesota is predicted to increase by 3.5 percent, while the estimated population in Cottonwood, Murray, and Redwood Counties is expected to decrease during this same time period (U.S. Census Bureau, 2017). Similarly, population estimates in the townships and municipalities within the HVTL Project Study Area are predicted to decrease during this period, with the exception of Johnsonville Township in Redwood County where population levels are expected to increase by 20.4 percent.

Most of the population in the HVTL Project Study Area identifies as Caucasian, which is consistent with the state level. The percentage of total minority residents in Cottonwood, Murray, and Redwood Counties is significantly lower than the state level. However, the total minority populations in Springdale Township and in the City of Walnut Grove are nearly double the state level; the total minority population in Springdale Township is approximately 25.8 percent and in the City of Walnut Grove is 36.6 percent, as compared to 14.7 percent of the total minority population at the state level.

The top three industries of employment in the State of Minnesota are "educational services, and health care and social assistance" at 25.0 percent, "manufacturing" at 13.5 percent, and "retail trade" at 11.1 percent (U.S. Census Bureau, 2017). The top three industries of employment in the counties, townships, and municipalities within the HVTL Project Study Area vary slightly from the state level, with "agriculture, forestry, fishing, and hunting, and mining" playing a larger role than retail trade in this area of southwestern Minnesota. Table 6.2.6-1 provides income and employment information, and Table 6.2.6-2 provides race and ethnicity information for Minnesota and the counties and townships in the HVTL Project Study Area.

Table 6.2.6-1 Population and Economic Characteristics within the HVTL Project Study Area

Location	2010 Population [1]	Population Estimates 2013 - 2017 [2]	Percent Change 2010 - 2017	Per Capita Income (U.S. Dollars) [2]	Unemployment Rate (%) [2]	Individuals Below Poverty Level (%) [2]	Top Three Industries [2,3c]
Minnesota	5,303,925	5,490,726	3.5	34,712	4.3	10.5	E, M, R
Cottonwood County	11,687	11,437	-2.1	27,206	5.1	15.6	E, M, Ag
Ann Township	179	144	-19.6	53,922	0.0	1.4	E, Ag, M
Murray County	8,725	8,394	-3.8	30,553	3.6	9.3	E, Ag, M
Holly Township	127	92	-27.6	29,183	2.1	8.7	Ag, R, C
Redwood County	16,059	15,430	-3.9	27,543	3.0	11.8	E, M, Ag/A
Gales Township	137	147	7.3	28,659	2.6	20.4	E, Ag, R
Granite Rock Township	225	183	-18.7	37,378	1.0	7.7	Ag, E, R
Johnsonville Township	152	183	20.4	29,997	2.2	7.1	Ag, E, R/T
North Hero Township	161	157	-2.5	41,526	10.0	5.7	Ag, E, M
Springdale Township	217	183	-15.7	36,755	0.0	14.8	Ag, E, R/F/O
Westline Township	178	185	3.9	37,771	3.7	1.1	Ag, E/A, M
Walnut Grove (city)	871	702	-19.4	18,996	3.1	36.3	M, E, A
Lucan (city)	191	164	-14.1	29,021	2.0	6.2	E, M, C

[1] U.S. Census Bureau, 2010

[2] U.S. Census Bureau, 2017

[3] Industries are defined under the 2012 North American Industry Classification System and abbreviated as follows: A = Arts, Entertainment, and Recreation, and Accommodation and Food services; Ag = Agriculture, Forestry, Fishing, and Hunting, and Mining; C = Construction; E = Educational, Health and Social Services; F = Finance and Insurance, and Real Estate and Rental and Leasing; M = Manufacturing; O = Other Services, except Public Administration; R = Retail Trade; T = Transportation and Warehousing, and Utilities.

Table 6.2.6-2 Race and Ethnicity of the Population in the HVTL Project Study Area

Location	Caucasian (%)	Black or African American (%)	American Indian or Alaska Native (%)	Asian (%)	Native Hawaiian/ Pacific Islander (%)	Some Other Race (%)	Two or More Races (%)	Hispanic (%)	Total Minority (%) [1]
Minnesota	85.3	5.2	1.1	4.0	0.0	1.9	2.4	4.7	14.7
Cottonwood County	92.2	0.7	0.2	2.7	0.1	2.7	1.3	6.2	7.8
Ann Township	98.9	0.0	0.0	1.1	0.0	0.0	0.0	2.2	1.1
Murray County	96.7	0.3	0.1	0.9	0.0	1.2	0.8	2.8	3.3
Holly Township	96.9	0.0	0.0	0.0	1.6	0.0	1.6	4.7	3.1
Redwood County	89.1	0.5	5.0	3.2	0.0	0.4	2.0	2.1	10.9
Gales Township	97.8	0.0	0.0	2.2	0.0	0.0	0.0	0.0	2.2
Granite Rock Township	85.8	0.0	0.0	4.0	0.0	0.0	10.2	0.9	14.2
Johnsonville Township	99.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7
North Hero Township	91.3	1.2	0.0	7.5	0.0	0.0	0.0	0.0	8.7
Springdale Township	74.2	5.1	0.0	18.0	0.0	0.9	1.8	1.4	25.8
Westline Township	92.7	1.1	0.0	4.5	0.0	0.0	1.7	0.6	7.3
Walnut Grove (city)	63.4	0.0	0.5	35.0	0.0	1.0	0.1	2.1	36.6
Lucan (city)	99.5	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.5

[1] Total minority percentage equals the total population minus the population of white, non-Hispanic or Latino.

Source: U.S. Census Bureau, 2010

6.2.6.1 Impacts and Mitigation – All Segments

Transmission line projects have the potential to impact the socioeconomic conditions of an area in the short term through an influx of non-local personnel, creation of construction jobs, construction material and other purchases from local businesses, and expenditures on temporary housing for non-local personnel. In the long term, transmission line projects may provide beneficial impacts to the local tax base in the form of revenues from utility property taxes. On November 5, 2019, the Redwood County Board of Commissioners provided a letter of support for the Project, citing significant economic development and long-term financial benefit to the area (Appendix K). Additionally, permanent job creation or relocation of project personnel to the area for operation of a transmission line project could affect area demographics.

Construction of the HVTL Project would have minimal, short-term impacts on the existing socioeconomic conditions in the HVTL Project Study Area. The Project would not result in long-term or signification changes in the population size or demographics, or significantly affect employment or income, in the HVTL Project Study Area. The construction and operation of any of the proposed segments is not anticipated to create or remove jobs in the HVTL Project Study Area or result in the permanent relocation of individuals to or from the area.

The communities in the HTVL Study Area will likely experience short-term positive economic impacts related to the increase in expenditures during construction of the HVTL Project. Construction of the HVTL Project would take approximately one year and the construction work force would be approximately 30 workers. Construction personnel would likely commute to the HTVL Project Study Area on a daily or weekly basis instead of relocating to the area. The influx of additional construction personnel in the HVTL Project Study Area will have a small positive impact on the local economy from construction crew expenditures in the local community (e.g., lodging, fuel, food). Construction materials (e.g., lumber, concrete, aggregate) may be purchased from local vendors when feasible.

No additional permanent staff will be necessary for operation and maintenance of the proposed transmission line. Therefore, the HVTL Project is not expected to change population trends, economic indicators, or employment. In addition, long-term beneficial impacts to the local tax base will result from the incremental increase in revenues from utility property taxes. As the overall socioeconomic impact of the HVTL Project is anticipated to be positive, no mitigation measures are proposed.

6.2.7 Cultural Values

Cultural values can be described as shared community beliefs or attitudes, among a given area or population, which provide a framework for that area's or population's commonality. The communities in the HVTL Project Study Area primarily have cultural values tied to agricultural production, light industry, and recreational activities such as hunting and fishing. In addition, the history surrounding Laura Ingalls Wilder, author of the *Little House on the Prairie* children's book series, plays an important role in the cultural values of the area. A detailed discussion of the Laura Ingalls Wilder Museum in Walnut Grove, Minnesota, and the various festivals associated with the museum is presented in Section 6.3.3, and a discussion of the historic site associated with the Ingalls family is presented in Section 6.4.

As noted in Section 6.3.1, agriculture is the predominant industry in the counties, townships, and municipalities in the HVTL Project Study Area. Farm-related businesses play an important role in the regional economy, and the area has a diversified agricultural mix of crops including corn, soybeans, forage crops (hay), and livestock production.

In general, agricultural communities in southwestern Minnesota, and in the HTVL Study Area, are characterized by relatively flat and wide-open vistas with scattered farmsteads and associated shelterbelts dotted throughout the landscape. However, in Cottonwood, Murray, and Redwood Counties, recent transmission line and wind energy development is also present within the landscape.

6.2.7.1 Impacts and Mitigation Measures – All Segments

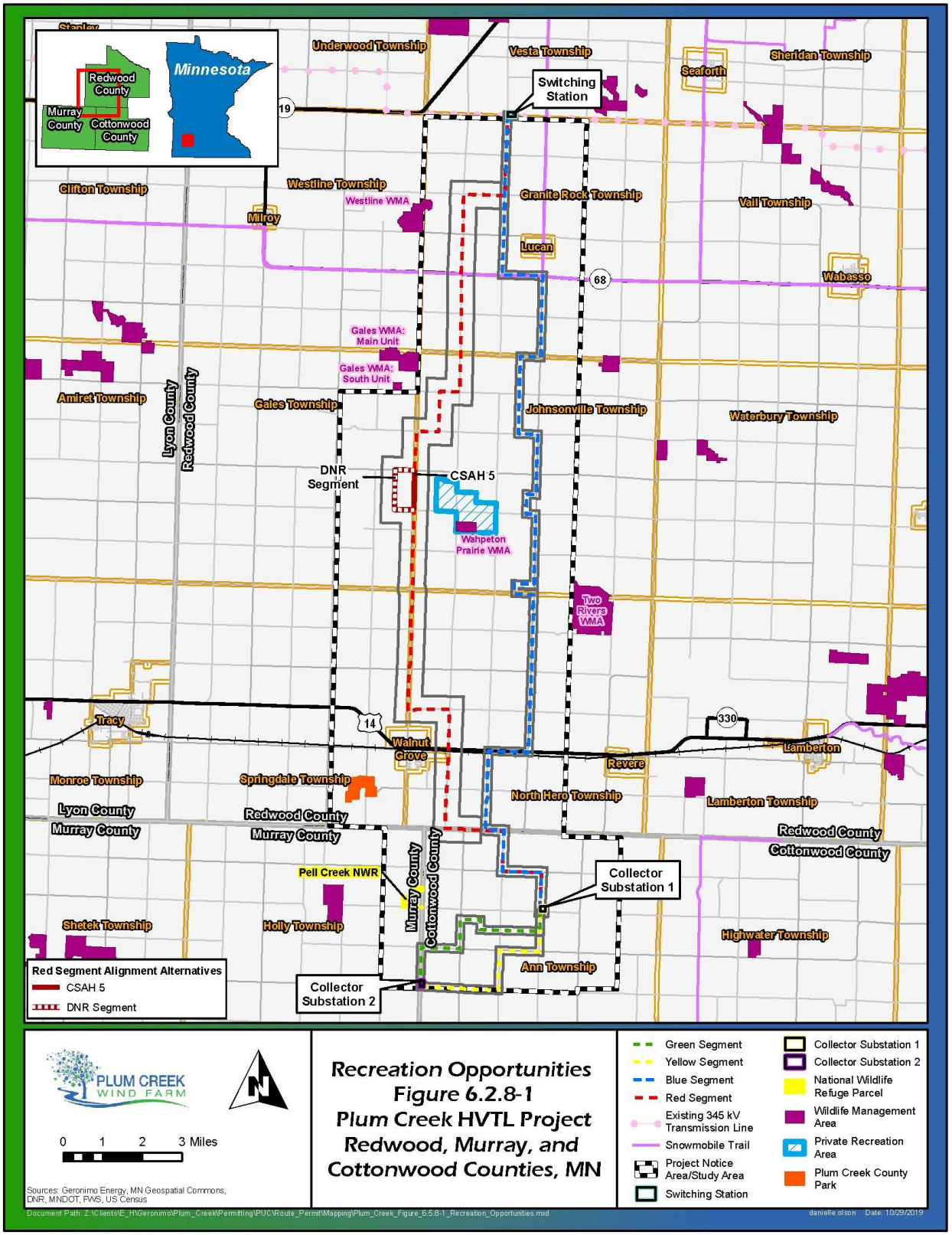
The presence of the HVTL Project will not significantly impact the use of land for agricultural production or the general character, aesthetics, or the cultural values of the HVTL Project Study Area. As demonstrated by other transmission line projects in the Midwest, agricultural practices continue throughout construction and operation. *See* Section 6.3.1.1 for a more detailed discussion of how the HVTL Project is expected to affect agricultural practices in the HTVL Project Study Area. No impacts to light industrial uses in the HVTL Project Study Area are anticipated from construction or operation of the HVTL Project.

In terms of aesthetic impacts, the presence of existing transmission lines and operating wind farms in Cottonwood and Redwood Counties has changed the traditionally bucolic landscape. *See* Section 6.2.5 for additional discussion of how the HVTL Project may affect aesthetic resources. The HVTL Project will not impact access to public hunting or fishing areas, so no impact to recreational fishing or hunting is anticipated.

Because no impacts to cultural values are anticipated, no mitigative measures specific to cultural values are proposed.

6.2.8 Recreation

There are various recreational opportunities in or near the HVTL Project Study Area. Recreational opportunities at public lands include USFWS National Wildlife Refuge (NWR) parcels, MNDNR WMAs and snowmobile trails, and county and city parks (refer to Figure 6.2.8-1). Each of these public lands offers many recreational opportunities that attract residents and tourists. Additionally, as described in Section 3.2.4, landowners identified an 850-acre avoidance area along the Cottonwood River between the Blue and Red Segments (approximately 0.8-mile and 0.3-mile east of the DNR Alignment, and CSAH 5 Alignment Alternatives on the Red Segment and approximately one mile west of the Blue Segment). This area is used by local families for various outdoor activities such as camping, fishing, four-wheeling, and outdoor enjoyment. This private recreation area is also displayed on Figure 6.2.8-1. There are additional recreational opportunities within the nearby municipalities of Walnut Grove and Lucan such as museums and festivals. See the Tourism section in 6.3.3 for more information on these potential recreational activities that are not on public lands.


Minnesota
Redwood County
Murray County
Cottonwood County
Underwood Township
Vesta Township
Sheridan Township
Seaforth
Switching Station
19
Clifton Township
Westline Township
Westline WMA
Granite Rock Township
Vail Township
Milroy
Lucan
68
Wabasso
Gales WMA: Main Unit
Gales WMA: South Unit
Amiret Township
Lyon County
Redwood County
Gales Township
Johnsonville Township
Waterbury Township
DNR Segment
CSAH 5
Wahpeton Prairie WMA
Two Rivers WMA
Tracy
14
330
Walnut Grove
Lamberton
Revere
Monroe Township
Springdale Township
North Hero Township
Lamberton Township
Lyon County
Murray County
Redwood County
Murray County
Redwood County
Cottonwood County
Pell Creek NWR
Murray County
Cottonwood County
Collector Substation 1
Shetek Township
Holly Township
Highwater Township
Ann Township
Collector Substation 2
Red Segment Alignment Alternatives
CSAH 5
DNR Segment
PLUM CREEK WIND FARM
N
0 1 2 3 Miles
Sources: Geronimo Energy, MN Geospatial Commons, DNR, MNDOT, FWS, US Census
Recreation Opportunities
Figure 6.2.8-1
Plum Creek HVTL Project
Redwood, Murray, and Cottonwood Counties, MN
Green Segment
Yellow Segment
Blue Segment
Red Segment
Existing 345 kV Transmission Line
Snowmobile Trail
Project Notice Area/Study Area
Switching Station
Collector Substation 1
Collector Substation 2
National Wildlife Refuge Parcel
Wildlife Management Area
Private Recreation Area
Plum Creek County Park
Document Path: Z:\Clients\E_H\Geronimo\Plum_Creek\Permitting\PUC\Route_Permit\Mapping\Plum_Creek_Figure_6.5.8-1_Recreation_Opportunities.mxd
danielle.olson Date: 10/29/2019

There is one 60-acre NWR parcel located within the HVTL Project Study Area and associated with Pell Creek. This parcel is part of the Northern Tallgrass Prairie NWR. The Northern Tallgrass Prairie NWR encompasses all or part of 85 counties in western Minnesota and northwestern Iowa and includes nearly 3,000 acres of land owned by the refuge system and an additional 2,500 acres protected in conservation easements. There are no WPAs in the HVTL Project Study Area.

WMAs are managed to provide wildlife habitat, improve wildlife production, and provide public hunting and trapping opportunities. These MNDNR lands were acquired and developed primarily with hunting license fees. There are two WMAs at least partially within the HVTL Project Study Area and both within Redwood County: the Wahpeton Prairie WMA is an 80-acre parcel located in the central portion of the HVTL Project Study Area between the Blue and Red Segments, and the Westline WMA is approximately 260 acres and located partially within the northwest portion of the HVTL Project Study Area. Additionally, there are two WMAs adjacent to the HVTL Project Study Area, both of which are also in Redwood County: the Two Rivers WMA is located east of the central portion of the HVTL Project Study Area and the Gales WMA is located west of the northern portion of the HVTL Project Study Area.

Snowmobile trails are mapped by MNDNR and managed locally by each county and their respective snowmobile clubs. There are two snowmobile trails in the HVTL Project Study Area, both in Redwood County: one bisects the HVTL Project Study Area, running east-west paralleling State Highway 68, just south of Lucan. The other breaks off of the east-west trail and runs north through Lucan along CSAH 10.

There are no MNDNR Scientific and Natural Areas, state trails, state water trails, Aquatic Management Areas, state parks, or migratory waterfowl feeding and resting areas in the HVTL Project Study Area.

There are no county parks in the HVTL Project Study Area in Cottonwood County (Cottonwood County, 2019b). In Redwood County, Plum Creek Park is within the HVTL Project Study Area, approximately two thirds of a mile southwest of Walnut Grove. Plum Creek County Park includes 215 acres of land and offers a wide range of recreational opportunities, including swimming, fishing, hiking, and camping (Plum Creek Park, 2019).

There are three city parks in the HVTL Project Study Area: Lucan City Park in Lucan and two parks associated with the City of Walnut Grove (Walnut Grove City Park and Ferguson Park).

6.2.8.1 Impacts and Mitigation – All Segments

Construction of the HVTL Project is not anticipated to affect public access to nearby recreational opportunities. The Application segments were routed to avoid and/or minimize impacts to recreation areas. None of the Application segments cross any federal, state, or local recreation areas.

The Green and Yellow Segments do not cross snowmobile trails; the Blue and Red Segments cross snowmobile trails in Redwood County. The Blue Segment will cross two snowmobile trails twice for a total of four crossings: at the intersection of Minnesota Highway 68 and CSAH 10, the Blue Segment Application Alignment will cross snowmobile trails on both sides of

Minnesota Highway 68 as each trail parallels the State Highway. As the Application Alignment turns west, it will cross snowmobile trails on either side of CSAH 10. As the Blue Segment continues west, it will parallel the snowmobile trail along Minnesota Highway 68 for one mile before the Blue Segment turns north along Eagle Avenue. The Red Segment will cross one snowmobile trail that parallels Minnesota Highway 68 as the Red Segment runs north-south along Duncan Avenue. Plum Creek would avoid impacting snowmobile trails by siting transmission structures outside of the existing path of the trails. Temporary disruptions to use of the snowmobile trails could occur if Project construction occurs during the winter months. However, any disruptions would be minimal, short-term, and would resolve with the completion of construction.

Impacts to recreation areas would mostly be related to HVTL Project construction, and will be minimal, temporary, and isolated to specific areas throughout the Application segments. Short-term increases in noise and dust would occur during construction of the HVTL Project, and could detract from public enjoyment of nearby recreational activities. However, these impacts would be minimal, and use of BMPs to limit noise and fugitive dust during construction would effectively mitigate their effects. Section 6.2.4 discusses how Plum Creek would mitigate potential noise impacts and Section 6.5.1 provides a discussion of how Plum Creek would mitigate fugitive dust emissions during construction of the Project.

Introduction of an aesthetic change to the predominantly agrarian landscape in the HVTL Project Area could impact public enjoyment of available recreation opportunities. Plum Creek has minimized impacts to recreational opportunities by siting Application segments to avoid these areas. A detailed discussion of how the HVTL Project could impact aesthetics and the measures Plum Creek would use to mitigate aesthetic impacts is provided in Section 6.2.5.

6.2.9 Land Use and Zoning

Information about land use and zoning provides important insight into existing human settlement patterns and future development. Plum Creek reviewed land use and county zoning information for the HVTL Project Study Area to assess the HVTL Project's potential to impact existing land uses and to identify any additional routing constraints that should be considered for development of the transmission line. All of the Application segments cross through predominantly rural areas with sparsely scattered rural residences, farmsteads, commercial livestock operations, agricultural support facilities, and commercial business throughout. The Green and Yellow Segments are not located near municipalities, while the Blue and Red Segments pass near the small towns of Walnut Grove, Revere, and Lucan.

6.2.9.1 Land Use

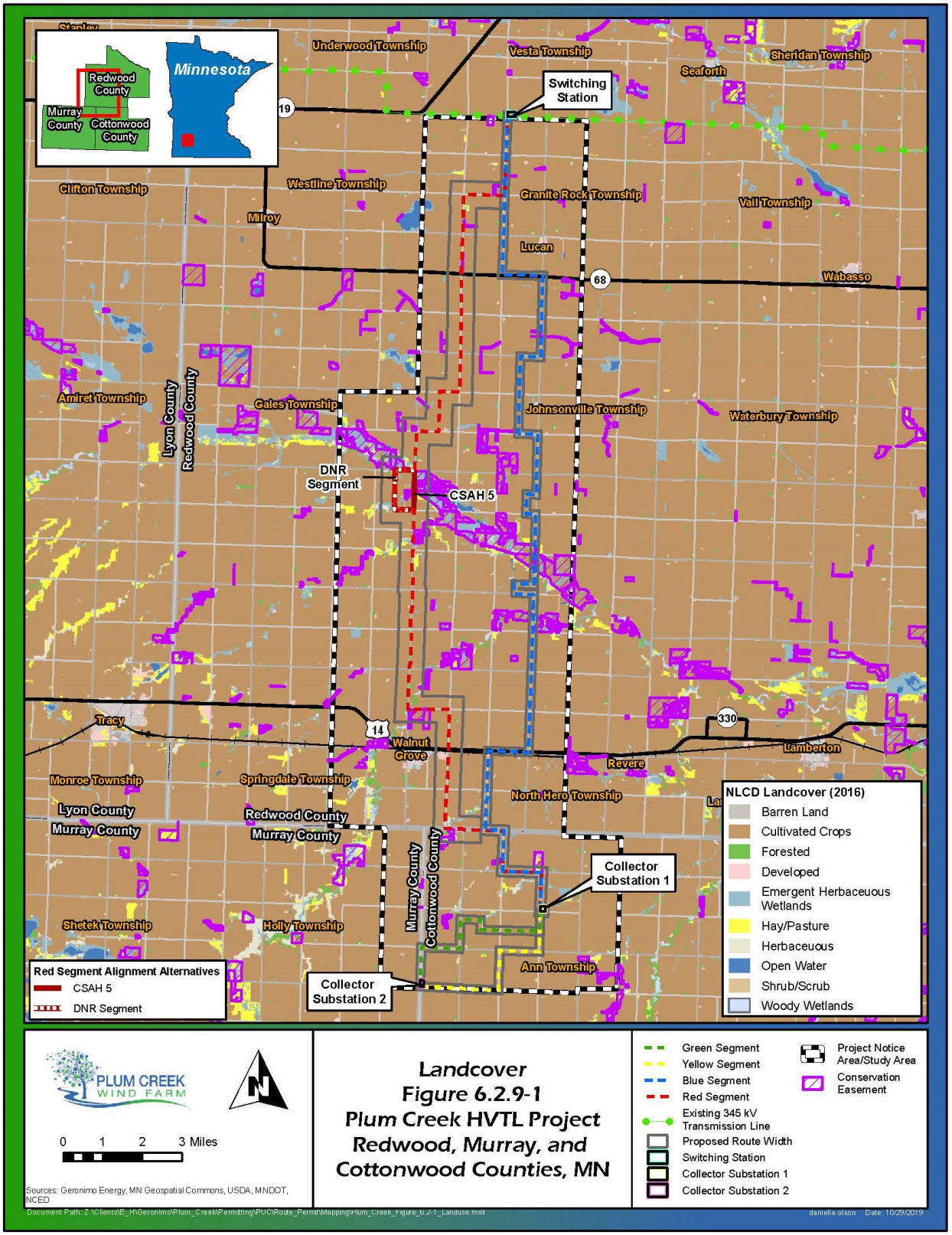
Plum Creek reviewed information available from the 2016 National Land Cover Database (NLCD) to identify existing land cover types and uses crossed by the Application segments (Yang et al., 2018). The primary land cover type crossed by the Application segments is cultivated crop land. The second most common land cover type crossed is developed, which includes roads and illustrates the degree of co-location for all segments (*see* Section 3.4). According to the NLCD data, the Green, Blue, and Red Segments also cross some emergent herbaceous wetlands, while the Yellow Segment does not (refer to Section 6.5.5 for a more

detailed review of potential wetland impacts). All four segments cross herbaceous lands, but only the Blue and Red Segments cross deciduous forest lands and hay/pasture land. Table 6.2.9-1 presents details about the amount of each NLCD land cover type crossed by the Application segments and this information is also displayed on Figure 6.2.9-1.

Table 6.2.9-1
Land Cover Types within the Application Segments

Land Cover/Use Category	Green Segment		Yellow Segment		Blue Segment		Red Segment	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Segment Length (miles)	5.5		5.0		26.1		26.8	
150-foot Right-of-Way (acres)	99.2		90.4		473.6		486.6	
Land Cover								
Cultivated Crops in 150-foot Right-of-Way (acres)	64.5	65.0%	43.1	47.7%	250.4	52.8%	257.3	52.9%
Hay/Pasture Land in 150-foot Right-of-Way (acres)	0.0	0%	0.0	0%	3.9	0.8%	5.3	1.1%
Emergent Herbaceous Wetlands in 150-foot Right-of-Way (acres)	0.7	0.7%	0.0	0%	11.2	2.4%	10.4	2.1%
Woody Wetlands in 150-foot Right-of-Way (acres)	0.0	0%	0.0	0%	0.0	0.0%	0.2	< 0.1%
Herbaceous Land in 150-foot Right-of-Way (acres)	< 0.1	< 0.1%	< 0.1	< 0.1%	0.7	0.1%	3.6	0.7%
Deciduous Forest in 150-foot Right-of-Way (acres)	0.0	0%	0.0	0%	0.1	< 0.1%	0.0	0%
Developed Areas in 150-foot Right-of-Way (acres) (i.e., low density, medium density, open space)	34.0	34.3%	47.2	52.2%	207.3	43.8%	209.9	43.1%
Barren Land in 150-foot Right-of-Way (acres)	0.0	0%	0.0	0%	0.0	0.0%	0.0	0%

Source: 2016 NLCD (Yang et al., 2018)


Minnesota
Redwood County
Murray County
Cottonwood County
Underwood Township
Vesta Township
Sheridan Township
Seaforth
Switching Station
19
Clifton Township
Westline Township
Granite Rock Township
Vail Township
Milroy
Lucan
68
Wabasso
Amiret Township
Lyon County
Redwood County
Gales Township
Johnsonville Township
Waterbury Township
DNR Segment
CSAH 5
Tracy
14
Walnut Grove
330
Lamberton
Revere
Monroe Township
Springdale Township
North Hero Township
Lyon County
Murray County
Redwood County
Murray County
Murray County
Cottonwood County
Collector Substation 1
Shetek Township
Holly Township
Ann Township
Collector Substation 2
Red Segment Alignment Alternatives
CSAH 5
DNR Segment
NLCD Landcover (2016)
Barren Land
Cultivated Crops
Forested
Developed
Emergent Herbaceuous Wetlands
Hay/Pasture
Herbaceuous
Open Water
Shrub/Scrub
Woody Wetlands
PLUM CREEK WIND FARM
N
0 1 2 3 Miles
Sources: Geronimo Energy, MN Geospatial Commons, USDA, MNDOT, NCED
Landcover
Figure 6.2.9-1
Plum Creek HVTL Project
Redwood, Murray, and Cottonwood Counties, MN
Green Segment
Yellow Segment
Blue Segment
Red Segment
Existing 345 kV Transmission Line
Proposed Route Width
Switching Station
Collector Substation 1
Collector Substation 2
Project Notice Area/Study Area
Conservation Easement
Document Path: Z:\Clients\E_H\Geronimo\Plum_Creek\Permitting\PUC\Route_Permit\Mapping\Plum_Creek_Figure_6.2-1_Landuse.mxd
danielle.olson Date: 10/29/2019

Green Segment

As noted in Table 6.2.9-1, approximately 64.5 acres of cultivated crop land would be within the 150-foot right-of-way for the Green Segment. Of the remaining 34.7 acres within the 150-foot right-of-way, 34.0 are developed land. These developed lands are roads with which the segment is co-located. Approximately 0.7 acre of emergent herbaceous wetland and less than 0.1 acre of herbaceous land are crossed by the Green Segment right-of-way. No hay/pasture, woody wetlands, forest land, or barren land would be within the 150-foot right-of-way of the Green Segment.

Typical crops grown in the cultivated crop areas along the Green Segment include corn, soybeans, and forage (hay and green chop) (U.S. Department of Agriculture [USDA], 2012). A more detailed discussion of the existing agricultural economy near the Green Segment is presented in Section 6.3.1, and a discussion of vegetation types found within the non-agricultural areas is provided in Section 6.5.6.

Yellow Segment

As noted in Table 6.2.9-1, approximately 43.1 acres of cultivated crop land would be within the 150-foot right-of-way for the Yellow Segment. The remaining 47.2 acres within the 150-foot right-of-way is developed land, with the exception of less than 0.1 acre of herbaceous land. Developed lands are roads with which the segment is co-located. No hay/pasture, emergent herbaceous wetlands, woody wetlands, forest land, or barren land would be within the 150-foot right-of-way of the Yellow Segment.

Typical crops grown in the cultivated crop areas along the Yellow Segment include corn, soybeans, and forage (hay and green chop) (USDA, 2012). A more detailed discussion of the existing agricultural economy near the Yellow Segment is presented in Section 6.3.1, and a discussion of vegetation types found within the non-agricultural areas is provided in Section 6.5.6.

Blue Segment

As noted in Table 6.2.9-1, approximately 250.4 acres of cultivated crop land would be within the 150-foot right-of-way for the Blue Segment. Of the remaining 223.2 acres within the 150-foot right-of-way, 207.3 acres are developed land. These developed lands are roads with which the segment is co-located. Approximately 11.2 acres of emergent herbaceous wetland are crossed by the Blue Segment right-of-way, primarily associated with the Cottonwood River. The right-of-way would include approximately 3.9 acres of hay and pasture land and approximately 0.7 acre of herbaceous land. Forest lands would make up 0.1 acre of the 150-foot right-of-way.

Typical crops grown in the cultivated crop areas along the Blue Segment include corn, soybeans, forage (hay and green chop), and sugar beets (USDA, 2012). A more detailed discussion of the existing agricultural economy near the Blue Segment is presented in Section 6.3.1 and a discussion of vegetation types found within the non-agricultural areas is provided in Section 6.5.6.

Red Segment

As shown in Table 6.2.9-1, approximately 257.3 acres of cultivated crop land would be within the 150-foot right-of-way for the Red Segment. Of the remaining 229.3 acres within the 150-foot right-of-way, 209.9 acres are developed land. These developed lands are roads with which the segment is co-located. Approximately 10.4 acres of emergent herbaceous wetland and 0.2 acre of woody wetland are crossed by the Red Segment right-of-way, primarily associated with the Cottonwood River. The right-of-way would include approximately 5.3 acres of hay and pasture land and approximately 3.6 acres of herbaceous land.

Similar to the Blue Segment, the typical crops grown in the cultivated crop areas along the Red Segment include corn, soybeans, forage (hay and chop), and sugar beets (USDA, 2012). A more detailed discussion of the existing agricultural economy near the Red Segment is presented in Section 6.3.1, and a discussion of vegetation types found within the non-agricultural areas is provided in Section 6.5.6.

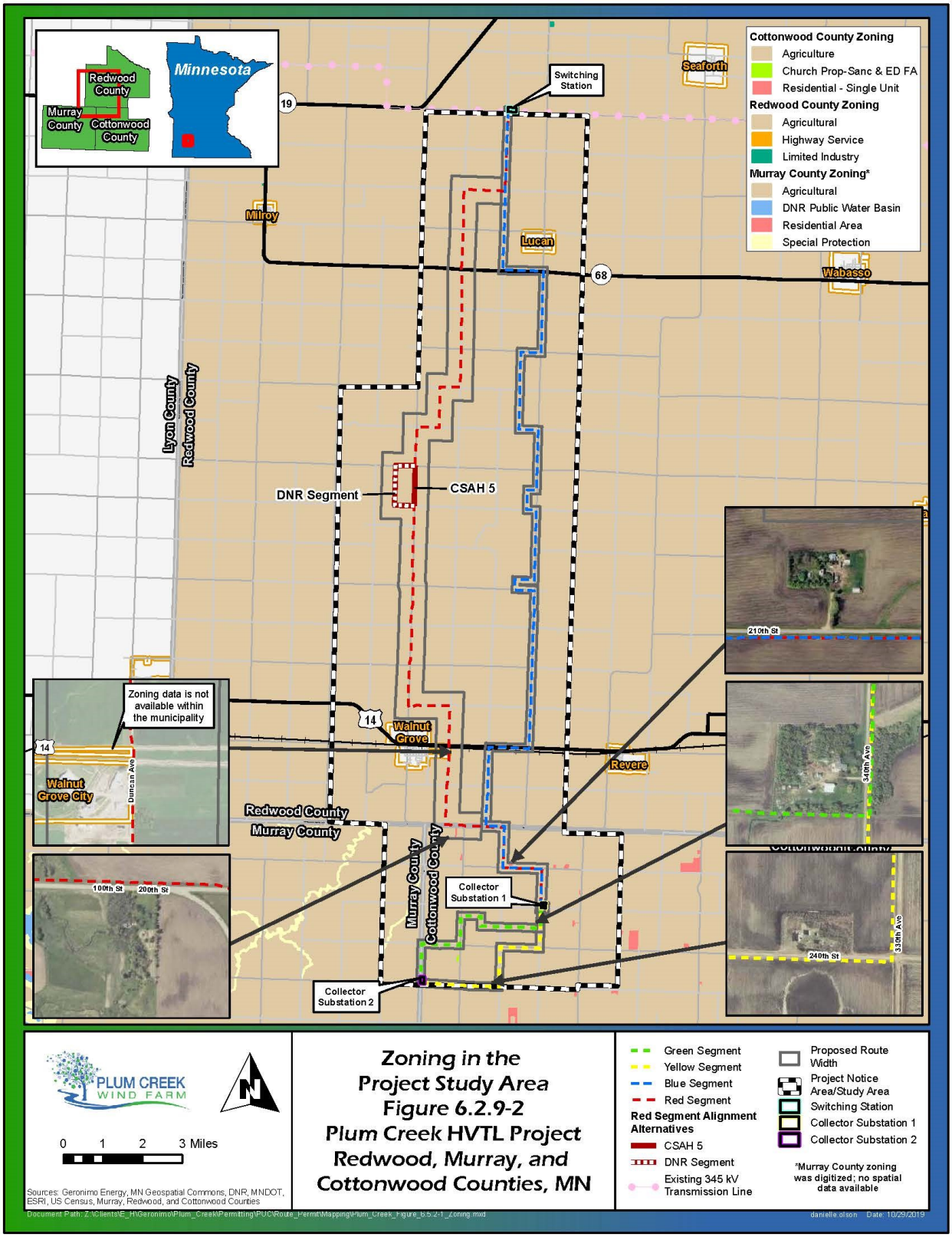
6.2.9.2 Zoning

The HVTL Project is subject to Minnesota's Power Plant Siting Act (Minn. Stat. § 216E). As such, and pursuant to Minn. Stat. § 216E.10, subd. 1, a route permit issued by the Commission, "shall be the sole site or route approval required to be obtained by the utility. Such permit shall supersede and preempt all zoning, building or land use rules, regulations or ordinances promulgated by regional, county, local and special purpose government." Therefore, Plum Creek is not required to apply to county zoning authorities for additional building or land use permits or approvals for the HVTL Project. However, as noted in Section 6.2.9, county zoning information provides important insight into existing human settlement patterns and future development and, for this reason, is presented herein.

Plum Creek reviewed county zoning information for Cottonwood, Murray, and Redwood Counties to identify any additional routing constraints for the proposed transmission line. As noted in Section 6.2.3, NESC standards require certain clearances between transmission line facilities and buildings for safe operation of the transmission line. Areas zoned as commercial, industrial, or residential are the most likely areas where future development of residences and other structures may occur.

Cottonwood, Murray, and Redwood Counties maintain zoning ordinances to regulate land use (Cottonwood County, 2005; Cottonwood County, 2019a; Murray County, 2019; and Redwood County, 2007). As demonstrated with the land use data, and generally in the human settlement section, much of the HVTL Project Study Area is rural and agricultural. However, the counties in the Project Study Area maintain their zoning data at varying levels of granularity, which results in different interpretations of zoning information. For example, both Cottonwood and Redwood Counties display their zoning classifications at the parcel level. In Cottonwood County, farmsteads within the rural landscape (i.e., outside of municipal boundaries) are sometimes classified as single-family residential even though the area surrounding the farmsteads is zoned as agricultural. This results in pockets of smaller areas zoned as single-family residential within an area that is predominantly zoned as agricultural. Single-family residential zoning in this context is different than in an urban area or municipality where single-family residential zones

are comprised of clusters of residences. While Redwood County displays their zoning data at the same scale (i.e., parcels), farmsteads outside of municipal boundaries are not zoned as residential, but agricultural. Murray County displays its zoning classifications at the county level, which lends more consistency to the distinction between residential and agricultural zones within the county. Zoning for the HVTL Project Study Area is depicted on Figure 6.2.9-2.


Minnesota
Redwood County
Murray County
Cottonwood County
Cottonwood County Zoning
Agriculture
Church Prop-Sanc & ED FA
Residential - Single Unit
Redwood County Zoning
Agricultural
Highway Service
Limited Industry
Murray County Zoning*
Agricultural
DNR Public Water Basin
Residential Area
Special Protection
Switching Station
Seaforth
Milroy
Lucan
Wabasso
19
68
Lyon County
Redwood County
DNR Segment
CSAH 5
210th St
Zoning data is not available within the municipality
14
Walnut Grove
Walnut Grove City
Duncan Ave
Revere
340th Ave
Redwood County
Murray County
Murray County
Cottonwood County
Collector Substation 1
Collector Substation 2
100th St
200th St
240th St
330th Ave
PLUM CREEK WIND FARM
0 1 2 3 Miles
Zoning in the Project Study Area
Figure 6.2.9-2
Plum Creek HVTL Project
Redwood, Murray, and Cottonwood Counties, MN
Green Segment
Yellow Segment
Blue Segment
Red Segment
Red Segment Alignment Alternatives
CSAH 5
DNR Segment
Existing 345 kV Transmission Line
Proposed Route Width
Project Notice Area/Study Area
Switching Station
Collector Substation 1
Collector Substation 2
*Murray County zoning was digitized; no spatial data available
Sources: Geronimo Energy, MN Geospatial Commons, DNR, MNDOT, ESRI, US Census, Murray, Redwood, and Cottonwood Counties
Document Path: Z:\Clients\E_H\Geronimo\Plum_Creek\Permitting\PUC\Route_Permit\Mapping\Plum_Creek_Figure_6.5.2-1_Zoning.mxd
danielle.olson Date: 10/29/2019

As noted in Section 6.2.9.1, all of the Application segments were developed to predominantly cross cultivated crop and developed land along existing roadways and property lines and avoid residential areas. The Green Segment crosses one mile of land zoned as agricultural in Murray County (Murray County, 2019). In Cottonwood County, the Green Segment crosses one parcel that is zoned as residential, just south of the Wind Farm Collector Substation 1 (Cottonwood County, 2019a). The Yellow Segment predominately crosses land zoned as agricultural; however, the Yellow Segment crosses two parcels zoned as residential: one is located at the corner of 240th Street and 330th Avenue, and the other is the same parcel identified above that the Green Segment crosses (this portion of both segments is a shared corridor for the Yellow and Green Segments; Cottonwood County, 2019a). Neither the Green or Yellow Segments cross any areas zoned as commercial or industrial.

In Cottonwood County, the Blue Segment predominately crosses land zoned as agricultural and crosses one parcel zoned as residential (Cottonwood County, 2019a). The Blue Segment does not cross any areas zoned as commercial or industrial in Cottonwood County. In Redwood County, the Blue Segment only crosses land zoned as agricultural; it does not cross commercial, industrial, or residential zoning classifications (Redwood County, 2019; Figure 6.2.9-2).

In Cottonwood County, the Red Segment predominately crosses land zoned as agricultural and crosses two parcels zoned as residential. The Red Segment does not cross any areas zoned as commercial or industrial in Cottonwood County. In Redwood County, the Red Segment crosses one quarter of a mile of within the municipal boundary of Walnut Grove (Figure 6.2.9-2). Zoning data is not available within the municipal boundary of Walnut Grove.

6.2.9.3 Impacts and Mitigation – All Segments

Construction and operation of the HVTL Project is not expected to have a significant impact on land use within Cottonwood, Murray, and Redwood Counties. Existing land uses will experience minimal, short-term impacts during the period of construction. As described in Section 3.4, Plum Creek sited the Application segments to be co-located with roads, railroads, or property lines for the entirety of their length to minimize impacts to non-developed areas. When transmission line construction is complete, Plum Creek will restore Project workspaces as described in Section 5.3, and land uses will be allowed to continue as before. No additional mitigation measures are proposed. For a more detailed discussion of impacts and mitigation measures that will be employed in agricultural land, refer to Section 6.3.1.

The Application segments predominantly cross areas zoned as agricultural in Cottonwood, Murray, and Redwood Counties. Though a few smaller pockets of residential zoning are crossed by the Application segments in all counties, all of the Application alignments are sited outside of the residential parcel boundary, and on the opposite side of the road, thereby avoiding direct impacts to parcels zoned as residential. No areas zoned as commercial or industrial are crossed by the Application segments. Based on review of the zoning information for Cottonwood, Murray, and Redwood Counties, the likelihood of future residential, commercial, or industrial development within the Application segments is low; therefore, no mitigation measures are proposed.

6.2.10 Public Services

Transmission line projects have the potential to impact public services during both construction and operation. This section provides information about public services in the HVTL Project Study Area including police, fire, and ambulance services; hospitals; water and wastewater services; school districts; utilities; and other public services such as public utility infrastructure. It also discusses whether the Project has the potential to affect these public services. A discussion of potential Project effects on radio, television, cellular phone, and global positioning systems; transportation; and farming operations, vehicle use, and metal buildings near power lines is provided in Sections 6.2.11 through 6.2.13.

Use of heavy equipment during construction presents the potential for injuries such as falls, equipment-use related injuries, or electrocution. Operation of a transmission line presents a potential risk to public safety if the transmission line or structures are damaged by inclement weather or not operated in compliance with safety standards. Injuries as a result of construction or operation of a transmission line project would require use of local emergency services such as police, fire, ambulance, or hospitals and could affect the availability of these services to the local population.

The influx of large numbers of non-local personnel to an area has the potential to increase enrollment in local school districts, if the non-local personnel are accompanied by their families. Finally, the location of existing utilities is one of the factors to be considered when siting of a transmission line. While co-location with existing utilities is encouraged, any co-location with existing utilities should be done in a way that avoids impacting the safe operation and routine maintenance of those utilities.

6.2.10.1 Police, Fire, and Ambulance Services

Within the HVTL Project Study Area, local law enforcement and emergency response agencies are available in Cottonwood, Murray, and Redwood Counties and nearby communities, and Cottonwood, Murray, and Redwood Counties have sheriff departments that provide services to their respective counties. Additionally, the cities of Windom, Redwood Falls, Marshall, Lamberton, and Wabasso have local police departments. Fire services within the area are provided by city and community fire departments, including Windom, Redwood Falls, Marshall, Lamberton, and Wabasso.

Ambulance response is provided by local ambulance services. The Windom Ambulance Service provides response services to a 200-square-mile region surrounding Windom, Minnesota. North Memorial Health Ambulance provides service to area surrounding Marshall, Minnesota, including Redwood Falls. The Wabasso Ambulance Association provides ambulance service in the center of Redwood County, Minnesota.

6.2.10.2 Hospitals

Hospitals within the HVTL Project Study Area include the Redwood Area Hospital in Redwood Falls, Windom Area Health in Windom, and Murray County Medical Center in Slayton. Smaller medical clinics or medical centers in the area include the Murray County Clinic in Fulda, Mayo Clinic Health System in Lamberton, Sanford Tracy Walnut Grove Clinic in Walnut Grove,

Sanford Tracy Medical Center in Tracy, Sanford Westbrook Clinic in Westbrook, and various eye clinics, dental offices, and chiropractors.

6.2.10.3 School Districts

School districts in the HVTL Project Study Area include Redwood Falls (Independent School District [ISD] 2837), Wabasso (ISD 640), Milroy (ISD 635), Red Rock Central (ISD 2884), Westbrook-Walnut Grove (ISD 2898), Windom (ISD 177), Fulda (ISD 505), Tracy Area (ISD 2904), and Murray County Central (ISD 2169).

6.2.10.4 Water and Wastewater Services

In the rural areas within the HVTL Project Study Area, residents often use private septic systems and wells. Cottonwood, Murray, and Redwood Counties provide septic system services to rural areas without access to water treatment facilities. In cities and townships around the HTVL Project Study Area, municipal water and sewer services are provided, including in Walnut Grove and Lucan. The majority of residences in the HVTL Project Study Area have private septic systems.

6.2.10.5 Utilities

Within the HVTL Project Study Area, electric utilities are provided by Nobles Cooperative Electric, South Central Electric Association, and Redwood Electric Coop. Natural gas for the HVTL Project Study Area is provided by Great Plains Natural Gas Company and Minnesota Energy Resources Corporation. In addition to the Great Plains Natural Gas Company and Minnesota Energy Resources Corporation's facilities, the Blue and Red Segments also cross one Northern Natural Gas pipeline in Redwood County. The Green and Yellow Segments do not cross existing pipelines.

6.2.10.6 Other Public Services

Other public services within the HVTL Project Study Area are located primarily within municipalities. Public works and utility departments design, build, and maintain streets and sidewalks, sanitary sewers, water mains, and public landscaping. Public facilities within municipalities in the HVTL Project Study Area include swimming pools, ice rinks, parks, and libraries.

6.2.10.7 Impacts and Mitigation – All Segments

No impacts to the availability of emergency services and schools, or impacts to existing utilities as a result of the HVTL Project are anticipated. Plum Creek will coordinate with utility providers and authorities, including emergency services, to determine the locations of facilities, appropriate safety precautions and standards, and measures to address these precautions and standards. Plum Creek may meet with utility providers and residents as needed to avoid direct and indirect impacts to their services.

HVTL Project activities could damage existing pipelines during grading, but this is improbable. Prior to construction, Plum Creek will locate and mark underground utilities using the Gopher

State One-Call system. If Plum Creek needs to cross an underground utility or other underground infrastructure with heavy equipment, they will employ BMPs to protect the infrastructure, such as construction matting.

Because no impacts to public services are anticipated, no mitigation measures are proposed.

6.2.11 Radio, Television, Cellular Phone, and Global Positioning System

Operation of transmission lines has the potential to interfere with reception of radio, television, cellular, and Global Positioning System (GPS) signals. Corona, as well as spark discharge, from transmission line conductors can generate electromagnetic "noise" at the same frequencies that some radio, television, cellular, and GPS signals are transmitted. Electromagnetic noise, which typically occurs from about 0.1 to 50 megahertz (MHz), can interfere with the reception of these signals, depending on the frequency and overall strength of the radio and television signal.

Plum Creek conducted online research to identify radio, television, and cell phone towers located within the HVTL Project Study Area. The results of this review and a discussion of potential impacts to these services from operation of the Project are presented below.

6.2.11.1 Radio

There are numerous AM and Frequency Modulation (FM) radio broadcasting stations such as KNSW (91.7 FM), KARZ (94.7 FM), KUSQ (95.1 FM), KKCK (99.7 FM), KWOA (730 AM), KNUJ (860 AM), KKOJ (1050 AM), and KMHL (1400 AM) that operate or can be heard within the HVTL Project Study Area.

6.2.11.2 Television

There are more than 45 channels broadcast in the HVTL Project Study Area; these channels would be received from cities including Redwood Falls, Mankato, and Worthington, Minnesota.

6.2.11.3 Cellular Phone

There are two cellular phone towers located within the HVTL Project Study Area, one in Walnut Grove and the other 2.4 miles northwest of Walnut Grove. Several cellular phone service providers operate in the vicinity of the Application segments, including large carriers like Verizon, AT&T, Sprint, T-Mobile, Virgin Mobile, Boost Mobile, Cricket, Straight Talk, and Republic Wireless.

6.2.11.4 Global Positioning System

GPS applications are important components of daily life, used in aviation, vehicle navigation, surveying, and agricultural activities. GPS equipment relies on satellites and typically mobile receiver equipment to provide locational information for navigation between endpoints, as well as geographic orientation for farm and other equipment. GPS equipment is likely used throughout the HVTL Project Study Area.

6.2.11.5 Impacts and Mitigation – All Segments

No impacts on radio, television, cellular phones, or GPS units are expected from construction or operation of any of the Application segments.

Amplitude Modulation (AM) radio frequencies are most commonly affected by corona-generated noise. Interference from a spark discharge source can be found and corrected. AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly within the right-of-way to either side. If radio interference from transmission line corona does occur, satisfactory reception from AM radio stations previously providing good reception can be restored by appropriate modification of (or addition to) the receiving antenna system.

Television broadcast frequencies are typically high enough that they are not affected by corona-generated noise. In particular, digital and satellite television transmissions are not affected by corona-generated noise because they are dependent on packets of binary information, or transmitted in the Ku band of radio frequencies (12,000-18,000 MHz), respectively. Digital and satellite transmissions are more likely to be affected by multi-path reflections (shadowing) generated by nearby towers. In addition, line-of-sight interference from transmission line structures can affect satellite television transmissions. The use of shielded coaxial cable for cable television transmittals generally makes them insusceptible to interference from electromagnetic noise. Interference to digital and satellite signals as a result of the HVTL Project is not anticipated. If interference to these signals were to occur from multi-path reflections or line-of-sight interference, such interference can be mitigated by use of an outdoor antenna to improve digital signals or by moving the affected satellite antenna to a slightly different location.

Cellular phone signals use an ultra-high frequency, generally around 900 MHz, which is significantly higher than the range of electromagnetic noise generated by transmission line conductors. GPS signals operate at a higher frequency as well, within the range of 1,225 to 1,575 MHz. Because both cellular phone signals and GPS operate at frequencies outside the range of electromagnetic noise generated by transmission line conductors, the risk of interference is negligible.

6.2.12 Transportation

Transmission line projects have the potential to affect local transportation networks such as roadways, railroads, airports, and airstrips. Use of heavy equipment during construction may damage existing road surfaces and local roadways could experience temporary road and/or lane closures during construction. In addition, the influx of construction contractors could increase traffic volumes on local roadways. Co-location of transmission lines with existing public roads could limit future roadway expansion or realignments, and could interfere with routine maintenance of roadways. In addition, if a transmission line is sited too close to an operating railroad, it could interfere with safe operation of the railroad.

The Federal Aviation Administration (FAA) and the MNDOT have both established guidelines for development of transmission lines near public airports. The FAA has developed height restrictions for development near public airports and has developed guidelines for placement of buildings and other structures near high frequency omni-directional range navigation systems.

MNDOT has established zoning areas around public airports that restrict the area where buildings and other structures can be placed. Both the FAA and MNDOT guidelines apply only to public airports and are not applicable to private airstrips.

Plum Creek conducted online research to identify roadways, railroads, airports, and airstrips within the HVTL Project Study Area. The results of this review and a discussion of potential impacts to these features from construction and operation of the Project is presented below.

Roadways

The Green and Yellow Segments do not cross and are not co-located with any United States or state highways; these segments primarily cross and are co-located with CSAHs and township roadways (refer to Table 6.2.12-1). U.S. Highway 14 and State Highway 68 are the main roadways crossed by the Blue and Red Segments. U.S. Highway 14 extends east to west across southern Redwood County and passes through the Town of Walnut Grove in the HVTL Project Study Area and Revere and Tracy east and west of the HVTL Project Study Area, respectively. State Highway 68 extends east to west across central Redwood County and passes through Wabasso and Milroy east and west of the HVTL Project Study Area, respectively. Multiple paved county roads are crossed by or exist within the HVTL Project Study Area for both the Blue and Red Segments, along with numerous other paved and unpaved roads.

Traffic volumes are relatively low on most roads crossed by the Application segments, as expected given the rural nature of the area (refer to Table 6.2.12-1). Annual Average Daily Traffic (AADT) rates are highest near Walnut Grove on U.S. 14 (1750) and Lucan on Minnesota Highway 68 (1150), followed by CSAHs (ranging from 165-640) and then county and township roads (ranging from 20-80).

Table 6.2.12-1
Annual Average Daily Traffic on Roads Co-located with the Application Segments

Segment	Road	County	AADT	Traffic Count Year	Co-located Distance (miles)
Green	CSAH 7	Cottonwood	600	2016	0.5
	340th Avenue	Cottonwood	40	2016	0.5
Yellow	CSAH 11	Cottonwood	55	Prior to 2012	2.0
	CSAH 11	Cottonwood	40	Prior to 2012	1.0
	340th Avenue	Cottonwood	40	2016	1.0
Blue	210th Street	Cottonwood	25	Prior to 2012	1.0
	CSAH 45	Cottonwood	165	2015	0.5
	U.S. 14	Redwood	1750	2017	1.0
	CSAH 10	Redwood	200-230	2015	9.25
	160th Street	Redwood	50	Prior to 2013	0.5
	220th Street	Redwood	20	Prior to 2013	0.5
	Minnesota Highway 68	Redwood	1150	2017	1.0
Red	210th Street	Cottonwood	25	Prior to 2012	1.0

Table 6.2.12-1
Annual Average Daily Traffic on Roads Co-located with the Application Segments

Segment	Road	County	AADT	Traffic Count Year	Co-located Distance (miles)
	CSAH 7	Cottonwood	640	2016	1.5
	Duncan Avenue	Redwood	370	Prior to 2013	3.0
	CSAH 5	Redwood	495	2015	5.1
	County Road 74/250th Street	Redwood	80	2015	1.0

Source: Minnesota Department of Transportation (MNDOT), 2019

Railroads

The Green and Yellow Segments do not cross and are not co-located with railroads. Both the Blue and Red Segments cross one Dakota, Minnesota and Eastern (DME) Railroad east of Walnut Grove. The Blue Segment overlaps this railroad for one mile between Eagle Avenue and CSAH 10 and parallel to U.S. 14. In this location, the transmission alignment is proposed immediately outside the U.S. Highway right-of-way, and over 300 feet from the rail line. The Red Segment crosses the DME Railroad along Duncan Avenue, immediately east of Walnut Grove.

Airports and Airstrips

There are no operating public-use or private-use airports or heliports in the HVTL Project Study Area. The nearest public airport is located approximately 4.5 miles west of the HVTL Project Study Area in Tracy, Minnesota. There are no known private landing strips in the HVTL Project Study Area.

Aerial crop dusting can be an important part of agricultural activities within the HVTL Project Study Area and various fields crossed by the Application segments may be subject to these activities.

6.2.12.1 Impacts and Mitigation – All Segments

Roadways

Construction activities are not expected to permanently or significantly impact transportation in the HVTL Project Study Area. Construction could create a minor increase in traffic from construction vehicles and material/equipment delivery along these and other roadways; however, this increase would be temporary and traffic volumes would return to normal conditions after construction activities are completed. Line and construction maintenance at crossing locations could also cause temporary delays if maintenance vehicles are present. To minimize overall impacts, Plum Creek will limit vehicle traffic to the HVTL Project right-of-way and existing access points to the greatest extent feasible.

Temporary road or lane closures may occur during the construction process to ensure safety of the construction crews and the traveling public. While the line is being constructed, the electrical conductors will be strung on support structures using a pulley system or a tensioner mounted on the back of a digger/derrick truck. At road crossings, roads or lands may be temporarily closed for safety purposes when stringing electrical conductors between support structures. These closures could range in duration from minutes to hours based on the width of the road and the complexity of the crossing. Temporary closings are not expected to have significant impacts on transportation in the area because of the generally rural nature of the area and subsequent low traffic levels on most roads. Once an aerial crossing is completed, the road(s) will be reopened to allow normal traffic flow.

The Blue Segment parallels U.S. Highway 14 on the south side of the eastbound lane for approximately one mile east of Walnut Grove. Any occupation of state highway right-of-way requires a Utility Permit from the MNDOT, per Minn. R. Ch. 8810.3100-3600. MNDOT's Accommodation Policy provides requirements and guidelines for the installation of utility facilities in and along MNDOT rights-of-way, which the HVTL Project was developed to meet. Plum Creek has begun coordinating with MNDOT and will continue to work with MNDOT throughout the Route Permit process to ensure that the Application alignment meets MNDOT guidelines.

As noted in Section 5.3, after the completion of construction, Plum Creek will ensure that township, city, and county roads used for purposes of access during construction are returned to either the condition they were in, or better, before right-of-way clearing began. Plum Creek will meet with township road supervisors, city road personnel, or county highway departments to address any issues that arise during construction with roadways to ensure the roads are adequately restored, if necessary, after construction is complete.

Railroads

Impacts to the DME Railroad are not anticipated as a result of construction and operation of the HVTL Project. Plum Creek will obtain all necessary railroad crossing permits from DME for their rail line. Plum Creek will also coordinate with the appropriate railroad personnel during construction to schedule electrical conductor stringing over the rail line for the safety of construction personnel and rail line operations.

Airports and Airstrips

Plum Creek does not anticipate any impacts to airports and airstrips because there are none in the HVTL Project Study Area. Plum Creek will coordinate with the FAA and MNDOT to address any HVTL Project-related concerns for aviation activities as the HVTL Project progresses and more detailed design information becomes available, including specific structure locations and heights above ground.

Crop-dusting operations servicing fields crossed by existing transmission lines will have already accommodated the presence of a transmission line. Plum Creek will mail notice of the Application filing to aerial applicators registered with the Minnesota Agricultural Aircraft Association in the HVTL Project Study Area.

6.3 Land Based Economies

Construction and operation of the HVTL Project has the potential to affect land-based economies in Cottonwood, Murray, and Redwood Counties through introduction of a physical, long-term presence which could prevent or otherwise limit use of the land for other purposes. The placement of transmission line structures in cultivated cropland has the potential to interfere with farming operations, if co-location with field edges and roadways is not possible due to other routing constraints. Interference with farming operations can negatively affect farm income. Additionally, trees and structures are not allowed within transmission line rights-of-way due to safety concerns, a restriction that could affect forestry businesses along the right-of-way, if present. Impacts to tourism could result from an aesthetic change to the predominantly agrarian landscape and interruption of public access to nearby recreational and tourism opportunities. Placement of transmission line towers near mining operations could interfere with access to existing mines and could limit the expansion of the mines. The following subsections present an overview of agricultural, forestry, tourism, and mining operations in the HVTL Project Area and discuss how the proposed Application segments may affect these industries and what measures Plum Creek will implement to mitigate Project effects.

6.3.1 Agriculture

As described in Section 6.2.9.1, the predominant undeveloped land cover type crossed by the Green, Yellow, Blue, and Red Segments in Cottonwood, Murray, and Redwood Counties is cultivated crop land. According to the USDA's 2012 Census of Agriculture, the average farm size in the three counties was similar, averaging 454 acres, and generally larger than the average size of all Minnesota farms (349 acres). As shown in Table 6.5.3-1 in Section 6.5.3, most of the soils crossed by the four segments are classified as "Prime Farmland" and "Farmland of Statewide Importance." Prime farmland crossed by the Application segments is described in Section 6.5.3.2. In summary, about 95 percent of the soil crossed by the Green Segment, 98 percent of the soil crossed by the Yellow Segment, 94 percent of the soil crossed by the Blue Segment, and 91 percent of the soil crossed by the Red Segment is identified as prime farmland.

Crop sales account for a larger percentage of total market value of agricultural products compared to livestock sales in Cottonwood County ($234 million vs. $140 million, annually), Murray County ($233 million vs. $133 million, annually), and in Redwood County ($365 million vs. $153 million, annually). Corn and soybeans are the dominant agricultural crops by acreage in all three counties followed by forage crops in Cottonwood and Murray Counties, and sugar beets in Redwood County. Cattle, hogs and pigs, and sheep and lambs are the dominant livestock raised in all three counties. Agricultural statistics for the counties crossed by the Application segments are summarized in Table 6.3.1-1.

Table 6.3.1-1
Agricultural Statistics of Counties Crossed by the Application Segments

Segment	County	Number of Farms	Average Farm Size (acres)	Land in Farms (acres)	Market Value of Agricultural Production - Crops	Top 3 Crops by Acreage	Market Value of Agricultural Production - Livestock	Top 3 Livestock Inventories by Farms
State of Minnesota	All	74,542	349	26 million (46.7 % of state)	$13.9 million (65.2 %)	Corn, soybeans, forage	$7.4 million (34.8 %)	Cattle, poultry, hogs and pigs
All	Cottonwood	813	459	372,767 (92 % of county)	$234 million (63 %)	Corn, soybeans, forage	$140 million (37 %)	Cattle, hogs and pigs, sheep and lambs
Green	Murray	895	456	407,919 (88 % of county)	$233 million (64 %)	Corn, soybeans, forage	$133 million (36 %)	Cattle, hogs and pigs, sheep and lambs
Blue, Red	Redwood	1,163	448	521,453 (93 % of county)	$365 million (70 %)	Corn, soybeans, sugar beets	$153 million (30 %)	Cattle, hogs and pigs, sheep and lambs

Source: USDA, 2012

Specialty crops typically include nurseries, vineyards, orchards, citrus groves, dairies, aquaculture, and tree farms. If present along the Application segments, specialty crop farms (e.g., organic farms) or livestock operations may necessitate additional specific mitigation measures to minimize the effects of construction. To date, no farmland engaged in specialty crop production has been identified along any of the Application segments. Plum Creek will continue to work with individual landowners through the easement process to identify any specialty crops or livestock operations that may be impacted by the Application segments. If any specialty crops or livestock operations are identified, Plum Creek will work with landowners to determine measures to avoid and minimize impacts to these resources.

Some of the cultivated crop areas along the Green, Yellow, Blue, and Red Segments are enrolled in the Conservation Reserve Enhancement Program (CREP). The CREP is an offshoot of the Conservation Reserve Program (CRP), which is a land conservation program established by the USDA and administered by the Farm Service Agency that pays farmers a yearly rental fee for agreeing to take environmentally sensitive land out of agricultural production in an effort to improve environmental health and quality (USDA, 2019). Minnesota implemented the CREP to target state-identified, high-priority conservation issues by offering payments to farmers and agricultural landowners to retire environmentally sensitive land using the Reinvest in Minnesota (RIM) Reserve Program (Minnesota Board of Water and Soil Resources [BWSR], 2019). Enrollment in the CRP and CREP is voluntary and participation in the program comes with certain restrictions on the types of development allowed on parcels enrolled in the program, if such development is inconsistent with the conservation goals of the program.

No CREP parcels have been identified within the 150-foot right-of-way of the Green or Yellow Segments. Seven CREP parcels have been identified within the 150-foot right-of-way of the Blue Segment and five of these CREP parcels are also part of the RIM program. Six CREP parcels have been identified within the 150-foot right-of-way of the Red Segment and two of these are also part of the RIM program. Easements are mapped on Figure 6.2.9-1 in Section 6.2.9.

6.3.1.1 Impacts and Mitigation

Construction of the HVTL Project could cause minimal, temporary impacts to farmland from soil compaction and rutting, accelerated soil erosion, crop damage, temporary disruption to normal farming activities, and introduction of noxious weeds to the soil surface. Table 6.3.1-2 summarizes the impacts of the Application segments on farmland. During construction, a portion of prime farmland will be taken out of agricultural production due to the development of the HVTL Project. However, the impacts will not have a significant impact on total prime farmland within the state of Minnesota or within Cottonwood, Murray, and Redwood Counties.

Table 6.3.1-2
Summary of Impacts of the Application Segments on Agricultural Land

Resource	Green Segment	Yellow Segment	Blue Segment	Red Segment
Farmland Area Comparison				
Segment Length (miles)	5.5	5.0	26.1	26.8
150-foot Right-of-Way (acres)	99.2	90.0	473.6	486.6
Cultivated Crop Land in 150-Foot Right-of-Way (acres)[1]	64.5	43.1	250.4	257.3
Number of Structures in Cultivated Crop Land (based on preliminary engineering design)[1]	45	41	212	216
Total Impact from Structures in Cultivated Crop Land (acres)	0.1	0.1	0.3	0.3

[1] Agricultural land includes row crops. Pasture and hay are not included as they are classified separately in Table 6.2.9-1 in Section 6.2.9.1. All segments are co-located with roads for the majority of their lengths, which are classified as developed. Where structures are adjacent to roads (developed), the next closest land use type was used to reflect that poles will not be placed on roadways.

Plum Creek will implement measures to reduce compaction, soil erosion, and the introduction of noxious weeds. Construction impacts to farmland would be short term and minimal in nature and would be mitigated through the proper use and installation of BMPs, such as minimizing the number of vehicles and protection and maintenance of topsoil during right-of-way clearing and generation-tie-line construction. Plum Creek will further mitigate impacts on agricultural production by coordinating with landowners or farm operators regarding the timing of construction to avoid peak growing season by constructing the HVTL Project before spring planting or after harvest in the fall. If this is not possible, Plum Creek will compensate the landowner or farm operator for crop damage, including any compaction that results from construction. See Section 5.0 for a discussion of construction methods and operation and maintenance procedures.

The Application segments were developed with attention to minimizing impacts to agricultural land; however, permanent impacts to agricultural land will occur where structures are placed in cultivated fields. Structures in cultivated fields act as barriers and can hinder efficient operation of large machinery. As described in Section 4.0, the proposed Application alignments predominately follow roads and property lines. Plum Creek proposes to minimize impacts to agricultural land by placing structures along field edges, as closely as feasible (approximately 10 feet) from the edge of road rights-of-way or parcel lines. Furthermore, Plum Creek will work with landowners to finalize the structure locations. The final spacing and location of structures will be designed to accommodate the movement of farm equipment within agricultural fields while still maintaining safety and design standards. The estimated permanent impacts from each transmission structure foundation will be up to 9 feet in diameter at the surface. Refer to Table 6.3.1-2 for an estimate of total acres of permanent impact from structures in agricultural lands. In addition, Plum Creek estimates that the proposed Switching Station will result in up to approximately 15 acres of construction impact on agricultural land.

Plum Creek has designed the proposed Application segments to avoid CREP and RIM parcels to the extent practicable. If final Project design requires transmission line structures to be placed on parcels enrolled in the CREP or RIM programs, Plum Creek will work with landowners and BWSR to address potential impacts to these conservation easements and to fully compensate landowners for lost CREP revenue resulting from the placement of the line within a CREP easement.

Post-construction restoration efforts will include restoration of any temporary access modifications and deep plowing to remove compaction. Both crop and livestock activities will be able to continue around HVTL Project facilities after construction. While no impacts to agricultural land are anticipated during operation of the HVTL Project, if impacts to crops do occur during operation or maintenance of the transmission line, Plum Creek will compensate the landowner or farm operator for crop damages.

Finally, Plum Creek will work with the Minnesota Department of Agriculture (MDA) to develop an Agriculture Impact Mitigation Plan. This plan will outline best practices to minimize and mitigate for agriculture impacts. including measures to protect agricultural land.

6.3.2 Forestry

There are no forestry operations along the Application segments right-of-way. Wooded areas along the four segments consist of isolated rows of trees that are used as shelter belts or wind breaks along the edges of agricultural fields or surrounding farmsteads and in riparian areas along waterbodies. Plum Creek made every effort to site the four segments in a way that minimizes tree clearing. Where possible, the Application alignments either cross a road to avoid tree clearing or are routed on the side with fewer trees.

6.3.2.1 Impacts and Mitigation

No forestry operations are present along the Application segments; therefore, no mitigation measures specific to forestry operations are proposed. The HVTL Project may result in the removal or trimming of trees within and/or adjacent to the transmission line right-of-way to ensure it is clear of obstructions. Vegetation management is necessary for the safe operation of the transmission line as tree branches can cause stress on transmission lines and increase the risk of outages, especially in areas with a strong wind resource, which is typical of this area of the state.

To the extent possible, Plum Creek will minimize the need for trimming and removal of trees during construction and operation of the transmission line. Where trimming of trees is necessary, it will be performed by an arborist familiar with best practices for tree trimming so as to minimize stress on the tree.

6.3.3 Tourism

Tourism in the HVTL Project Study Area centers around outdoor recreational opportunities described in Section 6.2.8 and various festivals and activities hosted by the cities within the HVTL Project Study Area, Walnut Grove and Lucan.

The Laura Ingalls Wilder Museum and Gift Store is in Walnut Grove just south of the intersection of U.S. 14 and 8th Street and approximately 0.7 mile west of the Red Segment (Walnutgrove.com, 2017). The museum is open between April and October and features collections of historical documents, quilts, and other household items that belonged to the Ingalls family, as well as memorabilia from the popular television show *Little House on the Prairie*. The museum is spread out between a number of buildings including an 1898 depot, a chapel, an onion-domed house, a dugout display, little red schoolhouse, early settler home, and a covered wagon display.

In addition to the Laura Ingalls Wilder Museum, another popular tourist attraction is the Ingalls Dugout Site (a NHRP-nominated site – *see* Section 6.4), located approximately 1.5 miles north of the town of Walnut Grove and approximately 250 feet east of the Red Segment along the banks of Plum Creek (Walnutgrove.com, 2017). The site is located on private land but is open to tourists between May and October each year. Additional information about the historical significance of the Ingalls Dugout Site is provided in Section 6.4.

Various festivals associated with the museum are held each year during the month of July including the Wilder Pageant, Family Festival, Little House TV Cast Reunion, Black Powder Shoot Rendezvous, Laura and Nellie Look-alike Contest, and various bus and walking tours (Walnutgrove.com, 2017).

According to their website, the City of Lucan hosts three main public events each year: The St. Patrick's Day Parade in March, the Booster Club Golf Day held the Monday after the 4th of July, and Pretzel Days which is held the second weekend in June each year (Lucanmn.net, 2019).

Outside these municipalities, residents and tourists enjoy recreational opportunities at the NWRs, WMAs, snowmobile trails, and county parks in the HVTL Project Study Area. See Section 6.2.8 for more details on recreation.

6.3.3.1 Impacts and Mitigation

Construction of the HVTL Project is not anticipated to affect public access to nearby tourism and recreational opportunities. Impacts to tourism would mostly be related to HVTL Project construction, which will be minimal, temporary, and isolated to specific areas throughout the Application segments.

The Application segments would not impact the Laura Ingalls Wilder Museum and Gift Store or the Ingalls Dugout Site. Construction and operation of the HVTL Project is not expected to impact public access to any of the festivals associated with the museum or held by the City of Lucan.

Short-term increases in noise and dust would occur during construction of the HVTL Project, and could detract from public enjoyment of nearby recreational activities and tourism. However, these impacts would be minimal, and use of BMPs to limit noise and fugitive dust during construction would effectively mitigate their effects. Section 6.2.4 discusses how Plum Creek would mitigate potential noise impacts and Section 6.5.1 provides a discussion of how Plum Creek would mitigate fugitive dust emissions during construction of the Project.

Introduction of an aesthetic change to the predominantly agrarian landscape in the HVTL Project Area could impact public enjoyment of available tourist attractions. Plum Creek has minimized impacts to tourism opportunities by siting Application segments to avoid recreation areas and municipalities where tourism opportunities are available. A detailed discussion of how the HVTL Project could impact aesthetics and the measures Plum Creek would use to mitigate aesthetic impacts is provided in Section 6.2.5.

6.3.4 Mining

Mining does not comprise a major industry in the HVTL Project Counties. Gravel operations are found throughout Cottonwood, Murray, and Redwood Counties. However, based on MNDOT's Aggregate Source Information System and County Pit Maps, there are no gravel pits within the Application segments' right-of-way (MNDOT, 2018; MNDOT, 2002; MNDOT, 2003a and 2003b). In the HVTL Project Study Area, there are two gravel pits mapped along the Cottonwood River in the area between the Blue and Red Segments. No gravel pits are mapped within two miles of the Green and Yellow Segments.

6.3.4.1 Impacts and Mitigation

No mining resources are located within the Application segments. Construction of the HVTL Project will require the use of sand and aggregate for structure backfill and to construct reliable access routes for construction equipment. Based on availability, some of the sand and aggregate material could come from sources nearby the HVTL Project Area. Increased demand for sand and aggregate material as a result of the Project would be temporary and limited to the period of construction. Additional new mining operations or expansion of existing mines would not be necessary to satisfy Project demand.

No direct impacts to mining operations will occur as a result of the HVTL Project and no mitigation measures are proposed.

6.4 Archaeological and Historic Architectural Resources

Cultural resources include archaeological and historic architectural resources that provide important information about the history of human occupation and alteration of the landscape over time. Archaeological resources include prehistoric and historic artifacts, structural ruins, or earthworks that are typically found either partially or completely below the ground surface. Historic architectural resources include standing structures, such as buildings and bridges, as well as historic districts and landscapes.

Plum Creek conducted background research on known cultural resources in October 2019 by requesting information from the Minnesota Office of the State Archaeologist (OSA) and the State Historic Preservation Office (SHPO). Data regarding known cultural resources information resulting from previous professional cultural resources surveys and reported archaeological sites and historic architectural resources was received from the agencies and reviewed. This information was used to identify types of archaeological sites that may be encountered and landforms or geographic features that have a higher potential for containing significant cultural resources. This investigation reviewed archaeological and historic architectural resources within

one mile of the Application segments and within each segment's route width. A copy of Plum Creek's literature review is provided in Appendix I.

The Application segments are located within the Prairie Lakes Archaeological Region (Region 2), which covers most of southwestern and south-central Minnesota. It includes Big Stone, Blue Earth, Brown, Carver, Chippewa, Cottonwood, Faribault, Freeborn, Jackson, Lac Qui Parle, Le Sueur, Lyon, McLeod, Martin, Murray, Nicollet, Redwood, Renville, Scott, Sibley, Stevens, Swift, Watonwan, and Yellow Medicine Counties and portions of Douglas, Grant, Kandiyohi, Lincoln, Meeker, Nobles, Otter Tail, Pipestone, Pope, Rice, Steele, Traverse, and Waseca Counties. The region extends into northeastern South Dakota and north central Iowa (Anfinson, 1997).

Regionally, archaeological sites are generally located in proximity to established water resources. Early and Middle Prehistoric sites may be deeply buried in the colluvium and alluvium along major river valleys, especially in the Minnesota River Valley. Middle to late Prehistoric sites can be found on the islands and peninsulas of moderate to large-sized lakes, as well as in the wooded areas of galley forests along the major rivers where indigenous populations would winter. Late Prehistoric sites include large agricultural village sites located on terraces of the major river systems. Large Cambria villages are largely confined to the Minnesota River valley and Oneota villages to the Blue Earth River valley (Anfinson, 1987). Small campsites and special activity sites from all periods are scattered throughout the region.

Contact period sites (circa 1700) are typically associated with the Yankton and Wahpeton-Sisseton Dakota and found along the Minnesota River. Early Anglo fur traders such as the French, English, and eventually Americans established posts along the upper Minnesota River between 1750-1800. American traders established posts further into the wooded interior by the early 1800s.

6.4.1 Previously Recorded Archaeological and Historic Architectural Resources

Table 6.4.1-1 summarizes the results of Plum Creek's review of OSA and SHPO data for previously recorded archaeological sites, historic architectural resources, and NRHP-listed sites within one mile of the Application segments and within each segment's route width (refer to Section 2.2 for a description of route width along each Application segment). Previously recorded cultural resources identified along each of the Application segments are depicted in Appendix I. A discussion of previously recorded cultural resources along each of the Application segments follows the table.

Table 6.4.1-1
Summary of Previously Recorded Archaeological and Historic Architectural Resources

Cultural Resources Categories	Green Segment		Yellow Segment		Blue Segment		Red Segment	
	Within 1 Mile of Segment	Within Segment	Within 1 Mile of Segment	Within Segment	Within 1 Mile of Segment	Within Segment	Within 1 Mile of Segment	Within Segment
Total Archaeological Sites	0	0	0	0	3	0	7	1
Total Eligible for NRHP [1]	0	0	0	0	0	0	1 [2]	0
Number of Historic Architectural resources	1	0	2	0	8	1	12	1
Total Eligible for NRHP [1]	0	0	0	0	1	0	1	0
Total Previously Recorded Cultural Resources	**1**	**0**	**2**	**0**	**11**	**1**	**19**	**2**
Total NRHP-eligible Resources	**0**	**0**	**0**	**0**	**1**	**0**	**2**	**0**

[1] The number of NRHP-eligible resources shown is a subset of the total number of archaeological sites or historic architectural resources.
[2] The NRHP-nominated archaeological site within one mile of the Red Segment is the Ingalls Dugout Site (Site No. 21RW0048); this site is not within the Red Segment width.

6.4.1.1 Green Segment

No previously recorded archaeological sites were identified within one mile of or within the route width of the Green Segment. One previously recorded historic architectural resource was identified within one mile of the Green Segment; this resource is not present within the Green Segment's route width. The previously recorded architectural resource is St. Olaf Lutheran Church, located along CSAH 7 north of the Green Segment. According to information obtained from OSA and SHPO, this resource was not evaluated for listing in the NRHP.

6.4.1.2 Yellow Segment

No previously recorded archaeological sites were identified within one mile of or within the route width of the Yellow Segment. Two previously recorded historic architectural resources were identified within one mile of the Yellow Segment; these resources are not present within the Yellow Segment's route width. One of the historic architectural resources is St. Olaf Lutheran Church, which is northwest of the Yellow Segment. The second historic architectural resource is the District School No. 43, located along CSAH 10. Neither of these previously recorded historic architectural resources was evaluated for listing in the NRHP.

6.4.1.3 Blue Segment

Three previously recorded archaeological sites were identified within one mile of the Blue Segment. The three previously recorded archaeological sites within one mile of the Blue Segment consist of two precontact lithic scatters and one precontact artifact scatter located along the Cottonwood River and Plum Creek in Redwood County. None of the previously recorded archaeological sites within one mile of the Blue Segment were evaluated for listing in the NRHP. No previously recorded archaeological sites were identified within the Blue Segment's route width.

Eight previously recorded historic architectural resources were identified within one mile of the Blue Segment. The previously recorded historic architectural resources are all within Redwood County and consist of the Tellefsen Farmhouse, Trinity Lutheran Church, Brau Harness Shop, Lucan Section House, the Chicago and North Western Railroad Depot, the Sleepy Eye Milling Company Elevator, Lucan Village Hall, and Trunk Highway 14. Of these eight resources, only the Chicago and North Western Railroad Depot is listed in the NRHP. One previously recorded historic architectural resource was identified within the route width of the Blue Segment. The previously recorded resource is an historic bridge, Bridge 89830; this resource was not evaluated for listing in the NRHP.

6.4.1.4 Red Segment

Seven recorded archaeological sites lie within one mile of the Red Segment in Redwood County. Most notably, the remains of Laura Ingalls Wilder's homesite along Plum Creek lies approximately 250 feet east of the Red Segment's route width (i.e., the Ingalls Dugout Site). This site preserves the collapsed foundation of the former sod house and surrounding landscape which served as the setting for Laura Ingalls Wilder's *Little House on the Prairie* book series. The site also serves as an example of earthen frontier home sites not otherwise well-preserved in the record. Due to the site's historic significance, it was nominated to the NRHP in 1978; however,

Plum Creek reviewed the NRHP database that is maintained by the National Park Service and the Ingalls Dugout Site is not listed in the database (National Park Service, n.d.). The remaining sites consist of five precontact lithic scatters, concentrated primarily along Plum Creek, and one railroad depot (the Walnut Grove Whistle Stop). According to information obtained from OSA and SHPO, none of these resources was evaluated for listing in the NRHP. One previously recorded archaeological site lies within the route width of the Red Segment. This site consists of a precontact lithic scatter that was not evaluated for listing in the NRHP.

Twelve previously recorded historic architectural resources were identified within one mile of the Red Segment. The previously recorded historic architectural resources are all within Redwood County and consist of Walnut Grove High School, Trinity Lutheran Church, Methodist Episcopal Church, Walnut Grove State Bank, Walnut Grove Cooperative Creamery, First State Bank Building, the Lantz House, the Bondeson House, Swoffer & Swoffer Grain Elevator, Bridge No. L6913, Lucan Village Hall, and Trunk Highway 14. Of these 12 recorded historic architectural resources, only the Walnut Grove Cooperative Creamery is listed in the NRHP. One previously recorded historic architectural resource was identified within the route width of the Red Segment. This resource is the Welsh Farmstead in Redwood County; this historic architectural resource was not evaluated for listing in the NRHP.

Additionally, Plum Creek met with the Tribal Historic Preservation Officer of the Lower Sioux Indian Community in January 2019 (*see* Appendix K).

6.4.2 Impacts and Mitigation – All Segments

Transmission line projects have the potential to impact archaeological and historic resources. Archaeological resources could be impacted by the disruption or removal of subsurface archaeological materials, structural remains, or earthworks during transmission line construction. Historic architectural resources may be impacted by the placement of a transmission line within the established viewshed of an historic property, which could affect the integrity of the viewshed in a way that decreases the historic value of the resource.

Information regarding the location of previously documented cultural resource sites was taken into consideration during initial segment design. Plum Creek designed the Application segments to avoid any direct physical impacts to all previously documented archaeological and historic architectural resources identified during the background literature review.

Plum Creek understands the area surrounding Application segments also has potential to contain additional, previously undocumented cultural resources. Archaeological resources would most likely be located on or near elevated landforms near permanent water sources. Historic architectural resources would most likely be located near existing municipalities, farmsteads, and infrastructure such as roads and bridges. After the final Route is ordered by the Commission, and in consideration of the literature search results and coordination with SHPO, Plum Creek will conduct field surveys in high-potential areas that could host previously unrecorded cultural resources. The survey protocol and report will be coordinated with and approved by SHPO. If archaeological or historic architectural resources are identified as a result of field surveys, Plum Creek will work with SHPO to identify measures to avoid, minimize or mitigate any effects to these resources.

If archaeological resources are discovered during construction, ground-disturbing activity will be halted in that location, SHPO will be notified, and appropriate measures will be developed in conjunction with SHPO to assess and protect the resource. Additionally, if unanticipated human remains or burial resources are discovered during construction, they will be reported to the State Archaeologist per Minn. Stat. § 307.08 and construction will cease in that area until adequate mitigation measures have been developed between Plum Creek and the State Archaeologist.

6.5 Natural Environment

Transmission lines have the potential to impact natural resources through temporary, construction-related impacts and long-term impacts to air quality, geology and groundwater, soils, water resources, flora, and fauna. Construction of the HVTL Project would temporarily impact air quality with vehicle emissions and dust, impact bedrock and groundwater resources with structure foundations, temporarily disturb soils and vegetative cover, which could affect water quality in adjacent water resources, and could affect habitat for flora and fauna. Avian species could also be impacted by operation of the HVTL Project through collisions with transmission line structures and conductors.

Potential impacts to natural resources as a result of the HVTL Project are anticipated to be minimal. This assessment is due to the fact that the HVTL Project Study Area is primarily agricultural land with limited natural resource diversity and that impacts to natural resources, to a great extent, can be avoided and mitigated.

6.5.1 Air Quality

Section 109(b) of the Clean Air Act (CAA) requires that the U.S. Environmental Protection Agency (EPA) establish National Ambient Air Quality Standards (NAAQS) "requisite to protect" public health and welfare (40 CFR Part 50). The CAA identifies two classes of NAAQS: primary standards, which are limits set to protect the public health of the most sensitive populations, such as asthmatics, children and the elderly; and secondary standards which are limits set to protect public welfare, such as protection against visibility impairment or damage to vegetation, wildlife and structures. The EPA has promulgated NAAQS for six criteria pollutants: ozone (O_3), particulate matter ($PM_{10}/PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and lead (Pb). Minnesota has been in compliance with the primary and secondary NAAQS for all criteria pollutants since 2002 (MPCA, 2019a).

In Minnesota, air quality is tracked using air quality monitoring stations across the State. The MPCA uses data from these monitors to calculate the Air Quality Index (AQI), on an hourly basis, for O_3, $PM_{2.5}$, SO_2, NO_2, and CO. The pollutant with the highest AQI value for a particular hour sets the overall AQI for that hour. The AQI is used to categorize the air quality of a region as one of five levels of quality: good, moderate, unhealthy for sensitive groups (USG), unhealthy, or very unhealthy (MPCA, 2019b).

The HVTL Project is located nearest to the air quality monitor in Marshall, Minnesota. This station monitors for O_3 and $PM_{2.5}$. The AQI for Marshall for the past five years is provided in Table 6.5.1-1 (MPCA, 2019c).

Table 6.5.1-1
Days in Each Air Quality Index Category (Marshall, Minnesota)

Year	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2017	329	31	0	0	0
2016	336	19	1	0	0
2015	338	26	1	0	0
2014	320	43	1	0	0
2013	291	72	2	0	0

Air quality has been considered good for the majority of the past five reported years in Marshall. Since 2013, the largest number of days classified as moderate or USG occurred in 2013. No days have been classified as unhealthy or very unhealthy.

Potential air quality impacts associated with the HVTL Project come from two primary sources: short-term emissions from construction vehicles and ozone and nitrogen oxide emissions from operating the facility.

6.5.1.1 Impacts and Mitigation – All Segments

During construction, the amount of dust generated would be a function of construction activity, soil type, soil moisture content, wind speed, precipitation, vehicle traffic, vehicle types, and road surface characteristics. Dust emissions would be greater during dry periods and in areas where fine-textured soils are subject to surface activity. If construction activities generate problematic dust levels, Plum Creek may employ construction-related practices to control fugitive dust such as application of water or other commercially available dust control agents on unpaved areas subject to frequent vehicle traffic, reducing the speed of vehicular traffic on unpaved roads, and covering open-bodied haul trucks.

Air emissions during construction would primarily consist of emissions from construction equipment and would include carbon dioxide, NOX, and particulate matter; dust generated from earth disturbing activities would also give rise to particulate matter. Emissions would be dependent on weather conditions, the amount of equipment at any given location, and the period of operation required for construction at that location. Any emissions from construction would be similar to those from agricultural activities common in the HVTL Project Area and would only occur for short periods of time in localized areas.

During operation of the line, air emissions would be minimal. An insignificant amount of ozone is created due to corona from the operation of transmission lines (Electric Power Research Institute, 1982; Whitmore and Durfee, 1973; U.S. Department of Energy, Bonneville Power Administration, 1989). A corona signifies a loss of electricity and Plum Creek has engineered the transmission line so as to limit the corona. The production rate of ozone due to corona discharges decreases with humidity and less significantly with temperature. Rain causes an increase in ozone production, but also accelerates the decay of ozone. Ozone production by high voltage transmission lines is not detectable during fair weather above ambient conditions. Ozone

production under wet-weather conditions is detectable with special efforts, but is still considered insignificant.

Design of the transmission line also influences its ozone production rate. The production rate decreases significantly as the conductor diameter increases and is greatly reduced for bundled conductors over single conductors. The production rate of ozone increases with applied voltage. The emission of ozone from the operation of a transmission line of the voltages proposed for the HVTL Project is not anticipated to have a significant impact on air quality and no mitigation is proposed..

6.5.2 Geology and Groundwater Resources

Minnesota is divided into six groundwater provinces based on bedrock and glacial geology. The aquifers within these provinces occur in two general geologic settings: bedrock, and unconsolidated sediments deposited by glaciers, streams, and lakes. The Application segments would cross the Western Province, which is characterized by 100 to 600 feet of clayey glacial drift overlaying Cretaceous and Precambrian bedrock. Glacial drift and Cretaceous bedrock contain limited-extent sand and sandstone aquifers, respectively. In this province, groundwater within the fractured bedrock is usually buried deeply beneath glacial sediments and is only locally used as an aquifer (MNDNR, 2001).

Plum Creek reviewed all Application segments for EPA-designated sole source aquifers (SSAs), wells listed on the Minnesota County Well Index (CWI), and MDH Wellhead Protection Areas (WHPAs).

The EPA defines a SSA or principal source aquifer area as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, where contamination of the aquifer could create a significant hazard to public health, and where there are no alternative water sources that could reasonably be expected to replace the water supplied by the aquifer (EPA, 2016). There are currently no EPA-designated SSAs crossed by any of the Application segments (EPA, 2017).

The CWI is the most complete record of well construction and location in Minnesota and is kept up-to-date and maintained by the Minnesota Geological Survey, in cooperation with the MDH. A search of the CWI (MDH, 2019a) identified no water supply wells within the 150-foot right-of-way for the Green, Yellow, and Blue Segments and one water supply well within the 150-foot right-of-way. The well within the Red Segment right-of-way is in an agricultural field and not associated with a residence.

Under the Safe Drinking Water Act (SDWA), each state is required to develop and implement a Wellhead Protection Program to identify the land and recharge areas contributing to public supply wells and prevent the contamination of drinking water supplies. The SDWA was updated in 1986 with an amendment requiring the development of a broader-based Source Water Assessment Program, which includes the assessment of potential contamination to both groundwater and surface water through a watershed approach. A WHPA encompasses the area around a drinking water well where contaminants could enter and pollute the well.

Public and non-public community water supply source-water protection in Minnesota is administered by the MDH through the Wellhead Protection Program. WHPAs for public and community water-supply wells are delineated based on a zone of capture for 10-year groundwater time-of-travel to the well and are available through a database and mapping layer maintained by MDH (2019b). A search for WHPAs in the MDH database indicated that Application segments right-of-way do not cross a WHPA. The nearest WHPA is located in the town of Lamberton, approximately seven miles east of the Blue Segment.

6.5.2.1 Impacts and Mitigation – All Segments

Plum Creek does not anticipate any impacts to bedrock during construction or operation of the HVTL Project as bedrock along the Application segments is at depths greater than proposed foundation depths of 18 to 48 feet deep. Similarly, Plum Creek does not expect any impacts to groundwater resources as there are no SSAs or wellhead protection areas within the Application segments' right-of-way. There may be a minor impact to a well within the Red Segment right-of-way. If the Red Segment is ordered by the Commission, Plum Creek will coordinate with the landowner to verify this well's location relative to potential transmission structures to minimize any impacts. If shallow depths to groundwater resources are identified during geotechnical investigations, specialty structures requiring wider, but shallower, excavation for foundations may be used. Plum Creek will continue to work with the landowners to identify springs and any additional wells near the HVTL Project.

6.5.3 Soils

Soil characteristics along the segments were assessed using the U.S. Department of Agriculture (USDA) Soil Survey Geographic Database (SSURGO) (Soil Survey Staff, 2019). The SSURGO database is a digital version of the original county soil surveys developed by Natural Resources Conservation Service (NRCS) for use with GIS. It provides the most detailed level of soils information for natural resource planning and management.

6.5.3.1 Soil Characteristics

The SSURGO data shows that the various soil types crossed by the four segments are clay loam or loamy and range from poorly drained to well-drained. Plum reviewed SSURGO data to identify prime farmland, farmland of statewide importance, wind or water erodible soils, hydric soils, soils with revegetation concerns, and soils prone to compaction. Table 6.5.3-1 presents the total acres of each of these soil characteristics that are within the rights-of-way of the four segments.

Table 6.5.3-1
Summary of Soil Characteristics Along the Application Segments

Soil Characteristics	Green Segment		Yellow Segment		Blue Segment		Red Segment	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Total Right-of-Way Acres	99.2		90.4		473.6		486.6	
Prime Farmland [1]	94.2	95.0%	88.9	98.4%	447.2	94.4%	443.1	91.1%
Farmland of Statewide Importance [2]	5.0	5.0%	1.5	1.6%	12.5	2.6%	25.3	5.2%
Wind Erodible [3]	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Water Erodible [4]	0.0	0.0%	0.0	0.0%	2.3	0.5%	7.6	1.6%
Hydric [5]	47.1	47.5%	54.4	60.1%	269.5	56.9%	265.3	54.5%
Revegetation Concerns [6]	0.0	0.0%	0.0	0.0%	14.0	3.0%	17.5	3.6%
Compaction-Prone [7]	47.1	47.5%	54.4	60.1%	258.3	54.5%	253.8	52.2%

Note: Soils may have more than one characteristic.

1 Includes soils that meet the prime farmland or prime farmland if a limiting factor is mitigated.

2 Includes soils classified as farmland of statewide importance by SSURGO.

3 Includes soils in WEG designation of 1 or 2.

4 Includes soils with a slope greater than 15 percent or soils with a K value of greater than 0.35 and slopes greater than 5 percent.

5 Includes soils that are classified as hydric by SSURGO.

6 Includes soils with a non-irrigated land capability classification of 4 or greater.

7 Includes soils in somewhat poor to very poor drainage classes with surface textures of clay loam and finer.

Of the soil characteristics included in Table 6.5.3-1, the characteristics most applicable for an assessment of the Project's potential to impact soils during construction and operation are prime farmland, farmland of statewide importance, and whether soils within the rights-of-way of the four segments are prone to compaction. Soils categorized as prime farmland and farmland of statewide importance are protected under the Farmland Protection Policy Act (FPPA) because of their value for agricultural production, and a significant or irreversible loss of these high-quality farmlands could have local economic impacts for the agricultural industry (*see* Section 6.5.3.2). Compaction-prone soils, particularly within agricultural fields, may require additional mitigation measures during construction to minimize compaction and/or additional protocols during restoration of Project workspaces.

Soils categorized as wind or water erodible may require additional mitigation measures to minimize the likelihood of soil migration outside of Project workspaces. Hydric soils are generally indicative of long periods of saturation or flooding during soil formation and can indicate wetland environments if vegetation and other hydrologic factors are present. Soils with revegetation concerns can indicate a need for additional mitigation measures during restoration to ensure revegetation of Project workspaces is successful. A minimal amount of wind- or water-erodible soils, hydric soils, and soils with revegetation concerns are within the 150-foot rights-of-way of the four segments. Because of their relative scarcity within the rights-of-way of the four segments, these soil characteristics are not likely to influence the overall impact of the Project on soils. For this reason, these characteristics are not discussed further in this Application. A discussion of the amount of prime farmland, farmland of statewide importance, and compaction-prone soils within the rights-of-way of the four routes is provided below.

6.5.3.2 Prime Farmland and Farmland of Statewide Importance

Prime farmlands are subject to protection under the FPPA. The intent of the FPPA is to protect high-quality farmland by minimizing the impact of federal programs on "the unnecessary and irreversible conversion of farmland to non-agricultural uses" (USDA-NRCS, n.d.). Protection under the FPPA extends to all lands that meet the criteria for prime farmland or prime farmland if a limiting factor is mitigated, regardless of whether the land is currently used for agricultural production.

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pasture, woodland, or other lands). Urbanized land and open water cannot be designated as prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent or prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by draining or irrigating).

As shown in Table 6.5.3-1, all of the proposed segments cross soils that are classified as "Prime Farmland" and "Farmland of Statewide Importance." There are 94.2 acres of prime farmland (all categories) within the Green Segment right-of-way, 88.9 acres of prime farmland within the Yellow Segment right-of-way, 447.2 acres of prime farmland within the Blue Segment right-of-way, and 443.1 acres of prime farmland within the Red Segment right-of-way.

The NRCS also recognizes farmlands of statewide importance, which are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by state agencies, typically in association with local soil conservation districts or other local agencies.

There are 5.0 acres of farmland of statewide importance within the Green Segment right-of-way, 1.5 acres of farmland of statewide importance within the Yellow Segment right-of-way, 12.5 acres of farmland of statewide importance within the Blue Segment right-of-way, and 25.3 acres of farmland of statewide importance within the Red Segment right-of-way.

6.5.3.3 Compaction-Prone Soils

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. Construction equipment traveling over wet soils could disrupt the soil structure, reduce pore space, increase runoff potential, and cause rutting. The degree of compaction depends on moisture content and soil texture. Fine-textured soils with poor internal drainage that are moist or saturated during construction are the most susceptible to compaction and rutting.

Soils classified as having somewhat poor to very poor drainage classes and surface textures of clay loam and finer are considered to have a high potential for compaction.

There are 47.1 acres of compaction-prone soils within the Green Segment right-of-way, 54.4 acres of compaction-prone soils within the Yellow Segment right-of-way, 258.3 acres of compaction-prone soils within the Blue Segment right-of-way, and 253.8 acres of compaction-prone soils within the Red Segment right-of-way.

6.5.3.4 Impacts and Mitigation

During construction of the HVTL Project, a small portion of prime farmland will be temporarily taken out of agricultural production for temporary workspace associated with erecting structures along the right-of-way. As discussed in Section 6.3.1, the footprint of each structure measures approximately 9 feet in diameter and will not have a meaningful effect on the availability of prime farmland within the state of Minnesota or within Cottonwood, Murray, and Redwood Counties. During construction of the HVTL Project, soil compaction and localized soil erosion may occur during clearing and grading of work areas. In addition, potential soil impacts may result from the excavation, stockpiling, and redistribution of soils. Plum Creek will implement measures to reduce soil compaction and will commit to decompaction of soils during restoration of Project workspaces. Impacts to soils would be temporary and minor, and would be mitigated through the proper use and installation of best management practices (BMPs), such as minimizing the number of vehicles and protection and maintenance of topsoil, during right-of-way clearing and generation tie line construction. Plum Creek will also develop a Stormwater Pollution Prevention Plan (SWPPP) that complies with MPCA rules and guidelines; implementation of the protocols outlined in the SWPPP will minimize the potential for soil erosion during construction.

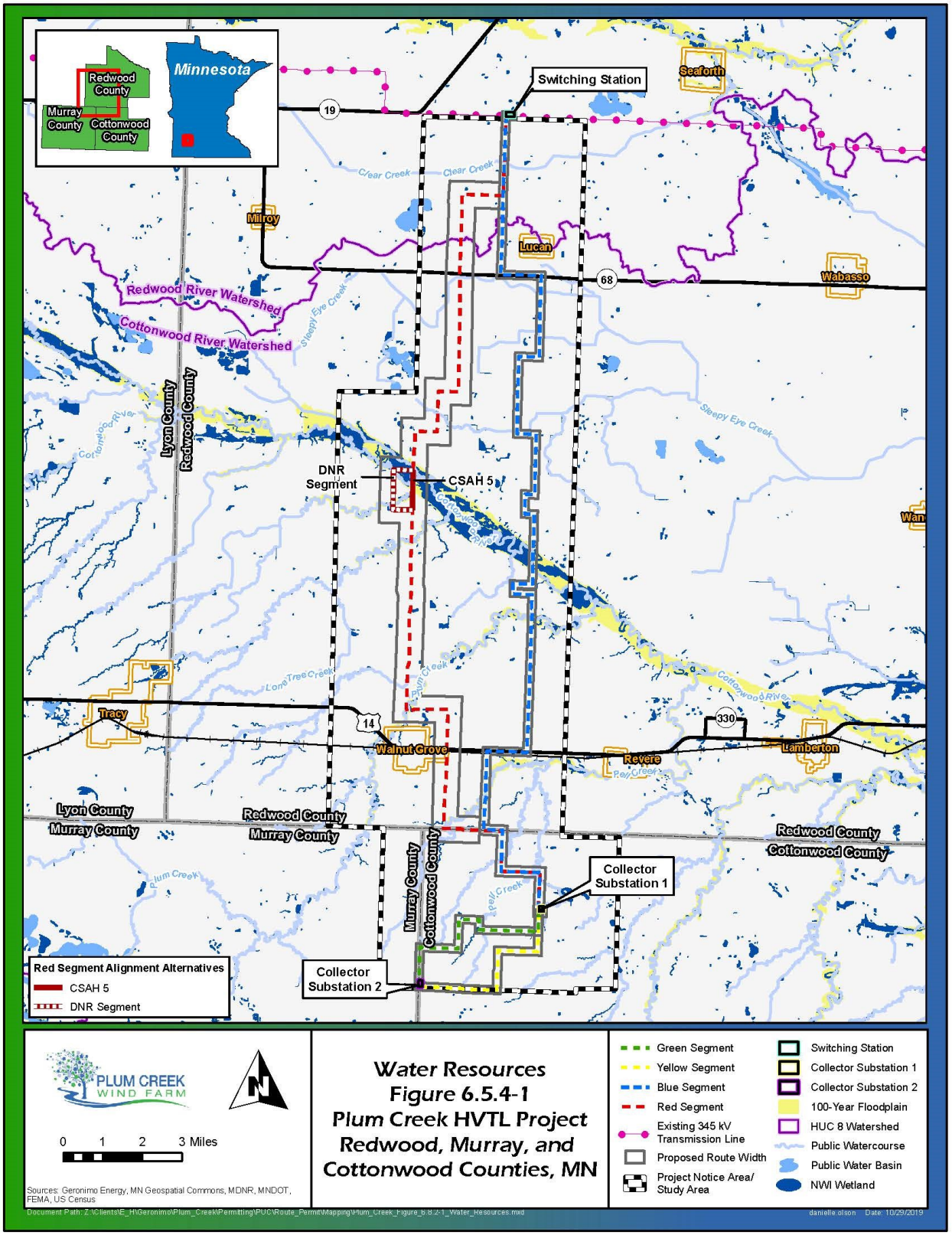
Landowners will be compensated accordingly for any localized crop damage and soil compaction that may occur. Refer to Section 6.3.1 for additional information related to agricultural impacts.

6.5.4 Surface Waters and Floodplains

Table 6.5.4-1 lists the watersheds crossed by each segment denoted by the 8-digit Hydrologic Unit Codes (HUCs) as assigned by U.S. Geological Survey (USGS). The Green and Yellow Segments occur within the Cottonwood River watershed. The Blue and Red Segments begin within the Cottonwood River watershed and cross into the Redwood River Watershed on the northern end of the HVTL Project; the majority of both segments is within the Cottonwood River watershed. Major rivers in the HVTL Project Study Area include the Cottonwood River (refer to Figure 6.5.4-1). Impacts to primary water resources, where anticipated along the Green, Yellow, Blue, and Red Segments, and applicable mitigation, are discussed in the sections that follow.

Table 6.5.4-1
Watersheds (HUC-8) Crossed by the Application Segments

Watershed Name	8-digit HUC-8	Crossing Length (miles)			
		Green Segment	Yellow Segment	Blue Segment	Red Segment
Redwood River	7020006	0.0	0.0	2.6	3.6
Cottonwood River	7020008	5.5	5.0	23.5	23.2


Minnesota
Redwood County
Murray County
Cottonwood County
Switching Station
Seaforth
19
Clear Creek
Milroy
Lucan
68
Wabasso
Redwood River Watershed
Cottonwood River Watershed
Sleepy Eye Creek
Lyon County
Redwood County
DNR Segment
CSAH 5
Tracy
14
Walnut Grove
330
Revere
Lamberton
Lone Tree Creek
Plum Creek
Lyon County
Murray County
Redwood County
Murray County
Redwood County
Cottonwood County
Murray County
Cottonwood County
Collector Substation 1
Collector Substation 2
Red Segment Alignment Alternatives
CSAH 5
DNR Segment
PLUM CREEK WIND FARM
0 1 2 3 Miles
Water Resources
Figure 6.5.4-1
Plum Creek HVTL Project
Redwood, Murray, and
Cottonwood Counties, MN
Green Segment
Yellow Segment
Blue Segment
Red Segment
Existing 345 kV Transmission Line
Proposed Route Width
Project Notice Area/ Study Area
Switching Station
Collector Substation 1
Collector Substation 2
100-Year Floodplain
HUC 8 Watershed
Public Watercourse
Public Water Basin
NWI Wetland
Sources: Geronimo Energy, MN Geospatial Commons, MNDNR, MNDOT, FEMA, US Census
Document Path: Z:\Clients\E_H\Geronimo\Plum_Creek\Permitting\PUC\Route_Permit\Mapping\Plum_Creek_Figure_6.5.4-1_Water_Resources.mxd
danielle.olson Date: 10/29/2019

6.5.4.1 Lakes, Rivers, Streams, and Ditches

Section 404 of the Clean Water Act (CWA) prohibits any discharge of dredged or fill materials into jurisdictional waters of the United States without a permit from the U.S. Army Corps of Engineers (USACE). Many of the rivers and streams crossed by the HVTL Project are likely to be jurisdictional waters of the United States. Navigable waters are defined by 33 CFR Part 329 as those waters that are subject to the ebb and flow of the tide and/or are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Navigable waters are designated by the USACE and regulated under Section 10 of the Rivers and Harbors Act of 1899. Impacts to jurisdictional waters and transmission line crossings of navigable waters both require permits from the USACE.

Plum Creek reviewed the USGS National Hydrography Dataset (NHD) waterbody data, MNDNR lake data, and MNDOT basemap lake delineations to assess the presence of lakes along the Green, Yellow, Blue, and Red Segments. The USGS NHD and USGS 7.5-minute quadrangle maps were reviewed to assess the presence of streams and rivers classified as perennial and intermittent.

In Minnesota, rivers, streams, and lakes may be designated as Public Waters (Minn. Stat. § 103G.005, subd. 15). These waters are listed in the Public Waters Inventory (PWI) and meet the criteria set forth in Minn. Stat. § 103G.005, subd.15. A license from the MNDNR is required to cross PWI waters with an electric transmission line (Minn. Stat. § 84.415) and a permit from the MNDNR is required to alter the course, current, or cross-section of any PWI water pursuant to the Minnesota Public Waters Work Permit Program (Minn. Stat. § 103G.245, subd. 1(2)). The MNDNR PWI was reviewed to identify Public Waters along the Application segments.

Certain surface waters are designated as trout streams or lakes by the State of Minnesota, according to Minn. Stat. § 6264.0050. No designated trout streams or lakes are crossed by the Application segments.

Table 6.5.4-2 provides a summary of waterbodies crossed by the Application segments. These are also displayed on Figure 6.5.4-1.

Table 6.5.4-2
Waterbodies Crossed by the Application Segments

Waterbody Feature	Green Segment	Yellow Segment	Blue Segment	Red Segment
Number of Stream and River Crossings by 150-foot Right-of-Way	8	4	19	19
Number of PWI Stream and River Crossings by 150-foot Right-of-Way	2	2	10	13
Number of PWI Basins within 150-foot Right-of-Way	0	0	0	0
Number of Shallow Lakes within 150-foot Right-of-Way	0	0	0	0

Green Segment

The Green Segment right-of-way crosses eight waterbodies (refer to Appendix C). All of the waterbodies crossed are intermittent streams. Of these streams, two are unnamed PWI waters. There are no PWI lakes crossed by the Green Segment alignment and no MNDNR-designated shallow lakes within the Green Segment right-of-way. One creek crossed by the Green Segment is listed as impaired on the 303(d) list (Pell Creek; discussed further in Section 6.5.4.2).

Yellow Segment

The Yellow Segment right-of-way crosses four waterbodies (refer to Appendix C). Similar to the Green Segment, all of the waterbodies crossed are intermittent streams. Of these streams, two unnamed streams are PWI waters. There are no PWI lakes crossed by the Yellow Segment alignment and no MNDNR-designated shallow lakes within the Yellow Segment right-of-way. One creek crossed by the Yellow Segment is listed as impaired on the 303(d) list (Pell Creek; discussed further in Section 6.5.4.2).

Blue Segment

The Blue Segment has 19 waterbody crossings (refer to Appendix C). These crossings include 13 intermittent and six perennial streams. Of these streams, the following are PWI waters: Cottonwood River; Plum, Sleepy Eye, Pell, and Clear Creeks; and five unnamed streams. There are no PWI lakes crossed by the Blue Segment right-of-way. Furthermore, there are no MNDNR-designated shallow lakes within the Blue Segment right-of-way. One river and four creeks crossed by the Blue Segment are listed as impaired on the 303(d) list (discussed further in Section 6.5.4.2).

Red Segment

The Red Segment has 19 waterbody crossings (refer to Appendix C). These crossings include 12 intermittent and seven perennial streams. Of these streams, the following are PWI waters: Cottonwood River; Plum, Sleepy Eye, Pell, Lone Tree, and Clear Creeks; and seven unnamed streams. There are no PWI lakes crossed by the Red Segment right-of-way. There are no MNDNR-designated shallow lakes crossed by the Red Segment right-of-way. One river and four creeks crossed by the Red Segment are listed as impaired on the 303(d) list (discussed further in Section 6.5.4.2).

Impacts and Mitigation – All Segments

The HVTL Project will have minor, mostly short-term effects on surface water resources. Plum Creek will design the HVTL Project to minimize or avoid impacts to surface water resources to the extent feasible. The HVTL Project will be designed to span surface water resources and floodplains where practicable and to minimize the number of structures in surface water resources where these resources cannot be spanned.

Plum Creek met with the MNDNR in October 2018 to discuss potential segment options. Specific to waterbody crossings, the MNDNR suggested reconsideration of the Red Segment's crossing of the Cottonwood River. Plum Creek initially proposed the alignment in this location

be routed along CSAH 5. However, MNDNR indicated the low area adjacent to the Cottonwood River along CSAH 5 provides wildlife habitat and frequently floods due to rain and spring melting. MNDNR suggested shifting the Red Segment west for at least half a mile to avoid this area. Plum Creek implemented this Application alignment suggestion into the Red Segment presented in this Application. However, Plum Creek has not been able to secure voluntary easements along the alignment suggested by MNDNR (i.e., the MNDNR Route Segment Alternative) and, therefore, conducted a comparison of the MNDNR Route Segment Alternative and the alignment along CSAH 5 (i.e., the CSAH 5 Route Segment Alternative); Plum Creek's comparison of these two route segment alternatives is provided in Appendix D.

Plum Creek will work with the MNDNR to ensure all proper licenses and approvals are obtained for PWI crossings by the HVTL Project. Through the license approval process, Plum Creek and the MNDNR will determine the appropriate mitigation measures for PWI crossings. Other mitigation measures for the crossing of streams, rivers, and ditches are discussed in Section 6.5.4.2.

Plum Creek will obtain a National Pollutant Discharge Elimination System (NPDES) permit from the MPCA for construction of the HVTL Project. As noted, Plum Creek will also develop a SWPPP that complies with MPCA rules and guidelines. All waterways crossed will be maintained for proper drainage through the use of temporary culverts or other temporary crossing devices, according to BMPs and permit requirements. If tree removal is required along waterways, trees will be cut so that the root system is not disturbed to retain bank stability. Sediment barriers, if deemed necessary, will be used along waterways and slopes during construction to protect from soil erosion and sedimentation. Additionally, if new access roads for vehicles and equipment are required, access roads will be selected to avoid disturbance to stream banks. No permanent impacts to surface water resources are anticipated.

6.5.4.2 Water Quality

Under Section 303(d) of the CWA, states are required to assess all waters of the state to determine if they meet water quality standards, list waters that do not meet standards and update the list biannually, and conduct total maximum daily load (TMDL) studies to set pollutant-reduction goals needed to restore waters to the extent that they meet water quality standards for designated uses. The list, known as the 303(d) list, is based on violations of water quality standards. The majority of impairments to surface waters in the HVTL Project Study Area are caused by agricultural sources (fecal coliform, dissolved oxygen, turbidity, excess nutrients/eutrophication). The MPCA has jurisdiction over determining 303(d) waters in the State of Minnesota.

Table 6.5.4-3 summarizes waterbodies crossed by the four Application segments that are listed by the MPCA Inventory of Impaired Waters, and their impairments. The Minnesota Statewide Mercury TMDL addresses mercury in waterbodies throughout Minnesota (MPCA, 2007). The TMDL attributes 99 percent of mercury load to Minnesota's lakes and streams to atmospheric deposition and attributes none to the operation of electric transmission lines.

Table 6.5.4-3
Impaired Waterbodies Crossed by the Application Segments

Waterbody Name	Impairment	Segment (No. of Crossings)			
		Green	Yellow	Blue	Red
Pell Creek	Turbidity	0	0	1	1
Plum Creek (Judicial Ditch 20A)	Turbidity, fecal coliform	0	0	1	1
Lone Tree Creek	Escherichia coli	0	0	0	1
Cottonwood River	Turbidity, mercury in fish tissue, fecal coliform	0	0	1	1
Sleepy Eye Creek	Chlorpyrifos, fishes bioassessments, turbidity, fecal coliform	0	0	1	1
Clear Creek	Fecal coliform	0	0	1	1

Under the CWA, states have the primary responsibility for establishing, reviewing, and revising water quality standards, which consist of the designated uses of a waterbody, the numerical values or narrative water quality criteria necessary to protect those designated uses, and an antidegradation policy per 40 CFR §§ 131.10 - 131.12 and 131.4.

Section 401 of the CWA grants state agencies the authority to require projects that discharge to jurisdictional waters to obtain a Water Quality Certification and comply with state and federal water quality regulations. The MPCA is granted the authority to implement Section 401 regulations.

The MPCA is the agency charged with classifying waterbodies in Minnesota. Consistent with the requirements of the CWA, the MPCA has established water quality standards, including the identification of beneficial uses of the state's waters, numeric standards and narrative criteria, and non-degradation protections for high-quality or unique waters. Minnesota advances the CWA's presumption that a waterbody should attain healthy aquatic life and recreation uses, and groups the waters of the state into one or more of the following seven designated use classifications per Minn. R. Ch. 7050.0140:

- Class 1 waters, domestic consumption
- Class 2 waters, aquatic life and recreation
- Class 3 waters, industrial consumption
- Class 4 waters, agriculture and wildlife
- Class 5 waters, aesthetic enjoyment and navigation
- Class 6 waters, other uses and protection of border waters
- Class 7 waters, limited resource value waters

The Green and Yellow Segments do not cross impaired waters or waters of the state identified in the Classes above. Lone Tree Creek, crossed by the Red Segment, is classified in Minn. R. Ch. 7050.0470 as a Class 7 waterbody (i.e., limited resource values). The other waterbodies crossed

by both the Blue and Red Segments are defined by default in Minn. R. Ch. 7050.0430 as Class 2B (aquatic warm water community) and 3C (industrial consumption).

Minnesota designates some surface waters as outstanding resource value waters (ORVWs) because of their exceptional qualities. As specified in Minnesota Rules, wild, scenic, and recreational river segments comprise a part of the definition of ORVWs. None of the Application segments cross ORVWs.

Impacts and Mitigation – All Segments

Construction of the proposed transmission line could potentially impact water quality. Rivers, streams, and ditches crossed by the Application segments are narrow enough to be spanned with normal spacing of the structures so that all structures can be placed outside of these features. Short-term, minor, HVTL Project-related water quality impacts may occur during the construction of the proposed HVTL Project even though mitigation measures will be implemented to prevent sedimentation. These impacts would be associated with the soils from areas disturbed during construction being washed by stormwater into adjacent waters during rainstorm events. Increased turbidity and localized sedimentation of the stream bottom may occur from the runoff. If any of these events occur, however, these impacts would be temporary and would not significantly alter water quality conditions due to the minimal soil disturbance that is expected to occur in any one location during construction of the HVTL Project. The construction and maintenance of the transmission line is not expected to disturb any subsurface waters.

Mitigation measures will be implemented to prevent or minimize surface water impacts. The MPCA, through the NPDES under the CWA, regulates construction activities that may impact stormwater runoff. An NPDES permit is required for construction activity disturbing: 1) one acre or more of soil; 2) less than one acre of soil, but part of a "larger common plan of development or sale" that is greater than one acre; or 3) less than one acre of soil, but that the MPCA determines poses a risk to water resources.

Plum Creek will apply for an NPDES permit from the MPCA and will develop an SWPPP that will identify BMPs to be implemented during construction to minimize erosion and sedimentation impacts to surface waters. Erosion and sedimentation abatement measures, for example, would be employed to decrease impacts to the hydrology of the HVTL Project Study Area. No fueling or maintenance of vehicles or application of herbicides would occur within 100 feet of streams, ditches, and waterways to protect against introduction of these materials into surface or groundwater systems. Materials such as fuels, lubricants, paints, and solvents required for construction would be stored away from surface water resources according to appropriate regulatory standards. Any spills or leaks would be cleaned up immediately and leaking equipment removed from the area for proper maintenance.

6.5.4.3 Floodplains

A floodplain is flat, or nearly flat, land adjacent to a river or stream that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which includes areas covered by the flood but

which do not experience strong current. Floodplains function to prevent 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. The base flood that FEMA uses, known as the 100-year flood, has a one percent chance of occurring each year.

At the state level, the MNDNR oversees the administration of the state floodplain management program by promoting and ensuring sound land use development in areas to promote the health and safety of the public, minimize loss of life, and reduce economic losses caused by flood damages. The MNDNR also oversees the national flood insurance program for the state of Minnesota. Floodplains are also regulated at the local level for each county. Associated ordinances allow for utility transmission lines as a conditional use for floodway and floodplain districts.

The Green and Yellow Segments do not cross floodplains. The Blue and Red Segments cross FEMA-designated 100-year floodplain areas in Redwood County. FEMA-designated 100-year floodplain areas are associated primarily with waterbodies along the Blue and Red Segments such as the Cottonwood River, Plum Creek, and Pell Creek. There are no 500-year floodplain areas crossed by the Application Segments. Table 6.5.4-4 provides the total acres of the Application segments' 150-foot rights-of-way that would cross FEMA-designated floodplains. Floodplains are also displayed on Figure 6.5.4-1.

Table 6.5.4-4
FEMA Designated 100- and 500-Year Floodplain Areas
Crossed by the Application Segments

Floodplain Category [1]	Segment Crossing (150' Right-of Way)							
	Green		Yellow		Blue		Red	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
100-Year	0.0	0%	0.0	0%	14.0	3.0%	18.4	3.8%

[1] None of the Application Segments cross 500-Year Floodplains

Impacts and Mitigation – All Segments

The HVTL Project may require transmission line structures to be placed within FEMA-designated 100-year floodplain areas. Based on preliminary engineering design, no structures would be placed in FEMA-designated 100-year floodplains along the Green or Yellow Segments. For the Blue Segment 7 structures would be placed in FEMA-designated 100-year floodplains and 9 structures would be placed in floodplains for the Red Segment. The placement of transmission line structures in floodplains is not anticipated to alter the flood storage capacity of the floodplain based on the minimal size of individual transmission line structures. Plum Creek will work with Cottonwood and Redwood Counties to permit any structures in floodplains.

6.5.5 Wetlands

Wetlands are areas with hydric (wetland) soils, hydrophilic (water-loving) vegetation, and wetland hydrology (inundated or saturated much of the year). Wetlands are part of the

foundation of water resources and are vital to the health of waterways and communities that are downstream. Wetlands detain floodwaters, recharge groundwater supplies, remove pollution, and provide fish and wildlife habitat. Wetlands are also economic drivers because of their key role in fishing, hunting, agriculture, and recreation. Wetland types include marshes, swamps, bogs, and fens. Wetlands vary widely due to differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors.

The USFWS National Wetlands Inventory (NWI), as updated by the MNDNR, was reviewed to assess the presence of wetlands along the four Application segments (refer to Appendix C). Wetland complexes and small isolated wetlands are scattered throughout the HVTL Project Study Area. Many of these wetlands are riverine and floodplain forest wetlands associated with the Cottonwood River. Palustrine-type wetlands are present in depressions on moraines, till plains, lake plains, floodplains, and seeps in the HVTL Project Study Area and include emergent, forested, unconsolidated bottom, and scrub-shrub wetlands.

The MNDNR PWI was also reviewed to identify Public Water Wetlands and State-protected calcareous fens along the Application segments. No records of calcareous fens exist along any of the segments. In addition, Minnesota's update to the NWI was reviewed for the occurrence of mapped wetlands along Green, Yellow, Blue, and Red Segments. Table 6.5.5-1 summarizes the wetland impacts associated with each segment's right-of-way. Wetlands are also displayed on Figure 6.5.4-1.

Table 6.5.5-1
Wetlands Crossed by the Application Segments

Wetland Feature	Green Segment	Yellow Segment	Blue Segment	Red Segment
Right-of-Way Acres	99.2	90.4	473.6	486.6
Total Wetlands in the 150-foot Right-of-Way (acres)	1.9	1.2	9.1	15.0
Non-forested Wetlands in 150-foot Right-of-Way (acres)	1.4	1.0	7.3	14.5
Forested Wetlands in 150-foot Right-of-Way (acres)	0.5	0.2	1.8	0.9
Number of PWI Wetlands Crossed by 150-foot Right-of-Way	0	0	0	0
Number of Poles in Wetlands Based on Preliminary Engineering Design[1]	0	1	3	10

6.5.5.1 Green Segment

Of the total 99.2 acres of right-of-way that will be needed for the Green Segment, approximately 1.9 acres of NWI-mapped wetlands occur within the Green Segment right-of-way, including 0.5 acre of forested wetlands (Appendix C). None of the wetlands crossed by the Green Segment 150-foot right-of-way are PWI wetlands. No structures would be placed in wetlands along the Green Segment.

6.5.5.2 Yellow Segment

Of the total 90.4 acres of right-of-way that will be needed for the Yellow Segment, approximately 1.2 acres of NWI-mapped wetlands occur within the Yellow Segment right-of-way, including 0.2 acre of forested wetlands (Appendix C). None of the wetlands crossed by the Yellow Segment 150-foot right-of-way are PWI wetlands. One structure would be placed in wetlands along the Yellow Segment.

6.5.5.3 Blue Segment

Of the total 473.6 acres of right-of-way that will be needed for the Blue Segment, approximately 9.1 acres of NWI-mapped wetlands occur within the Blue Segment right-of-way, including 1.8 acres of forested wetlands (Appendix C). None of the wetlands crossed by the Blue Segment 150-foot right-of-way are PWI wetlands. Three structures would be placed in wetlands along the Blue Segment and those are isolated to wetlands associated with the Cottonwood River and its tributaries where wetland complexes are wider than the typical span length.

6.5.5.4 Red Segment

Of the total 486.6 acres of right-of-way, 15.0 acres of NWI-mapped wetlands would occur within the Red Segment's right-of-way, including 1.0 acre of forested wetlands (Appendix C). None of the wetlands crossed by the Red Segment 150-foot right-of-way are PWI wetlands. Plum Creek anticipates spanning most NWI mapped wetlands within the 150-foot right-of-way. Ten would be placed in wetlands along the Red Segment and those are isolated to wetlands associated with the Cottonwood River and its tributaries where wetland complexes are wider than the typical span length.

6.5.5.5 Impacts and Mitigation – All Segments

Wetlands located in the 150-foot-wide right-of-way would be spanned and placement of structures within wetlands would be avoided to the extent practicable. Where it is not possible to span a wetland, Plum Creek identified several mitigation strategies to minimize impacts to wetlands including:

- Scheduling construction during frozen conditions where practicable;
- Use of construction mats when construction during frozen conditions is not feasible;
- Use of all-terrain construction equipment that is designed to minimize soil impact in damp areas;
- Use of the shortest route to the pole location in the wetland; and
- Assembling structures in upland areas, when feasible, before they are brought to the site for installation.

Wetlands impacted by construction will be restored as required by the USACE. Vegetation maintenance requirements under transmission lines prohibit establishment of trees. Existing trees must be removed throughout the right-of-way that are determined by Plum Creek to pose a hazard to transmission line operation, including those in forested wetlands. Any mitigation required will be determined through consultation with USACE. Plum Creek will obtain all appropriate permits and approvals from the USACE, MNDNR, LGU(s), and watershed districts (if necessary) for any actions determined to occur in wetlands.

Wetlands can be also be impacted by soil erosion and sediment deposition during construction. Sedimentation and ground disturbance in wetlands can make them more susceptible to establishment of invasive plant species, such as reed canary grass, which would adversely impact wetland function by reducing vegetative biodiversity and altering wildlife habitat.

6.5.6 Flora

The HVTL Project Study Area is in both the Coteau Moraines and Minnesota River Prairie subsections of the North Central Glaciated Plains Section in the Prairie Parkland Province, as defined by the ECS of Minnesota (MNDNR, Undated). The southern quarter of the HVTL Project Study Area occurs in the Coteau Moraines Subsection. At the time of European settlement, this landscape was dominated by tallgrass prairie and scattered wetlands. The tallgrass prairie was characterized by big bluestem, little bluestem, Indian grass, and sideoats grama. Wet prairies and forest were limited to ravines of a few streams. Similar to the Minnesota River Prairie subsection, the wet prairies in the Coteau Moraines Subsection were dominated by bluejoint grass, prairie cordgrass, and sedges, and the riparian forests contained primarily silver maple, cottonwood, elms, and willow (MNDNR,1988; MNDNR, 2006; MNDNR, 2019b).

Approximately 75 percent of the HVTL Project Study Area is in the Minnesota River Prairie subsection where the vegetation prior to European settlement was generally tallgrass prairie with scattered wetlands (MNDNR, 2019a). Dominant grasses in upland tallgrass prairie included big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), sideoats grama (*Bouteloua curtipendula*), and little bluestem (*Schizachyrium scoparium*) (MNDNR, 1988). The subsection was also characterized by areas of wet prairies with bluejoint grass (*Calamagrostis canadensis*), prairie cordgrass (*Spartina pectinata*), and sedges (*Carex* spp.). Riparian and floodplain forests comprised of silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), elm (*Ulmus* spp.), and willow (*Salix* spp.) occurred along the Minnesota River and other streams (MNDNR, 1988; MNDNR, 2019a).

Current land use in the Minnesota River Prairie and Coteau Moraines subsections is now dominated by agriculture, primarily active row crop fields with some pasture, as described in

Section 6.2. Other current land uses include small amounts of forest, wetlands, open water, and developed areas. Grassland-prairie complexes are typically privately owned and grazed. Few areas of pre-settlement vegetation such as native prairie and floodplain forest remain. Suitable habitat for protected and at-risk plant species may be present in these areas of remnant pre-settlement vegetation (MNDNR, 2006). These areas are typically associated with a managed land such as a WMA, an existing conservation easement, and/or are identified as Sites of Biodiversity Significance (SOBS).

The Green and Yellow Segments cross only the Coteau Moraines subsection, while the Blue and Red Segments cross similar portions of the Minnesota River Prairie and Coteau Moraines subsections. Refer to section 6.3.1 for more information on CRP, CREP, and RIM easements crossed by the Application segments. Section 6.6.2 discusses SOBS as they relate to the Application segments.

6.5.6.1 Impacts and Mitigation – All Segments

The acreage of each land cover type crossed by the Application segments is provided in Section 6.2.9.1 (refer to Table 6.2.9-1). Impacts on flora for the segments will primarily be associated with cultivated crop areas; *see* Section 6.3.1 for a discussion of impacts and mitigation measures that would be used in cropland and pasturelands. Other impacts to flora may be related to wind breaks, woodlots, fence rows, and other landscape features.

Construction of the HVTL Project will result in short-term adverse impacts on existing vegetation, including localized physical disturbance and soil compaction. Construction activities, such as site preparation and installation of structures, are anticipated to impact approximately 0.1 to 0.5 acres of vegetation per structure. Construction activities involving establishment and use of access roads, staging, and stringing areas would also have short-term impacts on vegetation by concentrating surface disturbance and equipment use.

Construction would also result in long-term impacts on vegetation by permanently removing vegetation at each structure and within portions of the right-of-way that are currently dominated by forest or other woody vegetation. Plum Creek would permanently convert forested areas and shrub lands to low-stature vegetation by clearing woody vegetation throughout the entire right-of-way where it occurs. Impacts to woody-dominated vegetation could be minimized by prudent routing to avoid areas where this vegetation type occurs.

Construction of the HVTL Project could lead to the introduction or spread of invasive species and noxious weeds. Construction activities that could potentially lead to the introduction of invasive species include 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 type, particularly from forested to open settings.

The primary means of mitigating impacts to flora is to avoid flora, particularly trees, through prudent routing. Mitigation can be achieved, in part, by using existing infrastructure rights-of-way (e.g., roadway, transmission line) such that tree removal is minimized. Mitigation can also be accomplished by spanning plant communities.

Impacts to flora can also be mitigated by a number of other strategies, including (1) placement of the alignment and of specific structures to avoid trees and other tall-growing species, (2) leaving or replanting compatible plants at the edge of the transmission line right-of-way, (3) limiting vehicle traffic to roads along the right-of-way, and (4) avoiding the introduction of invasive species and noxious weeds on equipment or through seeds or mulches.

Potential impacts due to invasive species and noxious weeds can be mitigated by:

- Revegetating disturbed areas using weed-free seed mixes and using weed-free straw and hay for erosion control;
- Removal of invasive species/noxious weeds via herbicide and manual means; and
- Cleaning and inspecting construction vehicles to remove dirt, mud, plant, and debris from vehicles prior to arriving at and leaving construction sites.

6.5.7 Fauna

The wildlife species that inhabit the HVTL Project Study Area are typical of those found in agricultural and grassland-prairie complexes. Wildlife species that occur in wetland and floodplain or riparian forest may also be present in the HVTL Project Study Area. Species adapted to agricultural landscapes that likely occur in the HVTL Project Study Area are listed in Table 6.5.7-1 (MNDNR, 2019c).

Table 6.5.7-1
Wildlife Species Common to the HVTL Project Study Area

Common Name	Scientific Name
Mammals	
Red fox	*Vulpes vulpes*
Virginia opossum	*Didelphis virginiana*
Striped skunk	*Mephitis*
White-tailed deer	*Odocoileus virginianus*
White-tailed jackrabbit	*Lepus townsendii*
Eastern cottontail	*Sylvilagus floridanus*
Raccoon	*Procyon lotor*
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*
Coyote	*Canis latrans*
Birds	
Wild turkey	*Meleagris gallopavo*
Ring-necked pheasant	*Phasianus colchicus*
American kestrel	*Falco sparverius*
Mourning dove	*Zenaida macroura*
Western meadowlark	*Sturnella neglected*
Bobolink	*Dolichonyx oryzivorus*
Eastern bluebird	*Sialia sialis*

Table 6.5.7-1 Wildlife Species Common to the HVTL Project Study Area	
Common Name	**Scientific Name**
Field sparrow	*Spizella pusilla*
Reptiles and Amphibians	
Great Plains toad	*Anaxyrus cognatus*
Northern leopard frog	*Lithobates pipiens*
Plains garter snake	*Thamnophis radix*
Fish	
White sucker	*Catostomus commersonii*
Bullhead	*Ameiurus* spp.
Channel catfish	*Ictalurus punctatus*
Long-nose gar	*Lepisosteus osseus*
Source: MNDNR, 2019c	

Migratory birds are protected by the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S. Code [USC] 703-712). The MBTA prohibits taking, killing, possession, transportation, and importation of migratory bird and their eggs, parts, and nests. Additionally, the Bald and Golden Eagle Protection Act (16 USC 668-668d) prohibits taking or possession of and commerce in bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), either alive or dead, or any egg, nest, or part of eagles.

During March 2018 and March 2019, Plum Creek conducted aerial surveys for bald eagle nests within 10 miles of the Plum Creek Wind Farm boundary; the survey area for the Wind Farm completely overlaps with the Green and Yellow Segments and partially overlaps with the Blue and Red Segments. During surveys, one active bald eagle nest was documented within one mile of the Blue Segment alignment; this nest is 0.95 mile east of the Blue Segment alignment along the Cottonwood River and was observed during both years of surveys. Two active bald eagle nests were documented within one mile of the Red Segment alignment. These nests were 0.95 mile and 0.6 mile from the Red Segment alignment along the Cottonwood River and observed during both years of surveys. No bald eagle nests are located within one mile of the Yellow or Green Segments. Additionally, the MNDNR maintains records of documented bald eagle nests in the state's Natural Heritage Information System (NHIS). Based on a review of the data, there are no records of bald eagle nests within one mile of the Application segments. It should be noted that since the bald eagle was delisted in 2007, MNDNR has not routinely updated the NHIS data with more current bald eagle nest records (that is, the NHIS database is not a comprehensive list of all eagle nests).

Key bird habitats in the United States are designated by The National Audubon Society (NAS) as Important Bird Areas (IBAs). The goal of IBAs is to ensure that bird populations persist by identifying and conserving significant habitats. In Minnesota, 57 IBAs have been identified (NAS, 2016a). The Application segments do not cross any IBAs. The nearest IBA to Application segments, the Upper Minnesota River IBA, is approximately 13.5 miles northeast of the Blue and Red Segments' northern terminus. The Upper Minnesota River Valley IBA is a global priority IBA encompassing the floodplains, marshes, swamps, and riparian habitat of the Upper

Minnesota River; the IBA provides a variety of key habitats and a corridor for movement in a landscape heavily dominated by agricultural land use. The Heron Lake IBA is about 14 miles south of the southern terminus of the Green and Yellow Segments (Collector Substation 2); it is a state priority IBA that includes North and South Heron Lakes, several WMAs and WPAs, and scattered small lakes and wetlands (NAS, 2016a and 2016b).

6.5.7.1 Impacts and Mitigation – All Segments

Plum Creek conducted a constraints analysis during the routing process to assess potential impacts to sensitive resources, including wildlife habitat (refer to Section 3.0). Where possible, Plum Creek designed the Application segments to avoid these resources. Given that the majority of the land use along Application segments is cultivated cropland, Plum Creek anticipates that the potential impacts on wildlife and wildlife habitat during construction and maintenance of the HVTL Project will be minimal. In addition, most impacts on wildlife habitat would be temporary with the exception of any necessary tree clearing and habitat conversion related to permanent HVTL Project features such as concrete foundations. Potential impacts on wildlife during construction would be primarily related to temporary disturbance and displacement; wildlife may be acclimated to human activity due to the agricultural activity within the HVTL Project Study Area.

During operations, birds, including eagles, may be injured or killed due to either collisions with the transmission line and associated HVTL Project components or electrocution. Avian collision risk may be greater during certain behaviors such as flushing, courtship displays, and aerial displays; these behaviors may distract birds such that they are less aware of nearby structures. Collision risk may also be greater if a powerline is located between roosting, feeding, or nesting areas. Individuals or species with poor vision, that are young or less agile, or that are unfamiliar with the area may also be at greater risk of collision with transmission lines. Electrocutions typically result when an individual bird's wingspan is equal to or greater than the distance between two energized and/or grounded components of a transmission line (Avian Power Line Interaction Committee [APLIC], 2006).

Plum Creek will coordinate with USFWS and MNDNR as needed to identify avian movement pathways and migration flyways that may be crossed by the Application segments and to discuss areas along the transmission line that may need to be marked with avian flight diverters to minimize impacts to birds. In addition, the HVTL Project will be constructed and operated according to Avian Power Line Interaction Committee (APLIC) recommended standards to reduce the potential for avian collisions and electrocutions (APLIC, 2006; APLIC, 2012).

No bald eagle nests are located within one mile of the Green or Yellow Segments. The bald eagle nests identified within a mile of the Blue and Red Segments are outside of the 0.125-mile (660-foot) buffer for bald eagle nests established by the USFWS (USFWS, 2007). Potential impacts on eagles using these nests would be the same as those described above for other birds—specifically, potential injury or death due to collision and electrocution. Plum Creek will avoid and minimize these potential impacts through coordination with the USFWS and MNDNR and adherence to APLIC recommended standards regarding avian collisions and electrocutions, as described above (APLIC, 2006; APLIC, 2012).

6.6 Rare and Unique Natural Resources

6.6.1 Threatened and Endangered Species

Plum Creek reviewed the USFWS Information for Planning and Conservation (IPaC) website for the federal endangered and threatened species, candidate species, and designated critical habitat that may occur in the vicinity of the Application segments (USFWS, 2019). Plum Creek also reviewed the MNDNR's NHIS for documented occurrences of federal- and state-listed species within one mile of each segment (MNDNR, 2019d). Although these reviews do not represent a comprehensive survey, they provide information on the potential presence of protected species and habitat within the vicinity of the Application segments (refer to Table 6.6.1-1 and Appendix I).

Table 6.6.1-1
Federal and State-Listed Species Potentially Present Within One Mile of the Application Segments

Common Name	Scientific Name	Habitat	Segment	Status [1]		Source
				State [2]	Federal [3]	
Mammals						
Northern long-eared bat	*Myotis septentrionalis*	In winter, hibernates in caves and mines. In fall, swarms in forested areas surrounding hibernation sites. During late spring and summer, forages and roosts in upland forests (USFWS, 2018a)	All	SC	T	USFWS
Birds						
Forster's Tern	*Sterna forsteri*	Extensive marshes with open water and emergent vegetation interspersed. Nests on floating vegetative platforms and muskrat houses (MNDNR, 2019e)	Red	SC	None	NHIS
Insects						
Dakota skipper	*Hesperia dacotae*	Remnants of mixed and tallgrass prairie remnants (USFWS, 2019b)	Green	E	T	USFWS
Plants						
Prairie bush-clover	*Lespedeza leptostachya*	Dry to mesic prairies with gravelly soils (USFWS, 2009)	All	T	T	USFWS
Slender milk-vetch	*Astragalus flexuosus* var. *flexuosus*	Dry prairies, mesic prairies, and hill prairies across a range of topographic and moisture conditions (MNDNR, 2019f)	Red	SC	None	NHIS

Table 6.6.1-1
Federal and State-Listed Species Potentially Present Within One Mile of the Application Segments

Common Name	Scientific Name	Habitat	Segment	Status [1]		Source
				State [2]	Federal [3]	

[1] E = Endangered, T = Threatened, SC = Special Concern
[2] MNDNR, 2019d
[3] USFWS, 2019

6.6.1.1 Federally listed species

According to the USFWS IPAC website, two federally listed species may occur in the vicinity of the Application segments: northern long-eared bat and prairie bush-clover. Both species are listed as federally threatened. Based on the USFWS IPaC review, no federally endangered species, candidate species, or designated critical habitat have potential to occur.

Northern Long-eared Bat

The northern long-eared bat (*Myotis septentrionalis*) is a medium-sized bat that is 3.0 to 3.7 inches in length with a wingspan of 9 to 10 inches. The species' name is due to its relatively long ears compared to other members of the genus *Myotis*. In winter, northern long-eared bats hibernate in mines and caves in areas with high humidity, constant temperatures, and no air currents. In summer, the species roosts alone or in colonies in live and dead trees under bark, in cavities, or in crevices. Males and non-reproductive females may roost in caves or mines in the summer. When they are not in hibernation, the species occurs in forested habitats, oftentimes near waterbodies. In Minnesota, the species typically begins hibernating in late August or September; they generally emerge from hibernation and begin their active season in May. Pups are born in June or July. When the young are able to fly, the maternity colonies disperse (MNDNR, 2019g; USFWS, 2015).

The northern long-eared bat was federally listed as "threatened" due to the threat from white-nose syndrome (WNS). Other sources of mortality that may further impact the species include loss of summer habitat, changes in the microclimate of the species hibernacula, and collisions with wind turbines (USFWS, 2015).

Dakota skipper

The Dakota skipper is protected as threatened under the Endangered Species Act (ESA), effective November 23, 2014 and is found in two types of prairies. One type is moist bluestem prairie in which three wildflower species are usually blooming when Dakota skippers are adults: wood lily (*Lilium philadelphicum*), harebell (*Campanula rotundifolia*) and smooth camas (*Zygadenus elegans*). The second type is upland prairie that is relatively dry and often found on ridges and hillsides. Bluestem grasses and needlegrasses dominate these prairies; purple coneflower (*Echinacea angustifolia*) is typical of high-quality sites that support this skipper, although it also uses other flowers for nectar. Both of these habitat types are unlikely to be reestablished on a site that has been plowed. Therefore, activities that maintain the original native grass habitat are fundamental to the species' conservation (USFWS, 2019b).

Prairie Bush Clover

The federally threatened prairie bush clover (*Lespedeza leptostachya*) 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 (MNDNR, 2019h; USFWS, 2009). 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 (MNDNR, 2019h; USFWS, 2009).

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 (MNDNR, 2019h; USFWS, 2009).

6.6.1.2 State-listed species

State-listed species and state species of special concern with documented occurrences within one mile of the Application segments are shown in Table 6.6.1-1. No state-listed threatened or endangered species are documented within one mile of the Application segments. Two records of state species of special concern are documented within one mile of the Red Segment. A record of the Forster's tern from 1984 is 0.78 mile from the Red Segment alignment and associated with the Westline WMA, and a record of the slender milkvetch from 1998 is 0.05 mile from the Red Segment alignment and associated with a SOBS ranked as moderate. Additionally, there are two records of dry hill prairies within one mile of the Red Segment. These terrestrial communities are described in Section 6.6.2. A brief summary of the natural history of the Forster's tern and slender milkvetch follows.

Forster's Tern

The Forster's tern is a gull-like bird with gray back and wings, black cap, white underparts, pointed wings, and forked tail. In Minnesota, the species is a seasonal resident where it inhabits marshes interspersed with open water and emergent vegetation. Its diet is comprised primarily of small fish. Forster's tern typically nests on muskrat lodges or floating vegetation. The species ranges across approximately one-third of the state, but much of its suitable habitat in the state is not occupied. Since 1990, only 50 active colonies have been documented. Threats to the species include nest predation, water level fluctuation, human disturbance, chemical contamination, and habitat destruction (MNDNR, 2019e).

Slender Milk-Vetch

The slender milk-vetch is a perennial legume with pale-purple pea-shaped flowers. Each plant has a branched crown from which multiple stems grow forming clumps up to one meter in diameter. The species occurs in mesic prairies, dry prairies, and hill prairies across a range of topographic and moisture conditions. Populations of slender milk-vetch are located in the Minnesota River Prairie and Coteau Moraines subsections of the North Central Glaciated Plains Section, as defined by the ECS of Minnesota. The species flowers in June and is insect-

pollinated. Threats to slender milk-vetch include over-grazing, herbicides, non-native invasive species, and habitat conversion (MNDNR, 2019f).

6.6.1.3 Impacts and Mitigation – All Segments

Federally Listed Species

The proposed HVTL Project may impact individual northern long-eared bats if clearing or construction occurs when the species is roosting, foraging, or raising pups in its summer habitat. The species may be injured or killed if occupied trees are cleared during the species' active window (i.e., April 1 – October 31). In addition, northern long-eared bats may be disturbed during clearing or construction activities due to human presence or noise.

The USFWS published a Final ESA 4(d) rule for the northern long-eared bat on January 14, 2016. In the Final 4(d) rule, the agency limited prohibitions for the species to those that would protect the bat in WNS-affected geographic areas during the most vulnerable stages in the species' life history—specifically, during hibernation, spring staging, fall swarming, and pup rearing (USFWS, 2016a). The HVTL Project's Application segments are located within the USFWS-designated WNS Zone (USFWS, 2018b). Per the species' final 4(d) rule, within the WNS Zone, incidental take due to tree removal is prohibited as follows:

- If it occurs within 0.25 mile of a documented hibernaculum, or
- If it involves a documented maternity roost tree or other trees within 150 feet of the documented maternity roost tree during June or July.

In addition, all take within known hibernacula is prohibited (USFWS, 2016a).

Records of documented hibernacula and roost trees are maintained in the MNDNR's NHIS. Based on a review of northern long-eared bat records, Plum Creek determined that there are no documented northern long-eared bat maternity roost trees within 150 feet or hibernacula within 0.25 mile of the Application segments.

None of the Application segments crosses prairie habitat for either prairie bush-clover or Dakota skipper. Therefore, impacts to these two species are not anticipated.

Plum Creek submitted a letter to the USFWS Minnesota-Wisconsin Field Office on October 1, 2018 introducing the HVTL Project and met with the USFWS Minnesota-Wisconsin Field Office staff in November 2018 to discuss the HVTL Project and federally protected species that may occur in the HVTL Project Study Area. The USFWS did not provide a letter response, but topics covered in the November 2018 meeting include eagle nests and potential habitat for threatened and endangered species. The USFWS indicated the Project is primarily routed along roads and parcel lines and cultivated crops which do not provide habitat for federally listed species in Cottonwood, Murray, and Redwood Counties.

State-Listed Species

Based on the Plum Creek's NHIS review, no occurrences of state-listed threatened or endangered species are recorded within one mile of the Application segments; however, there are two

records of state species of special concern within one mile of the Red Segment—one record for the Forster's tern and one record for slender milkvetch. Plum Creek does not anticipate future documented occurrences of state-listed species in the vicinity of the Application segments given that the majority of the land use along the Application segments' rights-of-way is cultivated crop land and developed areas. As such, impacts on state-listed plant species are not expected.

The state's designation as a species of special concern for the Forster's tern and slender milk-vetch does not afford protections under the Minnesota Endangered Species Statute (Minn. Stat., § 84.0895). The Forster's tern record was observed 35 years ago (1984) and is associated with the Westline WMA, approximately 0.75 mile from the Red Segment alignment. The slender milk-vetch record was observed about 20 years ago (1998) associated with the Gales 24 SOBS (*see* Section 6.6.2), approximately 0.05 mile from the Red Segment alignment. Because both records were associated with designated natural resource sites (i.e., WMA and SOBS), Plum Creek anticipates that any additional occurrences of these species may also be associated with natural resource sites or other areas designated as having value as wildlife habitat. The Green and Yellow Segments' rights-of-way do not cross any designated natural resource sites. The Blue Segment right-of-way does not cross any designated natural resource sites, with the exception of two SOBS ranked below the minimum threshold for statewide biodiversity significance (*see* Section 6.6.2). The Red Segment right-of-way crosses one SOBS, the Gales 24, where the slender milk-vetch record was documented. Overall, impacts on state species of special concern are expected to be insignificant given the limited number of occurrences within a mile of the Application segments, the dates of these records, the limited number of natural resource sites (*see* Section 6.6.2), and the predominant land uses (agriculture and developed).

Plum Creek sent a HVTL Project introduction letter to MNDNR in early October 2018 and held a follow-up meeting with MNDNR staff on October 22, 2018 to discuss impacts to sensitive resources, including state-listed species and state species of special concern (refer to Section 7.1. 2). MNDNR has not provided a comment letter for the Project, but based on the October 2018 meeting, Plum Creek modified the Red Segment near the Cottonwood River crossing based on comments from MNDNR (*see* Section 2.2). Plum Creek will continue to coordinate with the MNDNR to avoid and minimize adverse impacts on these species.

6.6.2 Natural Resource Sites

Plum Creek reviewed the HVTL Project Study Area for sites that have been specially designated as having notable natural resources. Natural resource sites designated by the State of Minnesota include SOBS, Native Plant Communities (NPCs), Native Prairie, railroad right-of-way prairie, WMAs, Scientific and Natural Areas, and state parks. Sites with notable natural resource value designated by the federal government include NWRs, wilderness areas, national wild and scenic rivers, national forests, WPAs, and grassland and wetland easements.

MNDNR's Minnesota Biological Survey (MBS) assesses Minnesota landscapes for NPCs, rare animals, rare plants, and animal communities through desktop review and follow-up field survey. Based on this assessment, MBS designates and assigns rankings to SOBS, based on landscape context, NPC, and occurrence of rare species populations. The MBS groups and ranks SOBS for each of Minnesota's ECS subsections for the purpose of designating and cataloguing the state's most notable examples of NPCs and rare species. There are four ranks for SOBS: outstanding,

high, moderate, and below (MNDNR, 2009). The Green and Yellow Segments do not intersect SOBS; the rights-of-way of the Blue and Red Segments intersect four SOBS (refer to Table 6.6.2-1).

Table 6.6.2-1
Sites of Biodiversity Significance Crossed by the Application Segments

Site of Biodiversity Significance	Rank	Acres of Crossing (150-foot Right-of-Way)			
		Green Segment	Yellow Segment	Blue Segment	Red Segment
Gales 14	Below	--	--	--	0.19
Gales 24	Moderate	--	--	--	3.47
Johnsonville 28	Below	--	--	8.99	--
North Hero 32	Below	--	--	1.63	--
Total for Each Segment		**--**	**--**	**10.62**	**3.66**

The MNDNR has also classified NPCs within the state using plant species, soils, and other site-specific data from vegetation plots. The current NPC classification covers most of the wetland and terrestrial vegetation in the state and was completed in 2003. It is a six-level hierarchical classification that accounts for vegetation structure and geology, ecological processes, climate and paleohistory, local environmental conditions, canopy dominants, substrate, and environmental conditions (Aaseng et al., 2011). Based on a review of the MNDNR's NPC data, no NPC's are located within the Green, Yellow, or Blue Segments. Three NPCs are located at least partially within the Red Segment; two are Dry Hill Prairie (Southern) Type and one is a Mesic Prairie (Appendix C). One Dry Hill Prairie Record is also recorded in the NHIS data, likely due to the presence of slender milk-vetch, and is associated with the Gales 24 SOBS. All three records are also recorded in the MNDNR native prairie data. The right-of-way of the Red Segment does not cross any NPCs or MNDNR-mapped Native Prairie. None of the Application segments cross any mapped railroad right-of-way prairie.

WMAs are described in Section 6.2.8. No WMAs are within 1.0 mile of the Green and Yellow Segments. The nearest WMA to the Blue Segment is the Two Rivers WMA, which is located approximately 0.4 mile east of the Blue Segment alignment. The nearest WMA to the Red Segment is Gales WMA; it is approximately 0.3 mile west of the Red Segment. The record for the Forster's tern, which is about 0.75 mile west of the Red Segment alignment, is within the Westline WMA. There are no WMAs within the 150-foot rights-of-way of the Blue or Red Segments.

The Green, Yellow, Blue, and Red Segments' rights-of-way do not cross other natural resource sites. Figure 6.6.2-1 depicts natural resource sites along the Application segments.

6.6.2.1 Green and Yellow Segments

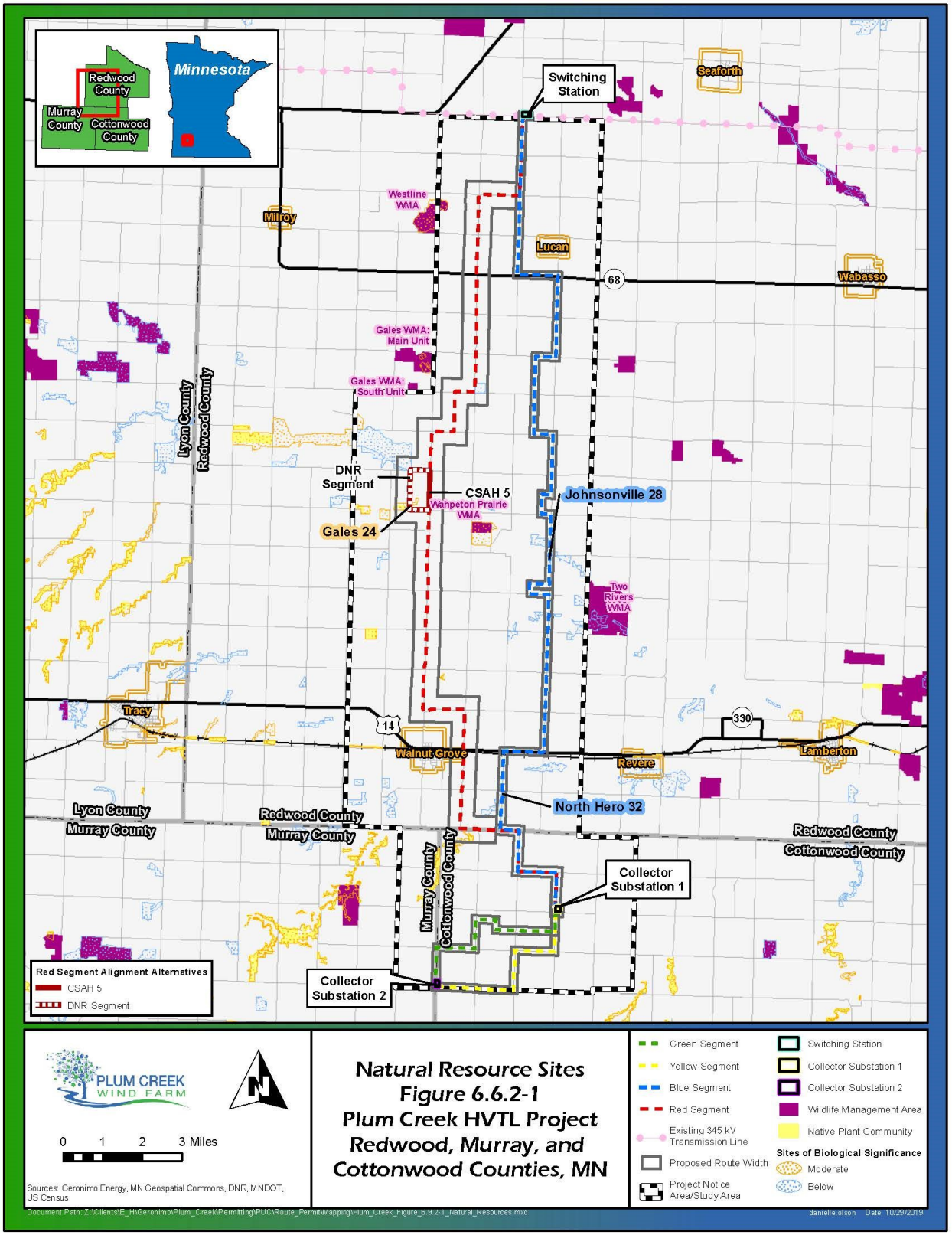
The 150-foot rights-of-way of the Green and Yellow Segments do not cross SOBS, NPCs, native prairie, railroad right-of-way prairie, WMAs, Scientific and Natural Areas, or state parks. Additionally, neither segment crosses NWRs, wilderness areas, national wild and scenic rivers, national forests, WPAs, grassland and wetland easements, or any other natural resource sites.

6.6.2.2 Blue Segment

The Blue Segment right-of-way crosses two SOBS that are ranked below the minimum threshold for statewide biodiversity significance, Johnsonville 28 and North Hero 32. The Johnsonville 28 SOBS is associated with the Cottonwood River; the North Hero 32 SOBS is associated with Plum Creek. SOBS that are ranked as below the minimum threshold are sites that may have local areas of conservation value that may serve as native plant and animal habitat, buffers around higher-quality habitat, corridors for animal movement, open space, or areas with high potential for restoration. The Blue Segment right-of-way does not cross other federally or state-designated natural resource sites.

6.6.2.3 Red Segment

The Red Segment right-of-way crosses one SOBS that is ranked moderate, Gales 24, and one SOBS ranked below the minimum threshold. SOBS ranked as moderate may have documented records of rare species, NPCs that are moderately disturbed, or strong potential for recovery of characteristic ecological processes and NPCs (Table 6.9.2-1). This SOBS includes NPC/MNDNR-mapped native prairie and one NHIS record of slender milk-vetch. The Red Segment right-of-way only crosses the SOBS; it does not intersect the NPC/native prairie or the NHIS record for slender milk-vetch. The Gales 14 SOBS below the minimum threshold is associated with the Cottonwood River north of CSAH 4. The Red Segment right-of-way partially intersects this SOBS; one corner structure transmission pole would be placed within the SOBS. . The Red Segment right-of-way does not cross other federally or state-designated natural resource sites.


Minnesota
Redwood County
Murray County
Cottonwood County
Switching Station
Seaforth
Westline WMA
Milroy
Lucan
68
Wabasso
Gales WMA: Main Unit
Gales WMA: South Unit
Lyon County
Redwood County
DNR Segment
CSAH 5
Wahpeton Prairie WMA
Gales 24
Johnsonville 28
Two Rivers WMA
Tracy
14
330
Walnut Grove
Revere
Lamberton
North Hero 32
Lyon County
Murray County
Redwood County
Murray County
Redwood County
Cottonwood County
Murray County
Cottonwood County
Collector Substation 1
Collector Substation 2
Red Segment Alignment Alternatives
CSAH 5
DNR Segment
PLUM CREEK WIND FARM
N
0 1 2 3 Miles
Sources: Geronimo Energy, MN Geospatial Commons, DNR, MNDOT, US Census
Natural Resource Sites
Figure 6.6.2-1
Plum Creek HVTL Project
Redwood, Murray, and
Cottonwood Counties, MN
Green Segment
Yellow Segment
Blue Segment
Red Segment
Existing 345 kV Transmission Line
Proposed Route Width
Project Notice Area/Study Area
Switching Station
Collector Substation 1
Collector Substation 2
Wildlife Management Area
Native Plant Community
Sites of Biological Significance
Moderate
Below
Document Path: Z:\Clients\E_H\Geronimo\Plum_Creek\Permitting\PUC\Route_Permit\Mapping\Plum_Creek_Figure_6.9.2-1_Natural_Resources.mxd
danielle.olson Date: 10/29/2019

6.6.2.4 Impacts and Mitigation – All Segments

Intersections of the Application segments with natural resource sites are minimal. The Green and Yellow Segments' rights-of-way do not cross natural resource sites. The Blue Segment right-of-way crosses two SOBS, but both are ranked below the minimum threshold for statewide biodiversity significance. The Red Segment right-of-way crosses one SOBS ranked as moderate, Gales 24, which indicates that the site has been characterized as having records of rare species, NPCs that are moderately disturbed, or strong potential for recovery of NPCs or ecological processes. The Blue and Red Segments do not cross any other federal- or state-designated natural resource sites, including WMAs and NPCs.

During development and refinement of the segments, Plum Creek conducted a comparative analysis of sensitive natural resources (refer to Section 3.0). Plum Creek designed the Application segments to avoid these resources where possible. The intersection of the Red Segment right-of-way and the Gales 24 SOBS is due in part to a re-routing of the Red Segment right-of-way farther west to avoid an area of high waterfowl use along the Cottonwood River as requested by MNDNR at the October 22, 2018 meeting. Permanent impacts on the Gales 24 SOBS will be primarily limited to a corner structure of the transmission line. Should the Red Segment be ordered by the Commission, Plum Creek will explore measures to minimize impacts on the SOBS, including pre-construction surveys for rare species, fencing and avoiding sensitive areas, timing restrictions for construction, line-marking, or specific site restoration measures. Overall, given the small number of natural resource sites present along the Application segments and the quality of these sites, minimal adverse impacts to rare or sensitive resources are anticipated.

Plum Creek sent a HVTL Project introduction letter to MNDNR staff in early October 2018 and had a follow-up meeting with MNDNR staff on October 22, 2018 to discuss potential impacts to rare features, including state-designated natural resource sites such as SOBS. Topics discussed at the October 2018 meeting with the MNDNR included SOBS and routing around them where possible and/or collocating the transmission line with roads or parcel lines where the route is in the vicinity of these natural resource sites. Plum Creek will continue to coordinate with the MNDNR to minimize impacts on sensitive resources.

Plum Creek will implement a vegetation-management plan that includes minimizing chemical use in sensitive areas by avoiding broadcast applications of herbicide and employing spot treatments for control of invasive species.

7.0 FEDERAL AND STATE AGENCY, LOCAL GOVERNMENT, AND PUBLIC INVOLVEMENT

This section describes outreach efforts conducted by Plum Creek and discusses pre-Application involvement by federal, state, and local agencies as well as the public information outreach campaign. Throughout the process, Plum Creek provided opportunities for stakeholders and potentially affected landowners to participate in the routing process. This engagement provided Plum Creek with valuable insight into landowner and public agency preferences regarding development of HVTL Project facilities. Copies of agency correspondence to date are provided in Appendix K.

7.1 Agency Involvement in Pre-application

As part of pre-Application efforts, Plum Creek initiated its outreach campaign to public agencies through in-person meetings and HVTL Project notification letters. Many agencies, stakeholders, landowners, and interested parties, were contacted to gather feedback on the HVTL Project (refer to Table 7.1-1). This included meetings with the USFWS, MNDNR, and various township and county commissioners.

On October 1, 2018, Plum Creek sent an informal HVTL Project introduction letter and map to federal, tribal, state (besides the MPUC), county, and local agencies and stakeholders with jurisdiction in the HVTL Project Study Area. Plum Creek sent a follow-up request for comment letter on September 20, 2019 (Appendix K). Plum Creek requested input from the federal and state agencies with respect to the resources under their jurisdiction as well as the identification of federal and state permits and/or approvals that may be potentially required for the HVTL Project. On November 16, 2018, Plum Creek sent the Project notices to local units of government as required by Minn. Stat. § 216E.03(3a)(Appendix J).

On February 4, 2019, as part of the Notice Plan, Plum Creek sent HVTL Project notification letters to landowners within the area reasonably likely to be affected by the proposed transmission line and LGUs. Both letters introduced preliminary details about the HVTL Project and provided information about the MPUC Certificate of Need and Route Permit review and approval process, including opportunities for public input.

A representative letter for each project notification mailing and responses received as of November 2019 are included in Appendix K. A summary of responses and meetings with federal and state agencies is included below. Plum Creek will continue to meet with township and county officials as the HVTL Project moves forward and will seek any necessary local permits. Table 7.1-1 identifies agencies and tribal government that were contacted through meetings or a notification letter and the date that the consultation was conducted.

Table 7.1-1
Plum Creek Agency Correspondence

Agency	Date Contacted
Federal	
U.S. Army Corps of Engineer, St. Paul District – Regulatory Branch	October 10, 2018 (Agency response) October 15, 2018 (Agency response)
U.S. Fish and Wildlife Service – Twin Cities Ecological Services Field Office	November 26, 2018 (Meeting)
Lower Sioux Indian Community – Tribal Historic Preservation Officer	January 29, 2019 (Meeting)
State	
Minnesota Historical Society – State Historic Preservation Office	November 26, 2018 (Agency response) November 28, 2018 (Applicant follow-up)
Minnesota Office of the State Archaeologist	No response to date
Minnesota Department of Natural Resources –Energy Projects Review – State Office and Region 4 (South Region)	October 22, 2018 (Meeting) November 4, 2019 (Agency response)
Minnesota Department of Agriculture – Agricultural Development and Financial Assistance Division	October 25, 2019
Minnesota Department of Transportation (MNDOT) – District 8 (Southwest Region)	October 24, 2019 (Applicant follow-up)
MNDOT – District 7 (South Central Region)	No response to date
MNDOT – Aeronautics	October 8, 2018 (Agency response) October 9, 2018 (Applicant follow-up)
Minnesota Department of Employment & Economic Development	No response to date
Minnesota Department of Health	No response to date
Minnesota Pollution Control Agency – Environmental Review Unit	No response to date
Minnesota Department of Public Safety	No response to date
Minnesota Board of Water and Soil Resources	January 8, 2019 (Applicant call)
County	
Cottonwood County – Environmental Office	October 8, 2018 (Agency response) October 9, 2018 (Applicant response)
Cottonwood County – Public Works	October 8, 2018 (Agency response) October 9, 2018 (Applicant response)
Murray County – Economic Development	No response to date
Murray County - Highway Department	No response to date
Murray County – Zoning	December 7, 2018 (Meeting)
Redwood County Board of Directors	November 5, 2019 (Letter of support)
Redwood County – Economic Development	No response to date
Redwood County – Environmental Office	No response to date

Table 7.1-1
Plum Creek Agency Correspondence

Agency	Date Contacted
Redwood County – Highway Department	No response to date
Local Government Units	
Southwest Regional Development Commission	November 7, 2018 (Agency response) November 12, 2018 (Applicant response)
City of Lucan	No response to date
City of Walnut Grove	No response to date
Ann Township	No response to date
North Hero Township	No response to date
Johnsonville Township	No response to date
Gales Township	No response to date
Granite Rock Township	No response to date
Springdale Township	No response to date

7.1.1 Federal Agencies

7.1.1.1 U.S. Army Corps of Engineers

The HVTL Project will require authorization from the USACE for wetland impacts under Section 404 of the CWA. On October 10, 2018, the USACE responded to the initial HVTL Project introduction letter and provided contact information for the agency contact assigned to the HVTL Project. On October 15, 2018, the USACE provided additional information regarding the anticipated permitting process for the HVTL Project including requirements under Section 10 of the Rivers and Harbors Act and Sections 404 and 401 of the CWA, as well as additional consultations that may be required for the HVTL Project.

7.1.1.2 U.S. Fish and Wildlife Service

Plum Creek met with USFWS staff in November 2018 to introduce the HVTL Project and discuss potential impacts to endangered species. A brief summary of USFWS coordination is below:

- USFWS staff provided guidance on habitat quality and route selection.
- Federally listed threatened and endangered species in the HVTL Project Study Area are limited to the northern long-eared bat and the prairie bush clover.
- There are no known roost trees or hibernacula in the area associated with the northern long-eared bat, and as such, the HVTL Project would likely be covered under the 4(d) rule (refer to Section 6.6.1).
- The prairie bush clover only occurs in areas of high quality prairie. Because most of the HVTL Project Study Area in Cottonwood and Redwood Counties is associated with agricultural land cover, suitable habitat for the species is likely not present.

- Nest surveys for bald eagles we conducted in March 2018 and March 2019 for the Wind Farm and approximately 10-mile buffer, including a portion of the HVTL Project Study Area. Routing efforts would avoid bald eagle nests identified from the nest survey and those records in the NHIS database.

7.1.1.3 Lower Sioux Indian Community

Plum Creek met with the Tribal Historic Preservation Officer for the Lower Sioux Indian Community on January 29, 2019 to introduce the HVTL Project and request input on areas of tribal interest in Cottonwood and Redwood Counties that should be considered during Route development for the HVTL Project. During the meeting, Plum Creek provided information about the MPUC approval process and opportunities for public input.

7.1.2 State Agencies

7.1.2.1 Minnesota Historical Society – SHPO

Plum Creek received a response to the HVTL Project introduction letter on November 26, 2018 in which the Minnesota SHPO asked for additional information about the planned location and height of the turbines in the Wind Farm. Plum Creek provided the additional HVTL Project information on November 28, 2018. Plum Creek will conduct a Phase 1a Literature Review and a Phase 1 archeological survey, if necessary, after a final route has been selected by the Commission. The results of the literature review and archaeological survey will be shared with the Minnesota SHPO when complete.

7.1.2.2 Minnesota Department of Natural Resources

Plum Creek met with MNDNR staff on October 22, 2018, to review the HVTL Project and discuss sensitive resources within the HVTL Project Study Area, including state-listed species, SOBS, NPCs, WMAs, native prairies, and public waters. An overview of the HVTL Project Study Area was examined with preliminary discussions of potential PWI crossing locations and the best way to limit impacts on forested areas along waterbody margins and on avian resources. Plum Creek reduced the number of PWI crossings based on this review.

On November 4, 2019, MNDNR staff provided an additional comment letter summarizing the October 22, 2018 meeting.

After the MPUC selects a route for the HVTL Project, the MNDNR requested Plum Creek provide the final route and alignment for the transmission line to agency staff for recommendations on flight diverter locations. Plum Creek will continue to work closely with the MNDNR to avoid and minimize impacts to state-protected resources.

7.1.2.3 Minnesota Department of Agriculture

On October 25, 2019, MDA requested Plum Creek prepare an Agricultural Impact Mitigation Plan for the Project.

7.1.2.4 Minnesota Department of Transportation

Plum Creek provided maps of the Route Segments crossing US-14 and MN-68 for MNDOT to review on October 24, 2019. A follow-up meeting and coordination is anticipated to occur by the end of 2019.

7.1.3 County Agencies

7.1.3.1 Cottonwood County

The Cottonwood County Public Works Department responded to the HVTL Project introduction letter on October 8, 2018 requesting an opportunity to review the transmission line route and noting that the HVTL Project will require a development agreement from the County Highway Department. Plum Creek will work with the Cottonwood County Highway Department to obtain a development agreement after the Commission selects a route for the transmission line.

The Cottonwood County Environmental Office responded to the HVTL Project introduction letter on October 9, 2018 and provided a link to the County Conditional Use Permit application. A conditional use permit is not required for the HVTL Project under Minn. Stat. § 216E.10, subd. 1, but Plum Creek will continue to coordinate with Cottonwood County to address any concerns they may have.

7.1.3.2 Murray County

Plum Creek met with Murray County staff on December 7, 2018 to discuss the HVTL Project. Plum Creek presented the current HVTL Project location and timeline to the Murray County Zoning/Environmental Administrator. The Administrator noted that the HVTL Project will require a development agreement with the County, and provided a template agreement for Plum Creek's review.

7.1.3.3 Redwood County

Redwood County issued a letter of support for the Project on November 5, 2019.

7.1.4 Local Government Units

7.1.4.1 Southwest Regional Development Commission

The Southwest Regional Development Commission (SRDC) responded to the HVTL Project introduction letter on November 7, 2018 and provided information about MNDOT districts and development agreements that may be needed for the HVTL Project. SRDC further advised that Plum Creek should work with the counties to obtain development agreements. Plum Creek responded to SRDC's letter on November 12, 2018 and agreed to pursue a development agreement with all three above-referenced counties.

7.2 Public Open Houses

In addition to agency outreach, Plum Creek conducted two public open houses. The first open house was held on February 8, 2018, and the second was held on May 23, 2019. Both were held at the Lucan Community Center in Lucan, Minnesota. Potential participating landowners were invited to the first open house via mailed invitation; all landowners with parcels within one mile of the Blue and Red Segments were invited to the second open house, also via mailed invitation. Landowner information for the mailing list was acquired directly from Cottonwood and Redwood Counties. Refer to Section 3.2.4 more detailed information.

8.0 REQUIRED PERMITS, APPROVALS, AND CONSULTATIONS

The HVTL Project will require various regulatory permits, reviews, and approvals. Table 8.0-1 provides a summary of the major permits, approvals, and consultations that may be required for the HVTL Project. All permits, licenses, approvals, or consultations required for the HVTL Project will be obtained in the applicable areas prior to construction beginning. Copies of agency correspondence to date are provided in Appendix K.

Table 8.0-1
Status of Potential Permits, Approvals, and Consultations

Administering Agency	Permit, Approval, or Consultation	Status and Applicability to the Project
Federal		
Federal Aviation Administration	Form 7460-1, Notice of Proposed Construction in compliance with 14 CFR § 77.9	After the Route Permit is Ordered by the Commission, Plum Creek will submit Form 7460-1 for the structure locations.
U.S. Army Corps of Engineers (USACE), St. Paul District	Section 404, CWA – Dredge and Fill	Plum Creek has coordinated with the USACE and conducted a desktop review of wetlands and potential impacts with the MNDNR update to NWI data. Based on this desktop data, the HVTL Project will fall under the Regional General Permit threshold for impacts. Once a route is ordered, Plum Creek will conduct wetland delineations to confirm wetland boundaries and impacts based on final design.
U.S. Fish and Wildlife Service (USFWS)	ESA of 1973, Section 9 Incidental or Non-Purposeful Take Permit, if deemed necessary	Based on coordination with USFWS, a Take Permit is not anticipated for the HVTL Project.
State of Minnesota		
Minnesota Public Utilities Commission	Certificate of Need and Route Permit	Submitted concurrent with this Application.
Minnesota Pollution Control Agency (MPCA)	Section 401 CWA Water Quality Certification	Concurrent with Section 404, CWA – Plum Creek will meet the Minnesota conditions.
MPCA	National Pollutant Discharge Elimination System Stormwater Permit (NPDES)	After the Route Permit is Ordered by the Commission, Plum Creek will submit NPDES Permit. The permit is required to be submitted within 30 days of the start of construction. The NPDES permit will cover the HVTL Project and Wind Farm.

Table 8.0-1
Status of Potential Permits, Approvals, and Consultations

Administering Agency	Permit, Approval, or Consultation	Status and Applicability to the Project
Board of Water and Soil Resources (BWSR)	Wetland Conservation Act approvals	Plum Creek has coordinated with the USACE and conducted a desktop review of wetlands and potential impacts with the MNDNR update to National Wetlands Inventory data. Based on this desktop data, the HVTL Project will fall under the Regional General Permit threshold for impacts. Once a route is ordered, Plum Creek will conduct wetland delineations to confirm wetland boundaries and impacts based on final design.
Minnesota Department of Natural Resources (MNDNR)	License to Cross Public Waters	After the Route Permit is issued by the Commission, Plum Creek will submit its License to Cross Public Waters.
MNDNR	State Protected Species Consultations	NHIS request submitted 10/30/2019. Plum Creek will continue coordinating with MNDNR.
Minnesota State Historic Preservation Office (SHPO)	Minnesota Statutes, Chapter 138 (Minnesota Field Archaeology Act and Minnesota Historic Sites Act)	Plum Creek has coordinated with SHPO, conducted a literature review of the route segments, and avoided and previously identified archaeological sites within the right-of-way. Once a route is designated by the Commission, Plum Creek will conduct surveys for previously unidentified cultural resources in high-potential areas. Plum Creek will coordinate with SHPO on the protocol and any potential mitigation.
Minnesota Department of Transportation (MNDOT)	Utility Permit on Trunk Highway Right-of-Way (Long Form No. 2525)	Plum Creek is coordinating the MNDOT on crossings of US-14 and MN-68.
MNDOT	Driveway Access	To be obtained prior to construction.
MNDOT	Oversize/overweight permits	To be obtained prior to construction.
Minnesota Department of Agriculture (MDA)	Agricultural Impact Mitigation Plan	Plum Creek will prepare an Agricultural Impact Mitigation Plan, and have it reviewed and approved by MDA.

Table 8.0-1
Status of Potential Permits, Approvals, and Consultations

Administering Agency	Permit, Approval, or Consultation	Status and Applicability to the Project
Local		
County, Township, City, BWSR	Minnesota Wetland Conservation Act approvals	
Redwood County	Floodplain Development Permit	Plum Creek will obtain a Floodplain Permit for structures placed with the floodplains depending on the route designated by the Commission.
County, Township, City	Right-of-way/utility permits	Plum Creek is coordinating with Cottonwood and Redwood Counties\.
County, Township, City	Overwidth/overweight loads permits	To be obtained prior to construction.
County, Township, City	Road crossing permits	To be obtained prior to construction.
County, Township, City	Driveway/access permits	To be obtained prior to construction.

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