Bemidji – Grand Rapids 230 kV Transmission Line Project

Draft Environmental Impact Statement

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Prepared by:
Minnesota Department of Commerce
Office of Energy Security
and
USDA Rural Development
Rural Utilities Service

Cooperating Agencies:
U.S. Forest Service, Chippewa National Forest
U.S. Army Corps of Engineers
Leech Lake Band of Ojibwe, Division of Resource Management

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Draft Environmental Impact Statement

Responsible State Agency: Minnesota Department of Commerce, Office of Energy Security

Responsible Federal Agency (Lead): U.S. Department of Agriculture, Rural Development Utilities Program

Cooperating Agencies: U.S. Army Corps of Engineers; U.S. Department of Agriculture, Forest Service, Chippewa National Forest; and the Leech Lake Band of Ojibwe, Leech Lake Division of Resource Management

Title: Bemidji-Grand Rapids 230 kV Transmission Line Project, Draft Environmental Impact Statement

Location: Beltrami, Hubbard, Cass and Itasca Counties, Minnesota

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Abstract:

This Draft Environmental Impact Statement (EIS) prepared by the Minnesota Department of Commerce Office of Energy Security (OES) provides information about the potential environmental impacts of the proposed Bemidji-Grand Rapids Transmission Line Project, a 230 kV transmission line that would extend from the Wilton Substation located west of Bemidji in Beltrami County, to the Boswell Substation in Cohasset in Itasca County, Minnesota. Depending upon the route selected, the Project may also expand the existing Cass Lake Substation or construct a new substation in the Cass Lake area. Otter Tail Power Company, Minnesota Power, and Minnkota Power Cooperative (the Applicants) propose to construct and operate the high voltage transmission line and made a joint application to the Minnesota Public Utilities Commission (Commission) for a route permit. The route permitting process is governed

by Minnesota Rules 7849.5010 – 7849.6500. The Applicants also approached the United States Department of Agriculture Rural Development (RUS) for financial assistance to construct the Project. RUS has determined that it's decision about whether to finance the Project would constitute a major federal action that may have a significant impact upon the environment, within the context of the National Environmental Policy Act of 1969 (NEPA). RUS serves as the lead federal agency for the NEPA environmental review of the Project.

OES and RUS held six public scoping meetings during the week of August 11, 2008. These meetings were held in Blackduck on August 11, Cass Lake on August 12, Deer River on August 13, Bemidji on August 14 at 1:00pm and 5:00pm, and Walker on August 15. This EIS evaluates the environmental consequences that may result from the Proposed Action along three route alternatives, sub-alternatives/crossover segments, and detailed segments that comprise those alternatives. This EIS also analyzes the No-Build Alternative, under which the Commission would not approve the route permit application.

Comment Period:

Comments postmarked by April 26, 2010 will be addressed in the Final EIS, which will be used by the Commission in its decision-making process for the Proposed Action. The Commission will consider late comments to the extent practicable.

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List of Acronyms and Abbreviations

AADT	annual average daily traffic
ac	acres
AC	alternating current
ACSR	aluminum conductor steel reinforced
ADT	average daily traffic
AES	Alternatives Evaluation Study
AM	amplitude-modulated
APE	Area of Potential Effect
APP	Avian Protection Plan
AREMA	American Railway Engineering and Maintenance-of-Way Association
ASR	Antenna Structure Registration
ATV	all-terrain vehicle
BA/BE	Biological Assessment/Biological Evaluation
B-GR	Bemidji-Grand Rapids
BIA	Bureau of Indian Affairs
BJI	Bemidji Regional Airport
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe
BP	before present
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNF	Chippewa National Forest
CNFLRMP	Chippewa Nation Forest Land Resource Management Plan
CO	carbon monoxide
CO2	carbon dioxide
CSAH	County State-Aid Highway
dB	decibels
dBA	A-weighted decibels
EA	environmental assessment
EDRR	Early Detection Rapid Response
EF	Experimental Forest
EFP	Energy Facility Permitting
EIS	Environmental Impact Statement
ELF	electromagnetic field
EMF	Electric and Magnetic Fields
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ER	Environmental Report
ERM	Environmental Resources Management
ERP	OES Energy Regulatory Planning
ESA	Endangered Species Act
FAA	Federal Aviation Administration

FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FLPMA	Federal Land Policy and Management Act
FM	frequency-modulated
FR	Federal Register
FSSS	U.S. Forest Service Sensitive Species
ft	feet
FY	fiscal year
GAP	Geographic Analysis Program
GHG	Greenhouse Gas
GIA	Grant-in-Aid
GIS	Geographic Information Systems
GPS	Global Positioning System
HDD	horizontal directional drilling
HDR	HDR Engineering, Inc.
HVTL	high voltage transmission line
IARC	International Agency for Research on Cancer
kHz	kilohertz
kV	kilovolt
LAU	Lynx analysis unit
LE	Landscape Ecosystem
LEP	limited English proficiency
LGU	local government unit
LIC	Local Indian Council
LLBO	Leech Lake Band of the Ojibwe
LLDRM	Leech Lake Division of Resource Management
LLHSP	Leech Lake Heritage Sites Program
LLR	Leech Lake Reservation
LOS	level of service
MA	Management Areas
MBTA	Migratory Bird Treaty Act
MDA	Minnesota Department of Administration
MEQB	Minnesota Environmental Quality Board
mi	miles
mG	milliGauss
MHB	Mississippi Headwaters Board
MMBF	million board feet
MN	Minnesota
MnDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MnDEED	Minnesota Department of Employment and Economic Development
MP	milepost
MPCA	Minnesota Pollution Control Agency
mph	miles per hour

MRCC	Midwestern Regional Climate Center
MRI	magnetic resonance imaging
MRPC	Mississippi River Parkway Commission
MVA	mega volt ampere
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NADP	National Acid Deposition Program
NAGPR	Native American Graves Protection and Repatriation
NDEX	North Dakota Export
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NERC	North America Reliability Council
NESC	National Electrical Safety Code
NFS	National Forest Service
NHIS	Natural Heritage Information System
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NO2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O3	ozone
OAHP	Office of Archaeology and Historic Preservation
OAQPS	Office of Air Planning and Standards
OES	Office of Energy Security
OHV	off-highway vehicle
OHWL	ordinary high water level
OSA	Office of the State Archaeologist
OSHA	Occupational Safety and Health Act
PAHs	polycyclic aromatic hydrocarbons
Pb	lead
PCP	pentachlorophenol
PILT	payment in lieu of taxes
PM10	particulate matter less than or equal to 10 microns in diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
PUC	Minnesota Public Utilities Commission
PWI	Public Waters Inventory
RE	riparian emphasis
RF	radio frequency
RFSS	Regional Forester Sensitive Species
ROC	Region of Comparison
ROD	Record of Decision
ROW	right-of-way
RTC	Reservation Tribal Council

RTE	rare, threatened, and endangered
RU	recreation use
RUS	U.S. Department of Agriculture – Rural Utilities Service
SFIA	Sustainable Forest Incentive Act
SGR	State Game Refuge
SHPO	State Historic Preservation Office
SIO	Scenic Integrity Objective
SMS	Scenery Management System
SNA	Scientific and Natural Area
SO2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SR	State Route
SSURGO	Soil Survey Geographic
SWCD	Soil and Water Conservation District
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traditional Cultural Property
TES	threatened, endangered, and sensitive
THPO	Tribal Historic Preservation Officer
TMDL	Total Maximum Daily Load
μT	micro Teslas
UB	Unique Biological, Aquatic, Geological, or Historical Management Area
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
VIA	Visual Impact Assessment
VMS	Visual Management System
VOR	Very High Frequency Omnidirectional Radio Range
VQOs	Visual Quality Objectives
WHO	World Health Organization
WMA	Wildlife Management Area
WSR	Eligible Scenic River

Executive Summary

This Executive Summary provides a summary of the proposed project and alternatives evaluated as well as a summary of findings of the document, highlighting conclusions, areas of controversy and issues to be resolved.

Project Introduction

Otter Tail Power Company, Minnesota Power, and Minnkota Power Cooperative (the Applicants) propose to construct a 230 kilovolt (kV) transmission line between the Wilton Substation, located west of Bemidji, Minnesota, and the Boswell Substation in Cohasset, Minnesota as well as upgrades to both the Wilton and Boswell substations (the Project). Depending upon the route selected, the Project may also expand the existing Cass Lake Substation, construct a new substation in the Cass Lake area, and/or construct a new Nary Breaker Station.

Co-Lead Agencies – Minnesota Office of Energy Security and the USDA Rural Utilities Service

High voltage transmission lines constructed in Minnesota require a route permit from the Minnesota Public Utilities Commission (Commission). The route permitting process is governed by Minnesota Rules part 7850. The Applicants made a joint application to the Commission for a route permit for the Project. As part of the permitting process for the high voltage transmission line, the Minnesota Department of Commerce Office of Energy Security (OES) prepared this Environmental Impact Statement (EIS) for the Project.

Minnkota Power Cooperative also has approached the United States Department of Agriculture Rural Utilities Service (RUS) for financial assistance to construct the Project. RUS has determined that the agency's decision about whether to finance the Project would constitute a major federal action that may have a significant impact upon the environment within the context of the National Environmental Policy Act of 1969 (NEPA). Thus, RUS serves as the lead federal agency for the NEPA environmental review of the Project. RUS also is responsible for ensuring compliance with Section 106 of the National Historic Preservation Act (NHPA), upholding Treaties of the United States with the Leech Lake Band of Ojibwe (LLBO) and meeting their trust obligations to the LLBO, and for initiating informal consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act (ESA) to determine the likelihood of effects on federally listed species.

As co-lead agencies, OES and RUS prepared this EIS in compliance with the requirements of NEPA and the Council on Environmental Quality regulations for implementing NEPA (40 CFR 1500 -1508). This DEIS was prepared to meet the following key objectives:

- Identify and assess potential impacts on the natural and human environment that would result from the Project;
- Identify and assess the potential impacts of the Project on the Federal Treaties and Trust Obligation to the Leech Lake Band of Ojibwe;
- Meeting Consultation Requirements for Section 106 of the NHPA
- Describe and evaluate reasonable alternatives, including a No-Build Alternative, to the Project that would avoid or minimize adverse effects to the environment; and
- Identify specific mitigation measures to minimize environmental impacts.

Cooperating Federal Agencies

In addition to the co-lead agencies, the U.S. Forest Service (USFS) Chippewa National Forest (CNF), the U.S. Army Corps of Engineers (USACE), and the Leech Lake Band of Ojibwe Division of Resources Management (LLDRM) agreed to assist the RUS as cooperating agencies in preparing this EIS. The roles of these agencies are described below.

Chippewa National Forest

The Applicants have applied to USFS CNF for a Special Use Permit to construct and operate the Project on National Forest Service (NFS) lands. The Forest Supervisor is responsible for management and evaluation of the occupation and use of NFS lands and may grant a special use on those lands in accordance with the Federal Land Policy and Management Act (FLPMA) of 1976. The USFS must also meet the U.S. Government Treaty and trust obligations to the Leech Lake Band of Ojibwe. The Forest Supervisor of the CNF must determine whether to issue a special use permit for the Project. Any action taken by the Forest Supervisor must be consistent with the objectives of the CNF Land and Resource Management Plan (Forest Plan), as revised in 2004.

U.S. Army Corps of Engineers

The Applicants would apply to the U.S. Army Corps of Engineers (USACE) for a permit for the Project under Sections 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbor Act. Section 404 of the Clean Water Act relates to the placement of dredge and/or fill material in the waters of the United States, including adjacent wetlands. Section 10 regulates the placement of structures in, on, or over navigable waters of the U.S. The USACE must determine whether or not to issue a Section 404 and Section 10 permit for the Project. The USACE must also meet the U.S. Government Treaty and trust obligations to the Leech Lake Band of Ojibwe.

Leech Lake Band of Ojibwe

The Applicants have requested that the Leech Lake Reservation Tribal Council (RTC) permit the Project to cross the proclamation boundaries of the Leech Lake Reservation (LLR). The Tribe retains treaty rights for all lands, regardless of land ownership or management, within the LLR boundaries. The LLBO is responsible for issuing the appropriate approval and authorizations for activities to cross lands upon which it retains treaty rights and easements or authorizations for activities on lands under its jurisdiction. Not all land inside the LLR boundaries is managed by the Tribe, but rather includes a patchwork of multiple owners and managers, including tribal trust land, tribal fee land, state land, federal land, county land, and private ownership.

The Leech Lake Division of Resource Management (LLDRM) is responsible for overseeing the development of land leases, easements, and Allotments Tribal and Band lands approved by the RTC and the Bureau of Indian Affairs (BIA). The LLDRM also works with the BIA and owners of tribal titled lands that the Project would cross to obtain their consent and easements or other agreements. The LLDRM analyzes proposed projects for their effect on never relinquished hunting, fishing, and gathering treaty rights of the LLBO on lands within the LLR. The LLDRM's review also includes impacts to gathering activities for tribally important species including but not limited to wild rice, blueberries, and sweetgrass. For the purpose of this EIS document the LLBO assumes the role of a Federal Entity, while still remaining a soverign government.

The Director of the LLDRM has authority to participate in the environmental review of projects and to prepare joint or separate Environmental Assessment (EA) or EIS documents for those projects that occur on lands within the LLR boundaries. The LLDRM Director has decided to be a full cooperating agency in this EIS. This EIS, and the other environmental documents issued in connection with the Project, will assist the LLDRM Director in making a decision about the merits of this Project and whether or not to sign a decision notice for the Project, and to prepare any necessary easements and other permits needed to cross the reservation. This EIS will be used to provide information sufficient to make a decision on the request to obtain permission to cross the reservation, and any easements, Allotments, Tribal or Band lands, and to receive Reservation Resolution.

Trust Responsibility

American Indian lands in the lower 48 States comprise over 45 million acres of reserved lands and an additional 10 million in individual allotments (USFWS, 2010). These lands contain sacred and cultural sites and many natural resources that are used by tribes for cultural and subsistence activities.

As representatives of the federal government, federal agencies have a responsibility to manage natural resources in adherence with the following objectives:

- *reflects Federal trust responsibility toward Indian tribes*
- *respects tribal rights*
- *acknowledges the treaty obligations of the United States toward tribes*
- *uses the government-to-government relationship in dealing with tribes*
- *protects natural resources that the Federal government holds in trust for tribes* (USFWS, 2010).

Within the Project area, RUS and the federal cooperating agencies have a trust responsibility to manage natural resources in accordance with the objectives noted above and with consideration to the specific land use policies of the Leech Lake Band of Ojibwe. Where the Project would result in long-term impacts to natural resources within the Leech Lake Reservation, federal agencies have the responsibility to mitigate such impacts.

Purpose and Need for Action

The Applicants propose to construct and operate the Project to meet projected future electric demand and to maintain electric transmission reliability standards in accordance with the requirements of the North American Reliability Council (NERC). In addition to meeting the future needs of the Bemidji area, the Project is intended to maintain regional transmission reliability for the larger northwestern Minnesota and eastern North Dakota region. The area is susceptible to low voltage conditions if the Winger – Wilton 230 kV transmission line is out of service during winter peak load conditions.

The electric power demand in the Bemidji area is growing at a rate of approximately 2 percent per year. Although interim measures to improve the electric transmission system have been taken, such as adding voltage support, the peak load is anticipated to reach 296 MW by the winter of 2011-2012, or approximately 135 percent of the system's maximum load-serving capability of 220 MW. The Applicants estimate that the peak load would reach approximately 360 MW by winter 2022-2023. Without improvements to address this deficit, the area would be in a situation of local load-serving inadequacy, meaning that in the event of the loss of local transmission capability, the area could be subject to brownouts or blackouts.

The Project also would facilitate the addition of new generation sources in the region by increasing the transfer of additional capacity from the North Dakota Export boundary to the Twin Cities metropolitan area. At the time of this EIS, there are no specific generation projects and therefore the assessment of the impacts of new generation is not included in this EIS.

Regulatory Framework

The following sections summarize the primary framework that provides the regulatory basis for each federal and state agency's role in approving the Applicants' Project and guides the permitting process.

Route Permit

The Commission has the responsibility for routing transmission lines capable of operating at or above 100 kV in Minnesota. The Applicants have applied to the Commission for a Route Permit for the Project. The Project is considered a High Voltage Transmission Line under Minnesota Statute 216E (Minnesota Power Plant Siting Act) and requires a route permit from the Commission. When the Commission issues a route permit, zoning, building, and land use regulations are preempted per Minnesota Statue 216E.10, subd. 1.

The Commission's route permit determination must be guided by the state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land-use conflicts, and ensuring the state's electric energy security through efficient, cost-effective power supply and electric transmission infrastructure (Minn. Stat. 213E.03, subd. 7a). These criteria are more fully developed in MN Rules 7849.5910. The process contains several opportunities for public involvement throughout the process.

As part of this permitting process, the OES prepares an EIS to provide information to the Commission, to assist in its decision about the route permit for the Project. The EIS contains information about the human and environmental impacts of the Project and selected alternatives, and addresses mitigation measures for anticipated impacts.

Certificate of Need

Because the Project is considered a Large Energy Facility under Minnesota Statute 216B.2421, a Determination of Need for the Project also is required from the Commission. The Certificate of Need process is designed to evaluate the level of need, as well as the alternatives available to satisfy that need. The Certificate of Need process is the only proceeding under Minnesota Statute in which a no-build alternative and the size, type, timing, system configuration, and voltage of a proposed project would be considered. The Commission determines the basic type of facility (if any) to be constructed, the size of the facility, and the timing of the facility (e.g., the projected in-service date).

The Certificate of Need process is governed by Minnesota Rules 7849.1000-2100. The OES prepares an Environmental Report analyzing the human and environmental impacts of each proposed large energy facility that have come before the Commission for a determination of need. The Applicants applied for a Certificate of Need for the proposed transmission line on March 17, 2008. The *Environmental Report* prepared for the Project was released on April 30, 2009. The Commission issued an order determining the need for the Project on July, 14, 2009.

National Environmental Policy Act

NEPA requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of, and reasonable alternatives to, their proposed actions. For major federal actions that have the potential to cause significant adverse impacts on the environment, NEPA requires agencies undertaking the action to prepare an EIS.

RUS has determined that providing financial assistance for the construction and operation of the Project constitutes a major federal action that may significantly affect the quality of the natural and human environment. Therefore, the EIS process is underway in accordance with 7 CFR 1794 Subpart G - Procedure for Environmental Impact Statement. In addition, RUS prepared this EIS for use by decision-makers in determining whether or not to provide assistance for construction and operation of the Project in the form of a loan to Minnkota Power Cooperative, one of the Applicants.

Clean Water Act

Clean Water Act Section 404 authorization is required for the Project, because its construction would require discharge of dredged and/or fill material into waters of the United States. As a cooperating agency in preparation of this EIS, and the agency responsible for determining whether to issue a permit for wetland impacts associated with the Project, it is the USACE's intention to adopt the EIS as part of its review of the Project.

Treaties of the United States Government with the Leech Lake Band of Ojibwe

The United States entered into a number of treaties with the Leech Lake Band of Ojibwe under which the LLBO retained rights to many of the resources on the LLR. All Federal agencies have trust obligations to assure that this Project does not infringe or negate the LLBO's ability to exercise these retained treaty rights.

Public Scoping

Both the Power Plant Siting Act and NEPA require that agencies responsible for preparing environmental review documents involve the public in environmental review of projects. Through the scoping process, OES and RUS invited federal, state, and local units of government; Native American tribes; organizations; and individuals interested in the Project to comment on the Project proposed by the Applicants and to identify issues and concerns to be addressed in the EIS.

Both OES and RUS are required to schedule at least one public meeting in the area of the proposed Project. The purpose of the meeting is to inform the public about the Project and to solicit public input into the scope of the environmental review. A "scope" is a determination of what needs to be assessed in the environmental review to fully inform decision-makers and the public about the possible impacts of a project or potential alternatives.

The OES Energy Facilities Permitting Unit and RUS held public information meetings in Blackduck, Cass Lake, Deer River, Bemidji, and Walker in August 2008. Approximately 120 people attended the public information meetings. In addition to the oral comments received at the public information meetings, more than 120 written comments were received by the close of the public comment period on September 30, 2008. Following the close of the comment period, OES staff reviewed the public comments about the scope of the environmental review and the rules governing the content of an EIS (site rule). Based upon that review, the Director of the OES issued a Scoping Decision on March 31, 2009.

Proposed Action, Alternatives, and Scope of the EIS

The Applicants propose constructing a 230 kV electric transmission line from Minnkota Power Cooperative's Wilton Substation located just west of Bemidji, Minnesota, to Minnesota Power's Boswell Substation in Cohasset, Minnesota, northwest of Grand Rapids, Minnesota. The Bemidji area includes the communities of Bagley to the west, Walker to the south, and Blackduck to the northeast, as well as a large portion of the Leech Lake Reservation. This section provides an overview of the alternatives evaluated in the EIS, as well as the potential impacts and mitigation measures.

The Applicants presented information on two routes in their June 4, 2008, *Route Permit Application*. Both of these routes are generally in the vicinity of U.S. Highway 2. Route Alternative 1, identified by the Applicants as their preferred route, generally follows the Great Lakes Gas Transmission Company pipeline and a 115 kV transmission line rights-of-way. Route Alternative 2, the Applicants' Alternate Route, generally follows U.S. Highway 2 and the Enbridge pipeline rights-of-way. Under Minnesota Statute 216E.03, the EIS must evaluate alternatives proposed by the Applicants.

The federal agencies consider both of the Applicant-proposed routes to be located within one study area, referred to as a "Macrocorridor" their screening materials. The Applicants prepared an *Alternative Evaluation Study* and a *Macrocorridor Study Report* in accordance with RUS guidelines. At the request of the CNF, RUS, and LLDRM three additional Macrocorridors were developed by the Applicants to evaluate whether potentially routing along one of these corridors might merit further investigation. These four Macrocorridors (referred to as the Central, North, South and non-CNF) were identified and noticed in area newspapers and in direct mail notification to approximately 11,000 potentially affected landowners.

Based on the scoping response and further analysis detailed in the Scoping Decision/Report, the federal agencies require that the EIS must evaluate a viable route alternative different from the two route alternatives originally proposed by the Applicants. In conjunction with the Applicants, OES staff developed 1,000-foot routes within each of the additional three "macrocorridors" and compiled a variety of social and environmental data on each of the routes. Staff from OES, LLBO, and federal partner agencies reviewed more detailed social and environmental information for the five routes (i.e., the two Applicant-proposed routes and one in each of the additional three macrocorridors). It was concluded that one additional route, located in the North macrocorridor and hereafter referred to as Route Alternative 3, should be fully evaluated in the EIS. This route avoids the heart of the Chippewa National Forest and largely avoids the Leech Lake Reservation.

During this review process, a number of concerns related to Route Alternative 1 were identified by agencies participating in the environmental review. The agencies identified potentially significant impacts to traditional cultural, biological, and socioeconomic resources along this route alternative. Additionally, impacts to the "Ten Section" area or the Pike Bay Experimental Forest would require a Forest Plan Amendment. Although several flaws were identified with this route alternative, Minnesota Statute 216E.03, subdivision 5, requires the evaluation of all routes proposed by the Applicant. More information on these concerns is provided in the RUS *Scoping Decision/Report* (Appendix A) and in the public comment summary (Appendix B).

Table ES-1: Summary of Route Alternatives

		No-Build Alternative	Route Alternative 1	Route Alternative 2	Route Alternative 3
Meets Identified Purpose and Need for Project		No	Yes	Yes	Yes
Route Length (miles)		N/A	69	68	116
Existing Linear Features (miles)	Transmission Lines	N/A	18	9	91
	Pipelines	N/A	61	48	8
	Highways	N/A	25	60	32
Length of new Corridor (miles)		N/A	5.2	2.6	5.1
New Corridor as a % of Route		N/A	7.5 %	3.8 %	4.4%
Cass Lake Substation		N/A	New (4 acres)	Expand (2.2 acres)	Expand (2.2 acres)
Nary Breaker Station		N/A	Yes, Depending upon Route (2.5 acres)	N/A	N/A
Wilton Substation		N/A	Add new Equipment; no expansion	Add new Equipment; no expansion	Add new Equipment; no expansion
Boswell Substation		N/A	Expand (1.3 acres)	Expand (1.3 acres)	Expand (1.3 acres)
Estimated Cost ($ million)		N/A	$62.6 – $65.3	$65.6	$99..1

No-Build Alternative

Under the No-Build Alternative the Project would not be constructed. Instead, significant load management and conservation measures would be implemented to limit energy load growth and the local reactive power supply would need to be improved to enable the current transmission system to handle the projected increase in energy demand. The No-Build Alternative described in the Application combined additional demand-side management, reactive power supply (capacitors), and greater use of local generation (the Solway Generating Station).

The OES Energy Regulatory Planning (ERP) staff estimates that a minimum of 110 MW of load reduction would be required to function as a viable alternative to the Project. ERP staff based this estimate on the 110 MW of dispatchable distributed generation identified as an alternative on page 56 of their Application. The Applicants estimate this amount would be needed to provide the redundancy to ensure that at least 76 MW would always be available.

To ensure voltage stability in the event of loss of one or more transmission sources into the area, the region's reactive power supply would require improvements. Energy demand in the Bemidji area is met primarily by power generated outside the area and transmitted to the area via the bulk transmission system. Otter Tail Power's Solway Generating Station, a 40 MW dual-fueled (natural gas and oil) peaking generator located approximately 13 miles west of Bemidji, is the only generator in the Bemidji area. The

Solway Generating Station also has the ability to operate as a source for dynamic reactive power supply.

Route Alternative 1

This route, referred to as Route 1 in the *Route Permit Application*, is approximately 69 miles long and generally follows the Great Lakes Gas Transmission Company pipeline and an 115 kV transmission line ROWs. This alternative would add equipment to the Wilton Substation and expand the Boswell Substation by approximately 1.3 acres to accommodate additional equipment. Under this alternative, a new 4-acre 230 kV substation would be constructed in Pike Bay Township in Cass County. Under certain routes, a new breaker station may be constructed near the existing Nary Breaker station. There are 12 Segment Alternatives associated with Route Alternative 1.

Route Alternative 2

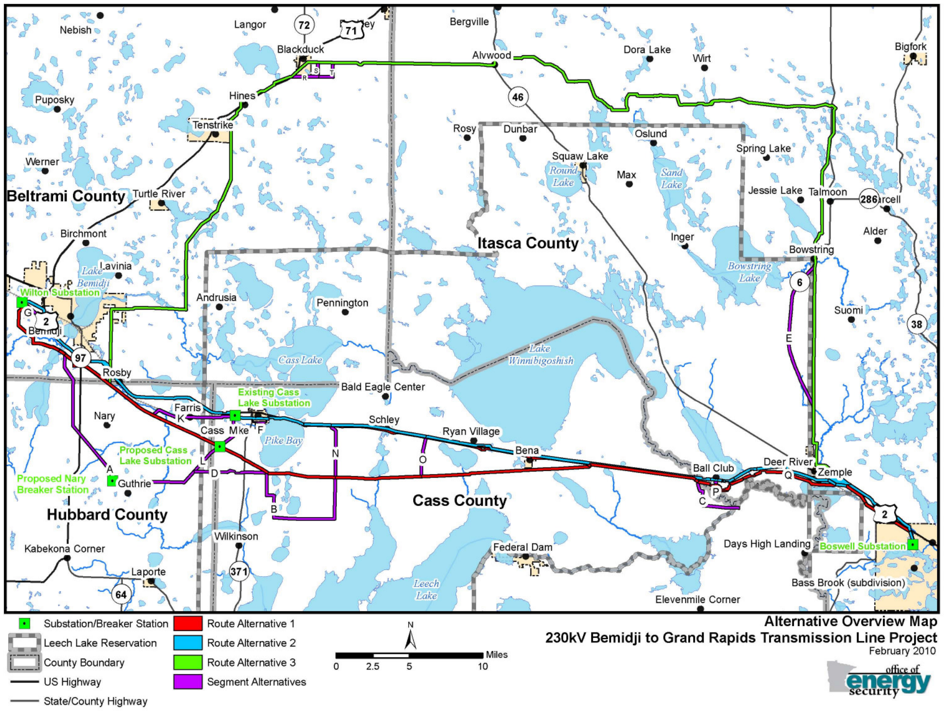
This route, referred to as Route 2 in the *Route Permit Application*, was proposed by the Applicants as an alternate route in their application to the Commission. This route is approximately 68 miles long and generally follows U.S. Highway 2 and the Enbridge pipeline ROWs. As with Route Alternative 1, this alternative would also entail additional 230 kV equipment to the Wilton Substation and would expand the Boswell Substation by approximately 1.3 acres to permit the addition of 230 kV equipment. Under this Route Alternative, the existing Cass Lake Substation would be expanded by approximately 2.2 acres to accommodate new 230 kV equipment. There are 11 Segment Alternatives associated with Route Alternative 2.

Route Alternative 3

This route follows existing pipeline, transmission, and road ROWs for most of its 116 miles. The route follows a series of transmission lines and roads between the Wilton Substation, northeast to the Blackduck area, east and then south to Deer River, and then southeast to the Boswell Substation. This route avoids a major gateway to the Chippewa National Forest and avoids bisecting the Leech Lake Reservation. This alternative would include improvements to the Wilton Substation and would expand the Boswell Substation by approximately 1.3 acres, but no additional substations or breaker stations would be constructed or expanded. There are four Segment Alternatives associated with Route Alternative 3.

Route and Segment Alternatives are shown below in Figure ES-1.

Figure ES-1: Route and Segment Alternative Overview Map



Potential Impacts

Potential direct and indirect impacts were identified and evaluated for each aspect of the natural and built environments potentially affected by the Project. These potential impacts of the Project route alternatives and the No-Build Alternative are summarized in Table ES-2, below.

Table ES-2: Comparative Impacts of Route Alternatives

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Treaty Trust Resources				
Direct impacts	Long-term loss of an important gathering area for tribal members.	Some long-term loss of gathering opportunities for tribal members.	Minimal loss of gathering opportunities for tribal members due to avoidance of the LLR.	No effect.
Aesthetics				
Direct impacts	Loss of scenic resources; loss of trees would change view; contrast to surrounding landscape. Conversion of 579 acres of forested area. Impact to spiritual and significant cultural area of the Leech Lake Band of Ojibwe; Aniishiinaabe cultural and spirituality is tied to land and the surrounding environment so any disturbance to this visual or aesthetics of Route Alterantive 1 corridor would have a direct affect to the Leech Lake People. Impacts to Ten Section management area	Loss of scenic resources; loss of trees would change view; contrast to surrounding landscape. Conversion of 439 acres of forested area. Alternative 2, which follows U.S.-2, would be visible to visitors and residents due to less forest cover to shield views and would be located near more recreational areas.	Loss of scenic resources; loss of trees would change view; contrast to surrounding landscape. Conversion of 813 acres of forested area.	No effect.
Air Quality and Climate				
Direct Impacts	Fugitive dust and vehicle emissions during construction.	Fugitive dust and vehicle emissions during construction.	Fugitive dust and vehicle emissions during construction. Alternative 3 would result in the greatest duration of construction effects due to its length.	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Indirect Impacts	Minor decrease in carbon sequestration potential due to loss of existing trees.	Minor decrease in carbon sequestration potential due to loss of existing trees.	Minor decrease in carbon sequestration potential due to loss of existing trees.	No effect.
Geology and Soils				
Topography	No effect.	No effect.	No effect.	No effect.
Geology	No effect.	No effect.	No effect.	No effect.
Soils	Soils would be disturbed during construction; erosion and compaction are possible.	Soils would be disturbed during construction; erosion and compaction are possible.	Soils would be disturbed during construction; erosion and compaction are possible.	No effect.
	Temporary soil impacts from transmission line structures for entire route are 876 acres and long-term impacts are 3 acres.	Temporary soil impacts from transmission line structures for entire route are 931 acres and long-term impacts are 3 acres.	Temporary soil impacts from transmission line structures for entire route are 1,070 acres and long-term impacts are 5 acres.	
	Temporary soil impacts to LLR from transmission line structures are 618 acres and long-term impacts are 2 acres.	Temporary soil impacts to LLR from transmission line structures are 631 acres and long-term impacts are 2 acres.	Temporary soil impacts to LLR from transmission line structures are 4 acres and long-term impacts are 0 acres.	
	Temporary soil impacts to CNF from transmission line structures are 341 acres and long-term impacts is 1 acre.	Temporary soil impacts to CNF from transmission line structures are 281 acres and long-term impacts is 1 acre.	Temporary soil impacts to CNF from transmission line structures are 846 acres and long-term impacts are 3 acres.	
	Long-term impacts from substation construction and expansion could range up to 7.8 acres.	Long-term impacts from substation construction and expansion are 3.5 acres.	Long-term impacts from substation construction and expansion are 3.5 acres.	
Water Resources				

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Surface Water	No major effect. If water bodies cannot be spanned, shore erosion, sedimentation, and changes in turbidity may occur. Crosses 4 water basins and 6 water courses along entire route. Crosses 3 water basins and 5 water courses on the LLR. Crosses 4 water basins and 5 water courses on CNF.	No major effect. If water bodies cannot be spanned, shore erosion, sedimentation, and changes in turbidity may occur. Crosses 2 water basins and 7 water courses along entire route. Crosses 2 water basins and 7 water courses on the LLR. Crosses 2 water basins and 2 water courses on CNF.	No major effect. If water bodies cannot be spanned, shore erosion, sedimentation, and changes in turbidity may occur. Crosses 9 water basins and 27 water courses along entire route. No water basin or water course crossings on LLR. Crosses 8 water basins and 15 water courses on CNF.	No effect.
Groundwater	No major effect.	No major effect.	No major effect.	No major effect. .
Floodplains				
Direct Effects	No major effect. If water bodies cannot be spanned, erosion or sedimentation may result in a loss of surrounding floodplains. Possible location of 8 structures in the FEMA designated areas.	No major effect. If water bodies cannot be spanned, erosion or sedimentation may result in a loss of surrounding floodplains. Possible location of 4 structures in the FEMA designated areas.	No major effect. If water bodies cannot be spanned, erosion or sedimentation may result in a loss of surrounding floodplains. Possible location of 46 structures in the FEMA designated areas with 16 in the CNF.	No effect.
Wetlands				
Direct Effects	Potential loss or conversion of wetlands.	Potential loss or conversion of wetlands.	Potential loss or conversion of wetlands. The highest amount of wetland type conversion would occur for Alternative 3.	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
	Potential effects to NWI wetlands: temporary impacts to 83 acres, wetland conversion of 209 acres, and <1 acre of long-term impacts along entire route. 113 structures are estimated in NWI wetlands.	Potential effects to NWI wetlands: temporary Impacts to 59 acres, wetland conversion of 166 acres, and <1 acre of long-term impacts along entire route. 93 structures are estimated in NWI wetlands.	Potential effects to NWI wetlands: temporary Impacts to 101 acres, wetland conversion of 269 acres, and <1 acre of long-term impacts along entire route. 120 structures are estimated in NWI wetlands.	
Indirect Effects	Conversion of wetland types may result in a change in wildlife species composition, diversity, and abundance.	Conversion of wetland types may result in a change in wildlife species composition, diversity, and abundance.	Conversion of wetland types may result in a change in wildlife species composition, diversity, and abundance.	No effect.
Biological Resources				
Direct Effects	Conversion of existing vegetation communities (1,048 acres). Disturbance of intact diverse native plant communities. Introduction or spread of noxious weeds in cleared ROWs. Short-term impacts to wildlife from conversion of forested habitat. Long-term conversion of wildlife habitat in areas that remain cleared and increased long-term fragmentation and edge effect (5.2 miles of new corridors). Would establish a long-term ROW in canopy forest.	Conversion of existing vegetation communities (1,018 acres). Disturbance of intact diverse native plant communities. Introduction or spread of noxious weeds in cleared ROWs. Short-term impacts to wildlife from conversion of forested habitat. Long-term conversion of wildlife habitat in areas that remain cleared and increased long-term fragmentation and edge effect (5.1 miles of new corridors).	Conversion of existing vegetation communities (1,759 acres). Disturbance of intact diverse native plant communities. Introduction or spread of noxious weeds in cleared ROWs. Short-term impacts to wildlife from conversion of forested habitat. Long-term conversion of wildlife habitat in areas that remain cleared and increased long-term fragmentation and edge effect (2.3 miles of new corridors).	No effect.
Species of Special Concern				

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Direct Effects	Potential for habitat conversion. Destruction of non-motile plant species, if located within ROW. Disturbance of intact diverse native plant communities. Affects Ten Section Area by converting forested land, resulting in habitat conversion and edge effect. MnDNR and LLDRM have preliminarily determined Route Alternative 1 would jeopardize the only known one-flowered broomrape population in Northern Minnesota.	Potential for habitat conversion. Destruction of non-motile plant species, if located within ROW. Disturbance of intact diverse native plant communities Affects periphery of Ten Section Area by converting forested land, resulting in habitat conversion and edge effect.	Potential for habitat conversion. Destruction of non-motile plant species, if located within ROW. Disturbance of intact diverse native plant communities	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Cultural Resources and Values including TCPs				
Direct Effects	Potential loss or disturbance of cultural resources or sites Potential impacts on the viewshed of historical structures or landscapes. Potential to disturb unrecorded archaeological sites. Long-term loss of TCPs and locations where they are gathered. Impact to the vitality of the spiritual well-being of tribal residents who use TCPs. Presence of transmission line would alter cultural experience in areas identified as culturally significant, including Ten Section and Guthrie Till Plain areas.	Potential loss or disturbance of cultural resources or sites Potential impacts on the viewshed of historical structures or landscapes. Potential to disturb unrecorded archaeological sites. Long-term loss of TCPs and locations where they are gathered. Impact to the vitality of the spiritual well-being of tribal residents who use TCPs.	Potential loss or disturbance of cultural resources or sites Potential impacts on the viewshed of historical structures or landscapes. Potential to disturb unrecorded archaeological sites.	No effect.
Land Use				
Direct Effects	Temporary and long-term loss of land use by private owners. Temporary and long-term land impacts within ROW: 879 acres of which 579 acres of forested land will have long-term impacts. Conversion of 4 acres for new Cass Lake substation. Additional acreage may be required for possible expansion at Nary Junction.	Temporary and long-term loss of land use by private owners. Temporary and long-term land impacts within ROW: 934 acres of which 439 acres of forested land will have long-term impacts.	Temporary and long-term loss of land use by private owners. Temporary and long-term land impacts within ROW: 1391 acres of which 825 acres of forested land will have long-term impacts.	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
	Total LLR temporary and long-term impacts: 620 acres; 433 acres of long-term forested land impacts. Total CNF temporary and long-term impacts: 342 acres; 294 acres of long-term forested land impacts.	Total LLR temporary and long-term impacts: 633 acres; 338 acres of long-term forested land impacts. Total CNF temporary and long-term impacts: 282 acres; 202 acres of long-term forested land impacts.	Total LLR temporary and long-term impacts: 4 acres; 1 acres of long-term forested land impacts. Total CNF temporary and long-term impacts: 840 acres; 584 acres of long-term forested land impacts.	
Indirect Effects	Potential for increased trespassing through creation of easements.	Potential for increased trespassing through creation of easements.	Potential for increased trespassing through creation of easements.	No effect.
Socioeconomics				
Direct Effect	Short-term influx of income during construction and increased tax base (property taxes from the Applicant) during operation of the project. Economic benefit to businesses and surrounding communities through increased electrical capacity and reliability. Potential decrease in property values. Least potential to directly affect residences. Up to 579 acres of forest land lost from timber harvesting. Greatest potential for impacts to subsistence uses from conversion and fragmentation of habitat and introduction of invasive species. Potential of up to 662 acres of total ROW within the LLR. .	Short-term influx of income during construction and increased tax base (property taxes from the Applicant) during operation of the project. Economic benefit to businesses and surrounding communities through increased electrical capacity and reliability. Potential decrease in property values. Up to 439 acres of forest land lost from timber harvesting. Moderate potential for impacts to subsistence uses from conversion and fragmentation of habitat and introduction of invasive species. Potential of up to 660 acres of total ROW within the LLR.	Short-term influx of income during construction and increased tax base (property taxes from the Applicant) during operation of the project. Economic benefit to businesses and surrounding communities through increased electrical capacity and reliability. Potential decrease in property values. Greatest potential to directly affect residences Up to 638 acres of forest land lost from timber harvesting. Least potential for impacts to subsistence uses from conversion and fragmentation of habitat and introduction of invasive species. Potential of up to 4 acres of total ROW within the LLR.	Would not meet the area's need for reliable electric supply.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Indirect Effects	Increased timber sales in the vicinity of the project during construction, but loss of future timber resources.	Increased timber sales in the vicinity of the project during construction, but loss of future timber resources.	Increased timber sales in the vicinity of the project during construction, but loss of future timber resources.	No effect.
Environmental Justice				
Direct Effects	Crosses the homeland of Minority Community. Will result in long-term loss of gathering lands and temporary disruption to hunting and gathering will occur during construction. Long-term aesthetic impacts to Minority Community	Crosses the homeland of Minority Community. Will result in long-term loss of gathering lands and temporary disruption to hunting and gathering will occur during construction. Long-term aesthetic impacts to Minority Community	Largely avoids the LLR. Will result in loss of a small amount of gathering lands on LLR and temporary disruption to hunting and gathering will occur during construction.	No effect.
Indirect Effects	Aesthetic intrusion would alter cultural experience in areas identified as culturally significant, including Ten Section and Guthrie Till Plain areas.			
Recreation and Tourism				
Direct Effects	Removal of forested land within the LLR and CNF. Possible location of the ROW within the Bemidji Slough or Bemidji State Game Refuge. Potential Bemidji Slough impacts: 5 acres temporarily and 675 square feet long-term. Potential Bemidji State Game Refuge impacts: 65 acres temporarily and 0.2 acres long-term.	Removal of forested land within the LLR and CNF. Possible location of the ROW within the Bemidji State Game Refuge. Potential Bemidji State Game Refuge impacts: 124 acres temporarily and 0.3 acres long-term.	Removal of forested land within the CNF. Possible location of the ROW within the Bemidji Slough or Bemidji State Game Refuge. Potential Bemidji Slough impacts: 4.3 acres temporarily and 561 square feet long-term. Potential Bemidji State Game Refuge impacts: 111 acres temporarily and 0.3 acres long-term.	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Indirect Effects	Changes to vegetation and land cover within easement may impact wildlife habitat and affect hunting areas. Creation of easements may increase the opportunities for OHV/snowmobile trails. Unexpected noise levels (during construction) or viewshed changes may affect non-motorized recreational activities.	Changes to vegetation and land cover within easement may impact wildlife habitat and affect hunting areas. Creation of easements may increase the opportunities for OHV/snowmobile trails. Unexpected noise levels (during construction) or viewshed changes may affect non-motorized recreational activities.	Changes to vegetation and land cover within easement may impact wildlife habitat and affect hunting areas. Creation of easements may increase the opportunities for OHV/snowmobile trails. Unexpected noise levels (during construction) or viewshed changes may affect non-motorized recreational activities.	No effect.
Agriculture				
Direct Effects	Loss of agricultural land (52 acres temporarily and 0.7 acres long-term) and prime farmland (1.3 acres long-term). Largest loss of agricultural and farmland on LLR. Potential interference with agricultural activities (maneuvering equipment around poles and aerial spraying).	Loss of agricultural land (31 acres temporarily and 0.3 acres long-term) and prime farmland (0.7 acres long-term). Potential interference with agricultural activities (maneuvering equipment around poles and aerial spraying).	Loss of agricultural land (119 acres temporarily and 2 acres long-term) and prime farmland (3.6 acres long-term). No affect to agricultural/farmland on LLR. Potential interference with agricultural activities (maneuvering equipment around poles and aerial spraying).	No effects.
Forestry				
Direct Effects	Long-term loss of forested land and timber resources.	Long-term loss of forested land and timber resources.	Long-term loss of forested land and timber resources.	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
	Conversion of about 579 acres of forested area to managed shrub and grasslands along entire route; 433 acres in LLR; 294 acres in CNF. 4 acres of forest land lost for new Cass Lake substation. Lost opportunity for silvicultural research in Pike Bay Experimental Forest. Affects Ten Section Area by converting forested land and resulting in loss of old growth.	Conversion of about 439 acres of forested area to managed shrub and grasslands along entire route; 335 acres in LLR; 202 in CNF. Affects periphery of Ten Section Area by converting forested land and resulting in loss of old growth.	Conversion of about 813 acres of forested area to managed shrub and grasslands along entire route; 1 acre in LLR; 584 acres in CNF.	
Mining				
	No major effect.	No major effect.	No major effect.	No effect.
Community Services				
	No major effect.	No major effect.	No major effect.	No effect.
Utility Systems				
Direct Effects	Potential interference with omnidirectional and unidirectional antenna, resulting in TV and radio interference. Electrical interference on underground pipelines.	Potential interference with omnidirectional and unidirectional antenna, resulting in TV and radio interference. Electrical interference on underground pipelines.	Potential interference with omnidirectional and unidirectional antenna, resulting in TV and radio interference. Electrical interference on underground pipelines.	Demand on existing transmission system would increase and brownouts (leading to blackouts) could occur.
Traffic and Transportation				
Direct Effects	Short-term road traffic and rail delays during construction. Electrical interference to railroads.	Short-term road traffic and rail delays during construction. Electrical interference to railroads.	Short-term road traffic and rail delays during construction. Electrical interference to railroads.	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Indirect Effects	Loss of living snow fences along highways, resulting in snow drift for drivers. Follows 25 miles of existing highway ROW. Potential conflicts with future roadway expansion.	Loss of living snow fences along highways, resulting in snow drift for drivers. Follows 60 miles of existing highway ROW. Potential conflicts with future roadway expansion.	Loss of living snow fences along highways, resulting in snow drift for drivers. Follows 32 miles of existing highway ROW. Potential conflicts with future roadway expansion.	No effect.
Safety and Health				
	No effect.	No effect.	No effect.	No effect.
Noise				
Direct Effects	Noise generated from operation of construction equipment.	Noise generated from operation of construction equipment.	Noise generated from operation of construction equipment.	No effect.

Mitigation Measures for Potential Impacts

The HVTL route permit would require the implementation of mitigation measures to prevent or minimize both short-term and long-term impacts to resources from construction and operation of the Project. Additional mitigation measures were agreed to by the Applicants in the Application for a Route Permit, submitted in June 2008. Mitigation measures for each resource area are summarized in Table ES-3, below.

Irreversible and Irretrievable Commitment of Resources

Irreversible commitment of resources refers to the loss of future options for resource development or management, especially of nonrenewable resources such as cultural resources.

The construction of the Project would require the irretrievable commitment of non-recyclable building materials and fuel consumed by construction equipment. Under certain Route Alternatives and Route Segments, as identified in applicable sections of the DEIS, the Project would require the irreversible or irretrievable commitment of old growth forest, including the Ten Section area and Pike Bay Experimental Forest. In addition, Route Alternative 1 could result in the loss of the Orabanche uniflora species, for which an incidental take permit from the USFWS may be required.

Table ES-3: Summary of Mitigation Measures

Resource	Mitigation Measures
Aesthetics	Limits imposed in the HVTL permit for the removal of vegetation and trees.
	HVTL permit requirements for cleanup of construction waste.
	HVTL permit requirement to span water bodies when possible.
	ROW,access roads, temporary work spaces, and other private lands restoration required by the HVTL permit and as agreed upon in the vegetative management plan.
	Communication with landowners regarding specific pole placement.
	Use of uniform structure designs that blend into the natural environmental (i.e., wood poles).
	Placement of structures at the maximum possible distance from trails, water bodies, and highways.
	Limit number and placement of construction staging areas. Possible use of Enbridge cleared right of way.
	Cross water bodies in the same location as existing transmission lines.
	Double-circuit the Project with existing transmission or distribution lines to the extent possible.
	Parallel existing transmission line and pipeline easement to the extent possible.
	The height of the structures may be reduced, as feasible, to minimize impacts within areas of high scenic importance. Use of H-frame structures for the Mississippi River crossing near Ball Club would have a lower profile than single pole structures.
Air Quality and Climate	Use of Best Management Practices (BMPs) to control fugitive dust during construction: monitor dust generation; operate vehicles at reduced speeds; and use of water and dust abatement methods.
	Maintain construction vehicles, limit idling time, and could use 15 ULSD in all on/off road construction equipment.
	Limit burning of vegetative and construction debris for the entire project. Use alternative methods such as chipping the debris for mulching, for use as a fuel source or other uses. .
	No burning of slash or construction piles on or near the boundaries of the Leech Lake Reservation; in order to reduce the potential for Black Carbon and other emissions. Burning permit would be required from Leech Lake Band of Ojibwe.
	Restoration of the natural landscape would commence shortly upon cessation of construction activities, as is typically required as a condition of the HVTL permits issued by the Commission.
Soil and Geology	HVTL permit requirement to re-grade areas disturbed to construction to reflect topography existing before construction.
	Avoid disturbance of soils and excavation in steeply sloped areas.
	Implementation of Soil Erosion and Sediment Control Plan, required by the HVTL permit.
	Development of BMPs under a Storm Water Pollution Prevention Plan (SWPPP), including installation of silt fencing, straw bales or ditch blocks and/or covering bare soils with mulch, plastic sheeting, or fiber rolls to protect drainage ways and streams from sediment runoff from exposed soils.
	Restore compacted soils to their native state through tillage operations.
	Limit setup and staging sites to previously disturbed areas.

Resource	Mitigation Measures
	Identification of wet organic soils through mapping and, if necessary on-site investigations and soil borings.
	To the extent practicable, complete construction in the wet organic soils when the ground is frozen.
	Develop procedures for the proper storage and disposal of all hazardous and non-hazardous wastes generated during construction.
	Use controlled staging areas for refueling and hazardous material loading/unloading.
	Revegetate all disturbed areas once construction is complete. Seed mixes could be specified based upon site characteristics and in accordance with regulatory permits.
	In the event that previously contaminated soils are discovered during construction, the Applicants could stop work immediately, contact the appropriate state or tribal agency, and consult with the agency with respect to an acceptable plan of action.
Water Resources	HVTL permit requirement to span all water bodies to the extent possible.
	Plant or seed non-agricultural areas disturbed by transmission line structures to prevent runoff. Ensure that native seed mixes from the plants already indigenous to the immediate area of disturbance are used for the seeding.
	HVTL permit could require the Project to co-locate with existing transmission facilities along certain segments of a permitted route.
	Development of BMPs under a SWPPP including location of structures and disturbed areas away from water bodies; location of fueling activities and fuel and chemical storage away from water bodies; installation of sediment and erosion control; use of turbidity control methods; spread topsoil and seed in a timely manner; avoid use of fertilizer, pesticides, or herbicides near water bodies; implement procedures to minimize and control inadvertent fluid returns during horizontal direction drilling (if used).
	Compensatory mitigation if required under the Section 404 permit could include the restoration, establishment, enhancement, or preservation of wetlands or other aquatic resources to off-set Project impacts.
Floodplains	HVTL permit requirement to return floodplain contours to their pre-construction profile if disturbed during construction.
	HVTL permit requirement to span all water bodies and associated floodplains to the extent possible.
	Plant or seed non-agricultural areas disturbed by transmission line structures to prevent runoff. Use native seed mixes from the indigenous plants and plant indigenous plants located in the immediate disturbed soil area; ensure seeding and/or plantings are done in a time congruent with seeding and growth of the area, not during a time that would preclude germination or rooting.
	Use construction techniques to minimize run-off into floodplains during construction.
Wetlands	HVTL permit requirement to span wetlands to the extent possible.
	Plant or seed non-agricultural areas disturbed by transmission line structures to prevent runoff. Use native seed mixes from the indigenous plants and plant indigenous plants located in the immediate disturbed soil area; ensure seeding and/or plantings are done in a time congruent with seeding and growth of the area, not during a time that would preclude germination or rooting.

Resource	Mitigation Measures
	Development of BMPs under a SWPPP, NPDES permit, License to Cross Public Waters permit, Public Waters work permit, and Section 10 permit, including location of fueling activities and fuel and chemical storage away from water bodies; installation of sediment and erosion control; use of turbidity control methods; spread topsoil and seed in a timely manner; avoid use of fertilizer, pesticides, or herbicides near wetlands; implement procedures to minimize and control inadvertent fluid returns during horizontal direction drilling (if used).
	Schedule construction during frozen ground conditions.
	Access wetlands through the shortest route resulting in the least amount of physical impact to the wetland during construction.
	Assemble structures on upland areas before transporting into wetlands.
	Use of construction mats and specially designed all terrain vehicles to minimize impacts within wetlands when construction during winter (frozen) months is not possible.
	Restore wetlands as required by the USACE St. Paul District to replace wetland functions and values lost due to regulated activities pursuant to Section 404 of the Clean Water Act and St. Paul District Policy for Wetland Compensatory Mitigation in Minnesota, and in concert with other district policies and guidance.
Biological Resources	Reseed disturbed areas following construction with native species seed mix to restore native vegetation cover. Seed mix will be developed in conjunction with appropriate resource agencies (LLDRM, CNF, DNR) taking into consideration culturally important species.
	Develop a noxious weed management program, including a noxious weed and vegetation management plan.
	Conduct a field review of ROW and construction staging sites prior to construction to identify areas that contain noxious weeds and should be avoided.
	Power-wash or manually remove material from construction vehicles prior to the start of construction and if equipment has traveled from an area contaminated by noxious weeds to an uncontaminated area.
	Siting the Project within or adjacent to existing ROWs to minimize impacts to wildlife habitat.
	Limit clearing and maintenance of the ROW within previously forested areas to the extent practicable.
	Install marked transmission line shield wires to the extent practicable within major flyways.
	Develop an Avian Protection Plan (APP).
Species of Special Concern	Placement of the ROW within the 1,000-foot-wide route to avoid known species of special concern, active nesting locations, and active breeding locations.
	Conduct ROW clearing outside of the breeding season.
	Notify appropriate agencies if previously unknown nesting/breeding sites are identified during construction.
	An *Orabanche uniflora* Mitigation Plan will be developed if the Project Route is placed in close proximity of the known population(s).
Cultural Resources	Avoid identified archaeological and historic resources through adjustment of the ROW within the selected 1,000-foot-wide route.
	Vegetative restoration of the ROW and construction areas using local native ecotype species. Seed mix will be developed in conjunction with appropriate resource agencies (LLDRM, CNF, MnDNR) taking into consideration culturally important species.

Resource	Mitigation Measures
	Implement BMPs for water resources (see above) to minimize potential effects to wild rice.
	Use of single pole structures within the city of Cass Lake to minimize visual and aesthetic impacts to the viewshed of historical properties.
Land Use	Co-locating the Project along existing ROWs, including highways, railways, existing transmission lines, and pipelines.
	Communicate with MnDNR LLDRM, and CNF to identify and avoid sensitive forested areas.
	Reseed state and federal forested land with a seed mix recommended by the appropriate agency's management. Seed mix will be developed in conjunction with appropriate resource agencies (LLDRM, CNF, MnDNR) taking into consideration culturally important species.
	Limit construction staging and lay-down areas to previously disturbed areas.
	Use the minimum necessary width and length for transmission line access roads.
	Communicate with private land owners regarding exact placement of structures and disturbed areas.
	Adjust conductor spans to avoid sensitive land use areas.
	Limit construction activities to the ROW, unless access permission is obtained from adjacent landowners.
	Repair or replace fences, gates, and similar improvements that are removed or damaged during Project construction.
Socioeconomics	Communicate with landowners regarding exact placement of structures and disturbed areas.
	Use the minimum necessary width and length for transmission line access roads.
	Limit construction activities to the ROW, unless access permission is obtained from adjacent landowners.
	Easement payments to landowners are required to compensate landowners for loss of use of the utility easement on their property.
	Co-locating the Project along existing ROWs, including highways, railways, existing transmission lines, and pipelines, to avoid crossing additional, undisturbed properties and affecting property values.
Environmental Justice	Communicate with private landowners regarding exact placement of structures and disturbed areas.

Resource	Mitigation Measures
	To prevent long-term disruption to hunting and gathering resources, the HVTL permit would require restoration of the rights-of-way, temporary work spaces, access roads, and other lands affected by constructions. The HVTL permit could require the Applicants to work with the MnDNR, LLDRM, CNF, landowners, and local wildlife management programs to restore and maintain the rights-of-way to provide a useful and functional habitat for plants, nesting birds, small animals, and migrating animals to minimize habitat fragmentation. The Applicants could work with the LLDRM to allow them to collect and transplant (in whole or in part) traditionally important plants from the entire ROW. Opportunities could be provided to the LLDRM Plant Resource Department in order to conduct long-term management of portions of or the entire ROW through the LLR to reduce the occurrence of non-native invasive species and support traditionally important plants.
	Span water bodies, wetlands, and floodplains to the extent possible, to minimize effects on wild rice resources.
Recreation and Tourism	Co-locating the Project along existing ROWs, including highways, railways, existing transmission lines, and pipelines, to avoid previously undisturbed recreation areas and wildlife habitat.
	Communicate with private landowners and resource management agencies regarding exact placement of structures and disturbed areas.
	Placement of barriers and signs at or near road crossings to limit unauthorized off-highway vehicle (OHV) or other vehicle traffic on ROWs.
	Conduct construction at water access points during winter months when use of such areas for recreation tourism is minimal.
	Align the Project ROW perpendicular rather than parallel to existing trails to the extent practicable to minimize impacts to recreation trails.
	Post signs during construction to provide residents and visitors with advance notice of what recreational activities may be affected during construction.
Agriculture	HVTL permit required Agricultural Mitigation Plan.
	Communicate with private landowners regarding placement of structures and disturbed areas to minimize effects on farming operations.
	Co-locating the Project along existing ROWs, including highways, railways, existing transmission lines, and pipelines, to avoid previously undisturbed agricultural land.
	Use of a single pole structure for placement on agricultural land.
	Compensate landowners for crop damage and soil compaction that occurs during Project construction.
	HVTL permit requirement to restore ROW and disturbed areas, including restoration of compacted soils through tillage operations.
Forestry	Limits imposed in the HVTL permit for the removal of vegetation and trees.
	Limits imposed in the HVTL permit for the creation of temporary easements for access roads and construction/staging areas. The HVTL permit could require that these areas be selected to minimize tree removal.
	Restoration of previously forested land with native shrubs and grasses as identified in the vegetation management plan. Plant seedlings in temporary work areas.

Resource	Mitigation Measures
	Conduct construction activities on CNF lands in accordance with the Forest-Wide Management Directions, as provided in the 2004 Final Forest Plan.
	Offer timber harvested from the Project to the local community for use as firewood.
Mining	No mitigation measures identified.
Community Services	No mitigation measures identified.
Utility Systems	Proper maintenance, preventative maintenance, and selection of hardware for the transmission line.
	HVTL permit condition requiring the correction of interference to communication systems that the transmission line causes or creates.
	Modifying receiving antennae to correct radio interference.
	Detuning of transmission line structures if receiving antennae modifications do not eliminate interference with radio frequencies.
	Communicate with local radio broadcasting stations to confirm that blocking interference does not occur due to structure placement.
	Modification or replacement of antenna or amplifier for residents that experience TV signal interference.
	Reduction of AC interference on pipelines through reducing the impedance of the transmission structure grounds, grounding the pipeline in conjunction with de-couplers, burying gradient control wires along the pipeline or ground mats under aboveground facilities (such as at valves), and the use of dead fronts at test stations.
	Conduct computer modeling of AC interference to ensure that property mitigation is designed and installed prior to energizing the transmission line.
	Schedule planned service disruptions that are necessary during construction activities with the affected owners of existing transmission lines. Provide advance notice of service disruption to electric customers.
	Ensure that utility repair crews are present or on-call during construction activities to respond to unplanned incidents that may result in an interruption to electric service.
Traffic and Transportation	Construct transmission line in accordance with National Electric Safety Code (NESC) guidelines for the required clearances between transmission lines and transportation structures.
	HVTL permit requirement to comply with MnDOT and all applicable road authorities' management standard and policies, including written notice of construction to MnDOT and applicable road authorities.
	HVTL permit requirement to restore the ROW, temporary work spaces, access roads, abandoned ROW, and other lands affected during construction, including living snow fences.
	File a "Notice of Proposed Construction of Alteration" with the FAA and provide an opportunity for the FAA to comment about compatibility of the Project with airport operations.
	Obtain MnDOT and county permits as applicable for transmission line crossings of roadways. Use of ROW along the National Highway System requires approval of the Federal Highway Administration.
	Implement traffic control measures during construction, which could include flag persons, barriers, and flashing lights.
	Install temporary wood pole "guard structures" to safeguard the public and construction workers during removal of existing conductors or stringing of new overhead conductors over highways.

Resource	Mitigation Measures
	Grounding tracks and communication cables on existing rail lines to prevent interference.
	Use of taller structures where the Project crosses the railroad to increase clearance between passing trains and conductors.
	Consolidate the Project with existing transmission line to reduce the number of railroad crossings.
Safety and Health	Use BMPs to minimize the potential for spills or leaks from equipment during construction, including frequent inspections of equipment; requiring portable spill containment kits for construction equipment; ensuring that equipment operations are present at the nozzle at all times when fueling is in progress; and prohibiting the refueling of equipment in wetlands.
	Use of protective devices (e.g., breakers and relays) that would de-energize the transmission line in the event of an emergency.
	Use of fences at substations to prevent access.
	Construct the Project in accordance with NESC standards regarding clearance, grounding, utility crossing, strength of materials, and ROW widths.
	Ground metal buildings, fences, and other large, permanent conductive objects in close proximity or parallel to the line to prevent electric field discharge.
	Minimize the length of the transmission line that parallels or is co-located with distribution of local service conductors to minimize the potential for stray voltage.
	Educating local livestock operations about techniques to reduce the potential for insulated electric fences to pick up an induced charge from the transmission line.
Noise	HVTL permit requirement for the Project to meet Minnesota noise standards.
	Limit construction to daytime work hours.
	Equip heavy equipment with sound attenuation devices, such as mufflers.
	Minimize noise impacts from substation through design, including setbacks from sensitive noise receptors, layout and landscaping choices, and use of low noise transformers.

1. Introduction

Otter Tail Power Company, Minnesota Power, and Minnkota Power Cooperative (Applicants) propose to construct a 230 kilovolt (kV) transmission line between the Wilton Substation, located west of Bemidji, Minnesota, and the Boswell Substation in Cohasset, Minnesota as well as upgrades to both the Wilton and Boswell substations (Project). Depending upon the route selected, the Project may also expand the existing Cass Lake Substation or construct a new substation in the Cass Lake area.

High voltage transmission lines constructed in Minnesota require a route permit from the Minnesota Public Utilities Commission (Commission). The route permitting process is governed by Minnesota Rules part 7850. The Applicants made a joint application to the Commission for a Route Permit for the Project. As part of the permitting process for a high voltage transmission line, the Minnesota Department of Commerce Office of Energy Security (OES) prepares an Environmental Impact Statement (EIS) on the Project.

The Route Permit application, actions by the Commission, and certain procedural documents related to the Minnesota route permitting process may be accessed at http://energyfacilities.puc.state.mn.us/Docket.html?Id=19344 and on the Commission's eDockets website available on the Commission's website at http://www.puc.state.mn.us/. Click on the "Search eDockets" button, then enter the year "07" and the sequence number "1327."

Minnkota Power Cooperative has approached the United States Department of Agriculture Rural Utilities Service (RUS) for financial assistance to construct the Project. RUS has determined that the agency's determination of whether to finance the Project would constitute a major federal action that may have a significant impact upon the environment within the context of the National Environmental Policy Act of 1969 (NEPA). RUS serves as the lead federal agency for the NEPA environmental review of the Project.

As co-lead agencies OES and RUS prepared this EIS in compliance with the requirements of NEPA and the Council on Environmental Quality regulations for implementing NEPA (40 CFR 1500 -1508). RUS must also meet treaty and trust obligations of the Federal Government to the Leech Lake Band of Ojibwe (LLBO). This EIS was prepared to meet the following key objectives:

- Identify and assess potential impacts on the natural and human environment that would result from the Project;
- Identify and assess the potential impacts of the Project on the Federal Treaties and Trust Obligation to the Leech Lake Band of Ojibwe;
- Describe and evaluate reasonable alternatives, including a No-Build alternative, to the Project that would avoid or minimize adverse effects to the environment; and
- Identify specific mitigation measures to minimize environmental impacts.

In addition to the co-lead agencies, the U.S. Forest Service (USFS) Chippewa National Forest (CNF), the U.S. Army Corps of Engineers (USACE), the Leech Lake Division of Resource Management (DMR), and the Leech Lake Band of Ojibwe Indians (LLBO) agreed to assist RUS as cooperating agencies in preparing this EIS.

The Purpose and Need for the Project is described in Section 1.1. The Regulatory environment within which the Project is proposed is described in Section 1.2. The role of the EIS in each agency's decision is described in Section 1.3.

1.1. Project Purpose and Need

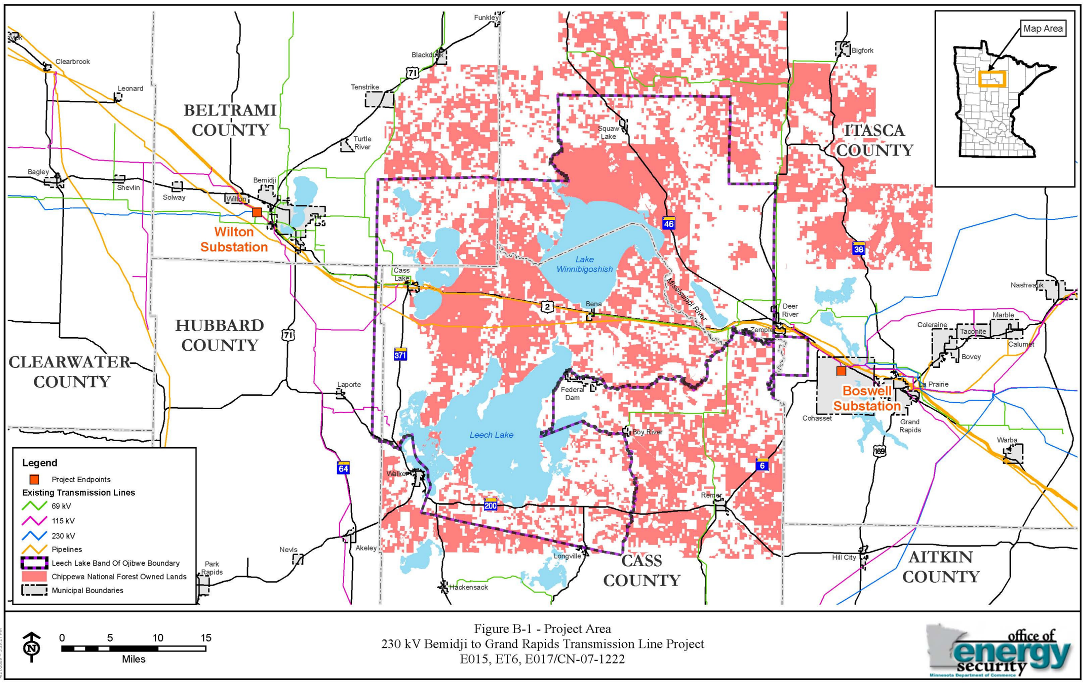
The Applicants propose to construct and operate the Project to meet projected future electric demand and to maintain electric transmission reliability standards in accordance with the requirements of the North American Reliability Council (NERC). The Project would also facilitate the addition of new generation sources in the region by increasing the transfer of additional capacity from the North Dakota Export boundary to the Twin Cities metropolitan area. At the time of this EIS, there are no specific generation projects and therefore the assessment of the impacts of new generation is not included in this EIS.

NERC is the international regulatory authority for reliability of the bulk power system in North America. The United States Federal Energy Regulatory Commission has granted NERC the legal authority to enforce Reliability Standards with all users, owners, and operators of the bulk power system in the United States, and made compliance with those standards mandatory and enforceable.

The need for improvements to maintain electric transmission reliability in the Bemidji area, as well as the larger northwestern Minnesota and eastern North Dakota region has been the subject of several studies since 2002. These studies are summarized in the *Alternative Evaluation Study* prepared by RUS (see Section 1.2) and in the *Environmental Report* prepared for the Project by OES.

The Bemidji area (shown in Figure 1-1) includes the communities of Bagley to the west, Walker to the south, and Blackduck to the northeast, as well as a large portion of the Leech Lake Reservation. In addition to meeting the future needs of the Bemidji area, the Project is intended to maintain regional transmission reliability for the larger northwestern Minnesota and eastern North Dakota region.

Figure 1-1: Bemidji Area



The Bemidji area is currently served by three transmission lines (the Winger–Wilton 230 kV line, the Winger-Bagley-Solway-Wilton 115 kV line, and the Badoura-Akely-Bemidji-Wilton 115 kV line) and one generator (Otter Tail Power's 40 megawatt [MW] Solway Generating Station).

The area is susceptible to low voltage conditions if the Winger–Wilton 230 kV transmission line is out of service during winter peak load conditions. The electric power demand in the Bemidji area is growing at a rate of approximately 2 percent per year. Although interim measures to improve the electric transmission system have been taken, such as adding voltage support, the peak load is anticipated to reach 296 MW by the winter of 2011-2012, or approximately 135 percent of the system's maximum load-serving capability of 220 MW. The Applicants estimate peak load to reach approximately 360 MW, or 164 percent of the system's maximum load serving capacity, by winter 2022-2023. Without improvements to address this deficit, the area would be in a situation of local load-serving inadequacy, meaning that in the event of the loss of local transmission capability, the area could be subject to brownouts or blackouts.

Portions of the Red River Valley and eastern North Dakota have been identified as areas for the potential development of wind energy generation sources. Although the Project would facilitate the addition of new generation sources in the region, specific generation, wind or otherwise, are not associated with this Project.

1.2. Regulatory Framework

This section summarizes principle federal and state regulations affecting the permitting process and the required environmental documentation for the Project. The Project would be subject to additional federal, state, and local regulations and permit conditions identified in Section 6.

1.2.1. National Environmental Policy Act

NEPA requires federal agencies to integrate environmental values in their decision-making processes by considering the environmental impacts of, and reasonable alternatives to, their proposed actions. For major federal actions that have the potential to cause significant adverse impacts on the environment, NEPA requires agencies undertaking the action to prepare an EIS.

RUS has determined that providing financial assistance for the construction and operation of the Project constitutes a major federal action that may significantly affect the quality of the natural and human environment. Therefore, the EIS process is underway in accordance with 7 CFR 1794 Subpart G - Procedure for Environmental Impact Statement.

1.2.2. Treaties of the United States Government with the Leech Lake Band of Ojibwe

The United States entered into a number of treaties with the Leech Lake Band of Ojibwe under which the LLBO retained rights to many of the resources on the LLR. All Federal agencies have trust obligations to assure that this Project does not infringe or negate the LLBO's ability to exercise these retained treaty rights.

1.2.3. Tribal Sovereignty

The LLBO retains sovereignty over lands within their reservation boundaries. The sovereignty applies to all lands within the reservation boundaries, regardless of land ownership.

> *Only Congress may decide to abandon the status of lands considered Indian country. Settlement by non-Indians does not withdraw land from Indian country status. Even land owned in fee simple by non-Indians as well as towns incorporated by non-Indians are still within Indian country if they are within the boundaries of a reservation or a dependent Indian community. (Minnesota House Research, 2007)*

The Applicants have requested that the Leech Lake RTC permit the Project to cross the proclamation boundaries of the Leech Lake Reservation. The LLBO has the authority to grant or deny the Applicants request.

1.2.4. Section 106 of the National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470f, requires federal agencies to take into account the effect of their undertakings on historic properties and to provide the Advisory Council on Historic Preservation (ACHP) with a reasonable opportunity to comment on such undertakings. This federal statutory requirement is implemented by a regulation, "Protection of Historic Properties" (36 CFR Part 800), promulgated by the ACHP. RUS may provide financial assistance for the construction and operation of the Project, thereby making it an undertaking subject to review under Section 106 and its implementing regulations.

Along with RUS, two other agencies have a compliance responsibility under Section 106 for the Project. The USACE may issue a permit under Section 404 of the Clean Water Act for the Project, thereby making it an undertaking subject to review under Section 106 and its implementing regulation. In addition, the CNF is considering a special use permit to construct and operate the Project on NFS lands. Issuance of such a permit is an undertaking subject to review under Section 106 and its implementing regulation.

In accordance with 36 CFR § 800.2(a)(2), RUS, USACE, and CNF may designate a lead agency for the purposes of review under Section 106. The lead agency shall act on behalf of all of the agencies, fulfilling their respective responsibilities under Section 106 and its implementing regulation.

Pursuant to 36 CFR § 800.8(a), federal agencies are encouraged to coordinate compliance with Section 106 and its implementing regulation with the steps taken to meet the requirements of NEPA. In doing so, RUS is conducting public participation, analysis and review in such a way that the purposes of NEPA and Section 106 of NHPA are met. The analyses and review presented in this DEIS have been developed to enable RUS to identify historic properties and resolve any adverse effects to them. In addition, RUS is using its NEPA public involvement procedures to satisfy the public participation requirement of Section 106 pursuant to 36 CFR § 800.2(d).

1.2.5. Clean Water Act

Clean Water Act Section 404 authorization is required for the Project, because its construction would require discharge of dredged and/or fill material into waters of the United States. As a cooperating agency in preparation of this EIS, and the agency responsible for determining whether to issue a permit for wetland impacts associated with the Project. It is the USACE's intention to adopt the EIS as part of its review of the Project.

1.2.6. Minnesota Certificate of Need

Because the Project is considered a Large Energy Facility under Minnesota Statute 216B.2421, a determination of need for the Project is required from the Commission. The Applicants applied for a Certificate of Need for the proposed transmission line on March 17, 2008. The Certificate of Need process is designed to evaluate the level of need, as well as the alternatives available to satisfy that need. The Certificate of Need process does not evaluate specific routes; more detailed evaluation of routes, including human and environmental impacts and mitigation, is contained in the Route Permitting process described in Section 1.2.7. The Certificate of Need process is the only proceeding under Minnesota Statute in which a no-build alternative and the size, type, timing, system configuration, and voltage of a proposed project would be considered. The Commission determines the basic type of facility (if any) to be constructed, the size of the facility, and the timing of the facility (e.g., the projected in-service date).

As part of the Commission's review of certificate of need applications, the OES prepares an Environmental Report to meet the environmental review requirements for the large energy project certificate of need determination identified in Minnesota Rule 7849.1000 – 2100. Minnesota Rule 7849.1500, subpart 1B identifies the alternatives to a proposed project that must be evaluated in the Environmental Report. The *Environmental Report* prepared for the Certificate of Need application describes the proposed Project and the applicable regulatory framework, general impacts, and mitigation measures for environmental issues based upon the size, type, and timing of the proposed Project within the study area. System alternatives may have the capability to alleviate the need for all or some of the Project. The *Environmental Report* prepared for the Project was released on April 30, 2009, and may be found at http://energyfacilities.puc.state.mn.us/Docket.html?Id=19344.

The Commission found that there is a need for a transmission project linking the Wilton and Boswell substations and issued an order determining the need for the Project on July 14, 2009. The need decision did not identify a route for the Project.

1.2.7. Minnesota Route Permit

The Project is considered a High Voltage Transmission Line under Minnesota Statute 216E (Minnesota Power Plant Siting Act) and requires a Route Permit from the Commission because the transmission line is capable of operating at or above 100 kV. Because the Commission has determined the need for the Project in the Certificate of Need process (Section 1.2.6), the Commission must now determine where the Project will be constructed and appropriate permit conditions that will minimize human and environmental impacts from the Project.

When the Commission issues a route permit, zoning, building, and land use regulations are preempted per Minnesota Statue 216E.10, subd. 1. The Commission's issuance of a Route Permit for the Project permits the Applicants to exercise the power of eminent domain to acquire land for this Project pursuant to Minnesota Statute § 216E.12, if they are not able to reach agreements with landowners.

The Route Permit issued by the Commission will identify where the Project will be constructed. The Route Permit will identify the right-of-way (ROW) for which the Applicants have the right-to-acquire for the Project. The ROW width may vary throughout the route, depending upon the engineering and routing constraints. In some areas, the Route Permit may identify a precise route, for instance a 125-foot ROW to be located on the north side of a road, while in other areas the Route Permit may specify the width of ROW but designate a larger route to allow the Applicants to negotiate with landowners.

The Route Permit will also define the Project that is being permitted. If the Applicants wish to, at some point in the future, upgrade the transmission line to a greater voltage, or add another transmission line of more than 100 kV, the Applicants would need to apply to the Commission for a permit for a new transmission line.

As part of this permitting process, the OES prepares an EIS. The EIS contains information about the human and environmental impacts of the Project and selected alternatives, and addresses mitigation measures for anticipated impacts.

1.3. Role of the EIS in Agency Review of the Project

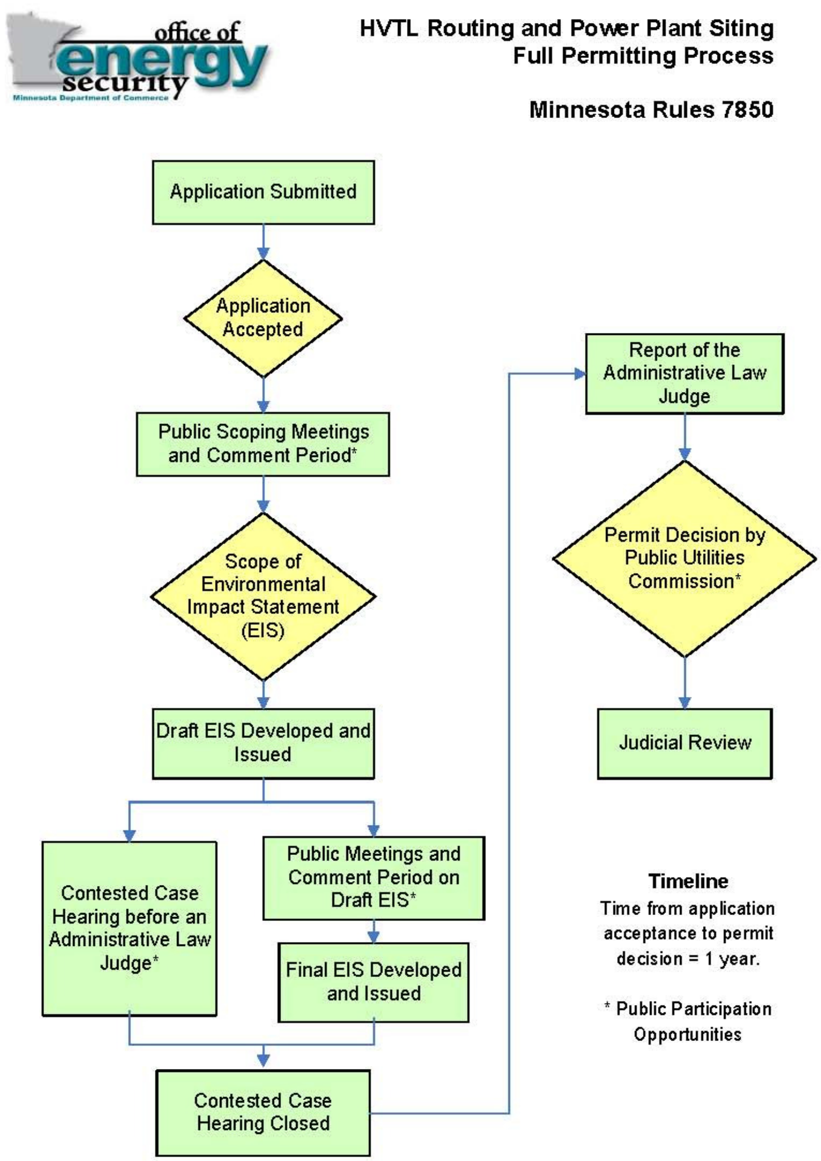
The EIS prepared for the Project will be used by Agencies responsible for review, permitting, and issuing Decision Notices on the Project.

1.3.1. Commission

The Commission's proposed action is a decision as to whether to issue a Route Permit for the Project. The Commission has the responsibility for routing transmission lines capable of operating at or above 100 kV in Minnesota. The Applicants have applied to the Commission for a Route Permit for the Project. The Commission is required to make a decision about the permit application.

The Commission's Route Permit determination 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 (Minn. Stat. 213E.03, subd. 7a). These criteria are more fully developed in MN Rules part 7850. The route permitting process is shown in the schematic in Figure 1-2. The process contains several opportunities for public involvement throughout the process.

Figure 1-2: Minnesota Route Permitting Process



This EIS will provide information to the Commission for use in its decision about the Route Permit for the Project.

1.3.2. Rural Utilities Service

The RUS's proposed action is a decision as to whether to provide financing for construction and operation of the Project to Minnkota Power Cooperative, one of the Applicants.

As lead federal agency, RUS is responsible for ensuring compliance with NEPA, Section 106 of the National Historic Preservation Act (NHPA), upholding Treaties of the United States with the Leech Lake Band of Ojibwe and meeting their trust obligations to the Band, and for initiating informal consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act (ESA) to determine the likelihood of effects on federally listed species. In addition, RUS coordinates with the cooperating and assisting agencies to ensure compliance with Federal environmental laws, statutes, regulations, and Executive Orders that apply to RUS programs, including but not limited to:

- Treaties of the United States with the Leech Lake Band of Ojibwe;
    - Treaty with Chippewa July 29th, 1837;
    - Treaty with Chippewa October 4th, 1842;
    - Treaty with Chippewa, Pillager August 21st, 1847;
    - Treaty with Chippewa September 30th, 1854;
    - Treaty with Chippewa February 22nd, 1855;
    - Treaty with Chippewa, Mississippi, Pillager, Lake Winnibigoshish May 7th, 1863;
    - Treaty with Chippewa, Mississippi, Pillager, Lake Winnibigoshish May 7th, 1864;
- EO 11988 - Floodplain Management;
- EO 11990 - Protection of Wetlands;
- EO 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations;
- the Native American Graves and Repatriation Act; and
- the Farmland Protection Policy Act.

RUS will consider information provided in the EIS in making its determination about whether to extend funding to the Minnkota Power Cooperative for its ownership portion of the Project.

1.3.3. Chippewa National Forest

The Applicants have applied to the USFS CNF for a Special Use Permit to construct and operate the Project on National Forest Service (NFS) lands. The Forest Supervisor of the CNF must determine whether to issue a Special Use Permit for the Project. The USFS must also meet the U.S. Government Treaty and trust obligations to the Leech Lake Band of Ojibwe.

The Forest Supervisor is authorized to approve or deny certain special uses on NFS lands. The Forest Supervisor is responsible for management and evaluation of the occupation and use of NFS lands and may grant a special use on those lands in accordance with the Federal Land Policy & Management Act (FLPMA), as amended in 1976.

The Forest Supervisor's decision must comply with other applicable laws and regulations, including but not limited to:

- Treaties of the United States with the Leech Lake Band of Ojibwe;
  - Treaty with Chippewa July 29th, 1837;
  - Treaty with Chippewa October 4th, 1842;
  - Treaty with Chippewa, Pillager August 21st, 1847;
  - Treaty with Chippewa September 30th, 1854;
  - Treaty with Chippewa February 22nd, 1855;
  - Treaty with Chippewa, Mississippi, Pillager, Lake Winnibigoshish May 7th, 1863;
  - Treaty with Chippewa, Mississippi, Pillager, Lake Winnibigoshish May 7th, 1864;
- Endangered Species Act of 1973;
- Clean Water Act, as amended in 1972;
- National Historic Preservation Act;
- Archaeological Resource Protection Act;
- Native American Graves Protection and Repatriation Act;
- National Environmental Policy Act of 1969;
- Rangeland Renewable Resources Planning Act of 1974;
- Multiple Use Sustained Yield Act of 1960;
- National Forest Management Act;
- Federal Land Policy & Management Act, as amended in 1976; and
- EO 13112 – Invasive Species.

In addition to compliance with the above laws and regulations, any action taken by the Forest Supervisor must be consistent with the objectives of the *CNF Land and Resource Management Plan* (Forest Plan), as revised in 2004.

The Project would comply with objective O-SU-1 from the 2004 Forest Plan. This objective states:

> *"Generally provide for utility transmission corridors and communications sites. Emphasize the use of common corridors and multiple use sites when granting appropriate right of ways." (USDA, 2004)*

The Energy Policy Act of 2005 directs federal agencies to establish procedures to ensure that corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on federal land are identified and designated as necessary. The Act also directs federal agencies to expedite applications to construct or modify such pipelines and facilities within such corridors:

> *"…(1) ensure that additional corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal land are promptly identified and designated as necessary; and (2) expedite applications to construct or modify oil, gas and hydrogen pipelines and electricity transmission and distribution facilities within such corridors, taking into account the designation of such corridors. (d) Considerations – In carrying out this section, the Secretaries shall take into account the need for upgraded and new electricity transmission and distribution facilities to (1) improve reliability; (2) relieve congestions; and (3) enhance the capability of the national grid to deliver electricity…." (Public Law 109-58, August 8, 2005).*

This EIS will assist the Forest Supervisor in making a decision regarding the issuance of a Special Use Permit to construct and operate the Project in observance of the aforementioned laws, regulations, and plans. The Forest Supervisor's jurisdiction to make such a decision is limited to those parcels of land that are managed by the USFS.

1.3.4. U.S. Army Corps of Engineers

The Applicants would apply to the USACE for a permit for the Project under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbor Act. Section 404 of the Clean Water Act relates to the placement of dredge and/or fill material in the waters of the United States, including adjacent wetlands. Section 10 regulates the placement of structures in, on, or over navigable waters of the U.S. The USACE must determine whether or not to issue a Section 404 and Section 10 permit for the Project. This EIS will assist the USACE in making a decision about the Section 404 permit for the Project. The USACE must also meet the U.S. Government Treaty and trust obligations to the Leech Lake Band of Ojibwe.

1.3.5. Leech Lake Band of Ojibwe

The Applicants have approached the Leech Lake Reservation Tribal Council (RTC) regarding the Project's potential to cross the proclamation boundaries of the Leech Lake Reservation. The Tribe retains treaty rights for all lands, regardless of land ownership or management, within the LLR boundaries. The LLBO is responsible for issuing the appropriate approval and authorizations for activities to cross lands upon which it retains treaty rights and easements or authorizations for activities on lands under its jurisdiction. Not all land inside the LLR boundaries is managed by the Tribe, but rather includes a patchwork of multiple owners and managers, including tribal trust land, tribal fee land, state land, federal land, county land, and private ownership.

The LLDRM is responsible for overseeing the development of land leases, easements, and Allotments for Tribal and Band lands approved by the RTC and the Bureau of

Indian Affairs (BIA). The LLDRM also works with the BIA and owners of tribal titled lands that the Project would cross to obtain their consent and easements or other agreements. The LLDRM analyzes proposed projects for their effect on never relinquished hunting, fishing, and gathering treaty rights of the LLBO on lands within the LLR. The LLDRM's review also includes impacts to gathering activities for tribally important species including but not limited to as wild rice, blueberries, and sweet grass. For the purpose of this EIS document the LLBO assumes a Federal Entity, while still remains a souvenir government.

The Director of the LLDRM has authority to participate in the environmental review of projects and to prepare joint or separate Environmental Assessment (EA) or EIS documents for those projects that occur on lands within the LLR boundaries. The LLDRM Director has decided to be a full cooperating agency in this EIS. This EIS, and the other environmental documents issued in connection with the Project, will assist the LLDRM Director in making a decision about the merits of this Project and whether or not to sign a decision notice for the Project, and to prepare any necessary easements and other permits needed to cross the LLR. This EIS will be used to provide information sufficient to make a decision on the request to obtain permission to cross the LLR, and any easements, Allotments, Tribal or Band lands, and to receive Reservation Resolution.

1.4. Scope of the EIS

Both the Power Plant Siting Act and NEPA require that agencies responsible for preparing environmental review documents involve the public in environmental review of projects. Prior to development of the EIS, the responsible agencies determine what information is to be evaluated in the EIS. A "scope" is a determination of what needs to be assessed in the environmental review in order to fully inform decision-makers and the public about the possible impacts of a project or potential alternatives. Through the scoping process, OES and RUS invited federal, state, and local units of government; Native American tribes; organizations; and individuals interested in the Project to comment on the Project proposed by the Applicants and to identify issues and concerns to be addressed in the EIS. This section summarizes the scoping process and the scoping decisions/reports issued by OES and RUS. Section 2 identifies the alternatives analyzed in the EIS as well as alternatives considered, but not evaluated.

1.4.1. Public Scoping Process

Both OES and RUS are required to schedule at least one public meeting in the area of the Project. The purpose of the meeting is to inform the public about the Project and to solicit public input into the scope of the environmental review.

The OES Energy Facilities Permitting (EFP) Unit and RUS held public information meetings in Blackduck, Cass Lake, Deer River, Bemidji, and Walker in August 2008. Approximately 120 people attended the public information meetings. In addition to the oral comments received at the public information meetings, more than 120 written comments were received by the close of the public comment period on September 30, 2008. These comments are summarized in Appendix B. Written comments as well as written reports of the comments received at the public information meetings can be found on the EFP website (http://energyfacilities.puc.state.mn.us/Docket.html?Id=19344) and in the official record for the routing process located on the e-Dockets website (https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showeDocketsSearch&showEdocket=true&userType=public) by entering "2007" in the year and "1327" as the number.

In summary the comments identified the following issues and concerns:

- **Crossing the Leech Lake Reservation**. The Project proposes to cross the sovereign lands of the Leech Lake Reservation. The LLBO retains the powers of self-government within the Leech Lake Reservation. The United States entered into a number of treaties with the LLBO under which the LLBO retained rights to many of the resources on the Leech Lake Reservation. All Federal agencies have trust obligations to assure that the Project does not infringe or negate the LLBO's ability to exercise these retained treaty rights. The Leech Lake Reservation also qualifies as a minority community, which triggers other considerations.
- **Description of Proposed Project.** A number of questions and comments were received regarding the Project, including pole specifications, development and maintenance of easements, and proposed distances between the transmission line and private homes.
- **Route Alternatives.** Numerous commenters stated preferences for either the proposed route, preferred alternative in the central corridor, or alternative corridors. Commenters also submitted questions regarding the proposed and alternative routes, the feasibility and availability of the routes, and their anticipated impacts.
- **Biological Resources (Flora and Fauna).** A number of comments were received that described existing flora and fauna in the Study Area that may be affected by the Project. Several of these comments addressed specific types of vegetation and wildlife in the Study Area.
- **Aesthetics.** A number of comments were received regarding potential aesthetic impacts from the Project. Comments expressed both a general concern for aesthetics in the Project area as well as aesthetic concerns for specific geographic areas.
- **Water Resources.** A number of commenters expressed concern for water resources in the central and alternative corridors. Several commenters expressed a general concern for lake, river, and stream crossings. Some commenters provided details about specific water resources of concern.

- **Land Use.** A number of commenters submitted questions and concerns about potential land use impacts from the Project, including incompatibility with planned development and with local land use and zoning. Some commenters noted that the location of a transmission line on private property would limit land use (e.g., agricultural, recreational, and residential development). Commenters identified specific pinch points located along the central corridor and expressed concern about the potential for additional impacts to those private land owners with existing easements.
- **Socioeconomics.** A number of comments were received regarding the potential impacts of the Project upon socioeconomic resources, including displacement of homes or residences, displacement of businesses, and impacts to local economies. Several comments were received regarding compensation negotiation and easement payments. In addition, several commenters noted fairness concerns for the land owners' continued responsibility to pay property taxes for the proposed transmission line easements controlled by the Applicants.
- **Safety and Health.** A number of comments and questions were received regarding potential safety and health impacts from the Project. Several commenters identified a general concern about the potential health effects from transmission lines. Others identified concerns about more specific health effects, including the potential impact of transmission lines on pregnant mothers, newborn babies, persons with mental disabilities, and persons with pacemakers. Several comments contained questions regarding the safe distance between a transmission line and home or other land improvements. A number of commenters cited concerns about the proposed transmission line route in proximity to existing pipelines in the area.

1.4.2. Rural Utilities Service Pre-scoping Documents

As part of their scoping process, RUS requires loan applicants to prepare two documents, a *Macrocorridor Study* and an *Alternatives Evaluation Study,* to support their proposed action. Guidance for these documents, and for the scoping process as a whole, is provided in RUS Bulletin 1794A-603, *Scoping Guide for RUS Funded Projects Requiring Environmental Assessments with Scoping and Environmental Impact Statements*. The intent of these documents is to provide information about the proposed action to the public to facilitate public participation in the NEPA process. Both the *Macrocorridor Study* and *Alternatives Evaluation Study* prepared for the Project can be found at: http://www.usda.gov/rus/water/ees/eis.htm#Minnkota%20Electric%20Cooperative,%20Inc.0.

The *Macrocorridor Study* identifies a study area encompassing the endpoints for a proposed transmission project and develops macrocorridors within which a proposed transmission project could be located. The *Macrocorridor Study* provides information about environmental, social, and cultural factors for each of the macrocorridor options within the Study Area. The four macrocorridors evaluated in this study typically are about 2 miles wide, with some portions of the Central Macrocorridor being 8 miles wide.

The *Alternatives Evaluation Study* examines the purpose and need for the Project. The study identifies the electrical problem the Project is proposed to address and identifies and analyzes several alternatives to the Project such as no-action, load management, baseload generation, intermediate generation, peaking generation, and several different transmission system alternatives. The *Alternatives Evaluation Study* was released for public review and comment in June 2008.

1.4.3. Advisory Task Force

In their order accepting the Route Permit application, the Commission authorized the OES to establish an Advisory Task Force to advise the Commission about what routes should be evaluated and what impacts and issues should be considered in the EIS for the Project. OES staff solicited Advisory Task Force nominations from 25 local units of government located along the proposed and alternate routes identified by the Applicants. The OES appointed representatives from each of the eight governmental units responding to the OES's solicitation: Beltrami County, Hubbard County, Itasca County, Frohn Township (Beltrami County), Farden Township (Hubbard County), Pike Bay Township (Cass County), Wilkinson Township (Cass County), and Morse Township (Itasca County).

The Advisory Task Force met July 14 and August 13, 2008. The meetings were open to the public and, in addition to task force members, were attended by OES staff, representatives of federal agencies, and the Applicants. The Task Force, through a facilitated process, discussed the Project and the charge of the Task Force. The Task Force Report may be found on the OES website maintained for the Project: http://energyfacilities.puc.state.mn.us/Docket.html?Id=19344.

Task Force members reviewed and prioritized the issues and impacts to be considered in the EIS. Task Force members reviewed in detail the preferred and alternative routes for the transmission line to address questions of clarity. After further discussion, Task Force members were asked to identify the potential benefits and issues with each of the routes. Task Force members then discussed whether there were any additional routes or route segments, beyond those proposed by the Applicants, that should be included in the EIS.

Task Force members considered the routes and route segments proposed by the Applicants in their route permit application to the Commission, as well as all the route corridors (macrocorridors) that were studied by the Applicants prior to deciding on the two routes proposed in the route permit application. Advisory Task Force members recommended that no additional routes be studied in the EIS.

1.4.4. Agency and Tribal Review of Route Alternatives

Following the close of the public comment period the participating agencies reviewed the comments received, the RUS pre-scoping documents, and additional environmental material comparing routes within the macrocorridors.

1.4.5. Office of Energy Security Scoping Decision

Following the close of the comment period, OES staff reviewed the public comments about the scope of the environmental review and the rules governing the content of an EIS (site rule). Based upon that review, the Director of the OES issued a Scoping Decision on March 31, 2009. The Scoping Decision is included in Appendix A of this EIS. Comments submitted during the scoping period are generally summarized in Appendix B. A list of comments, organized by subject area, is included in Appendix B of this document.

1.4.6. Rural Utilities Service Scoping Decision/Report

RUS released a *Scoping Decision/Report* for the Project in December 2009. *The Scoping Decision/Report* summarized the public scoping process and inter-agency consultation regarding Project alternatives. Based upon the scoping process, the *Scoping Decision/Report* identified the issues and alternatives to be evaluated in the EIS. The RUS *Scoping Decision/Report* is included in Appendix A of this document.

2. Project Description

This section describes the construction and operation of the Project and alternatives considered in this EIS. Alternatives to the Project were screened to assess the ability of the alternatives to meet the identified need for the Project and to provide a comparison of the impacts of different alternatives in meeting the identified need for the Project. Based upon this screening, a No-Build Alternative and three route alternatives are evaluated in this document, as described in Section 2.2. In addition to these four alternatives, a number of system and route alternatives were considered, but not evaluated in detail; these alternatives not evaluated in the EIS are described in Section 2.3.

2.1. Project Alternatives

Several alternatives to the Project were identified during the Applicants' development of the Project and during the public scoping process carried out by OES and RUS. Two types of alternatives to the Project were developed and evaluated:

- System alternatives, which look at alternative means for meeting the stated need of the Project; and
- Route alternatives, which look at alternative routes to get from one end point to another.

2.1.1. System Alternatives

Both the RUS scoping requirements and the Commission's Certificate of Need process require review of alternative methods of meeting the purported need for the Project; see Sections 1.3 and 1.2. Both the *Alternative Evaluation Study*, prepared in accordance with RUS guidelines, and the *Environmental Report: Bemidji to Grand Rapids 230 kV Transmission Project*, prepared in accordance with Commission guidelines, considered three alternatives to meeting the need of anticipated customer demand into the future:

- No-Build Alternative;
- Use of demand-side management and conservation measures;
- Transmission system alternatives, including existing line or system improvements; and
- Generation alternatives.

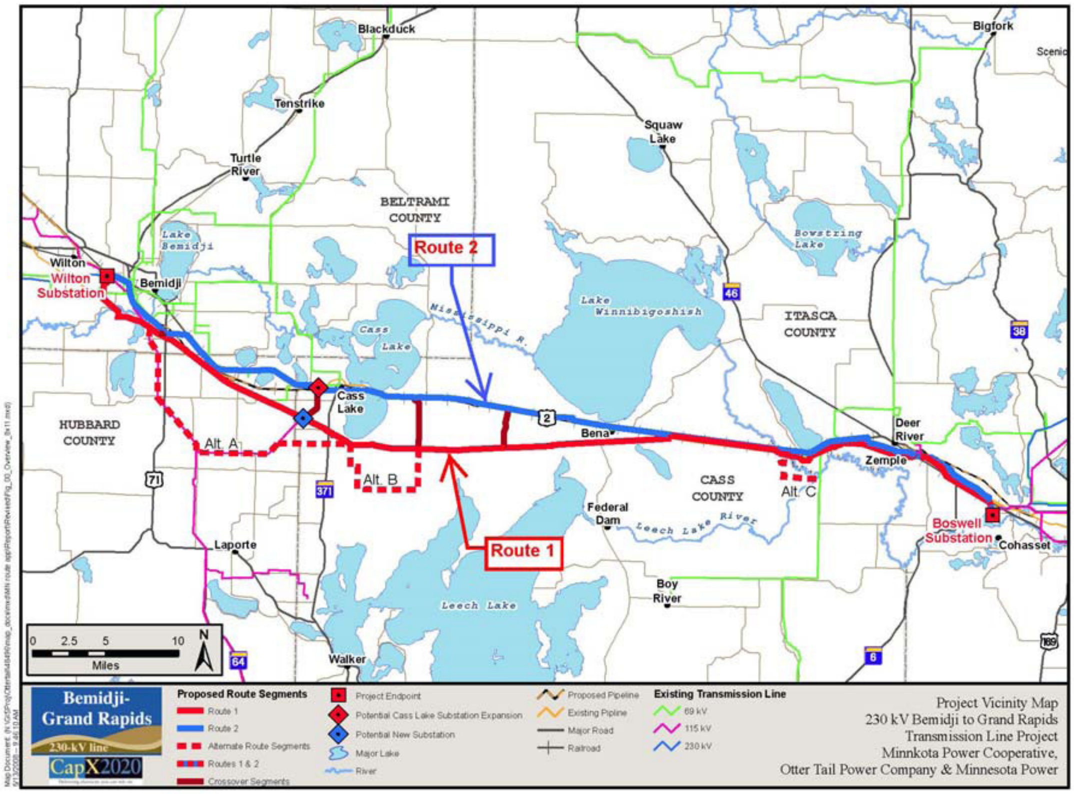
Both the *Alternatives Evaluation Study* and the Commission's July 14, 2009 order granting a Certificate of Need for the Project found that none of the system alternatives evaluated were able to meet the identified need as well or at a comparable cost as the Project.

2.1.2. Route Alternatives

Minnesota Statute (Minn.Stat. 216E.03, subd. 3) and rules (MN Rules 7850.1900, subp. 2) establish the requirements for submitting and processing a permit application. Under these rules, the Applicants must present information for at least two routes for a proposed high voltage transmission line (HVTL) in their *Route Permit Application* to the Commission. The Applicants must also identify in the application the preferred route for the transmission line and at least one alternative route.

In accordance with these rules, the Applicants presented information for two routes in their June 4, 2008, *Route Permit Application*. Both of these routes are generally in the vicinity of U.S. Highway 2 (Figure 2-1). Route 1 (identified by the Applicants as their preferred route) generally follows the Great Lakes Gas Transmission Company pipeline and a 115 kV transmission line right-of-way (ROW); Route 2 (the Applicants Alternate Route) generally follows U.S. Highway 2 and the Enbridge pipeline ROWs. Under Minnesota Statute 216E.03, the EIS must evaluate alternatives proposed by the Applicants. The *Route Permit Application* also contains several alternative segments proposed by the Applicants to avoid or minimize impacts to certain sensitive areas. These segments are discussed in greater detail in Section 2.2.

Figure 2-1: Applicant-Identified Route Alternatives



The federal agencies consider both of the Applicant-proposed routes to be located within one study area, referred to as a "Macrocorridor" in their screening materials. At the request of the CNF, RUS, and LLDRM three additional Macrocorridors were developed by the Applicants to evaluate whether potentially routing along one of these corridors might merit further investigation (Figure 2-2). These four Macrocorridors (referred to as the Central, North, South and non-CNF) were evaluated in the *Macrocorridor Study Report* discussed in Section 1.4.2. Notices, identifying the Macrocorridors on maps, were published in area newspapers and in direct mail notification to approximately 11,000 potentially affected landowners.

Figure 2-2: Federal Macrocorridors Identified

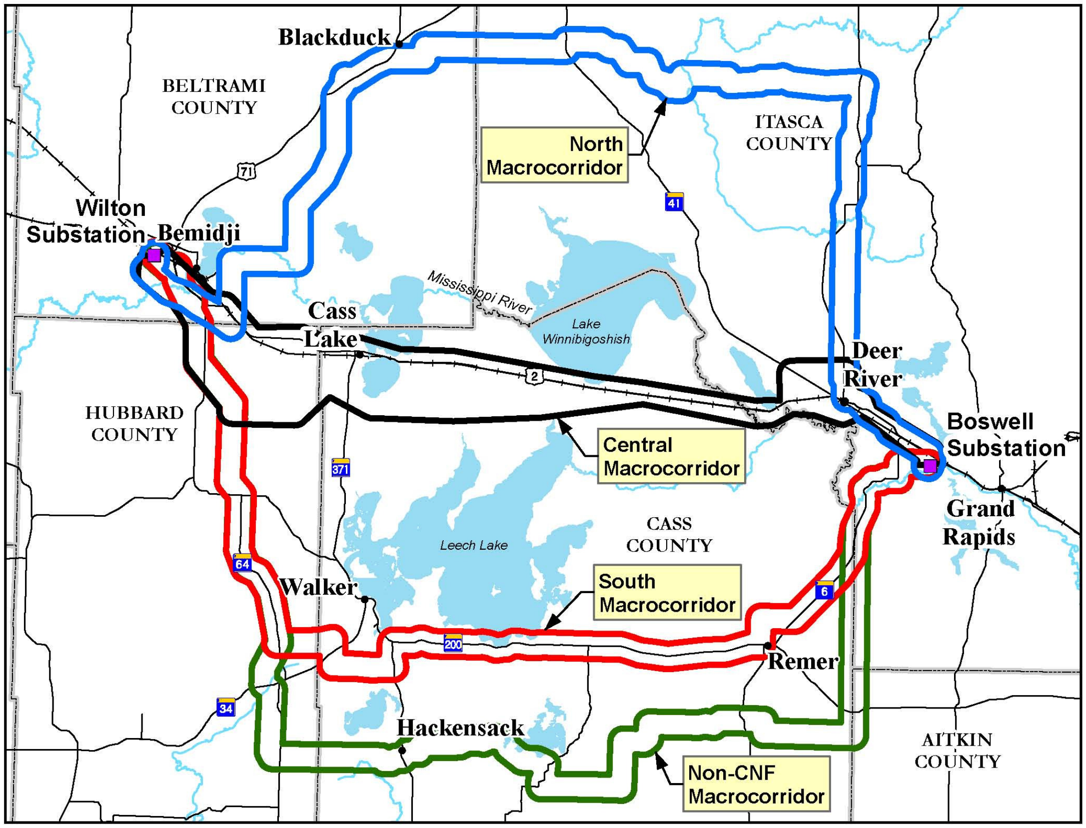


Figure 1: Corridor Map

The federal agencies require that the EIS evaluate a potentially viable route alternative that is different than the two route alternatives proposed by the Applicants. In conjunction with the Applicants, OES staff developed 1,000-foot routes within each of the additional three "macrocorridors" and compiled a variety of social and environmental data on each of the routes. As discussed in the RUS *Scoping Decision/Report* (see Appendix A), staff from OES, the LLBO, and federal partner agencies reviewed more detailed social and environmental information for the five routes (i.e., the two Applicant-proposed routes and one in each of the additional three macrocorridors).

During this review process, a number of concerns related to Route Alternatives 1 and 2 were identified by agencies participating in the environmental review. More information on these concerns is provided in the RUS *Scoping Decision/Report* (Appendix A) and in the public comment summary (Appendix B).

Issues Identified with Route Alternative 1: The agencies identified potentially significant impacts to traditional cultural, biological, and socioeconomic resources along this Route Alternative. Additionally, impacts to the "10 Section" area or the Pike Bay Experimental Forest would require a Forest Plan Amendment. Although several flaws were identified with this Route Alternative, Minnesota Statute 216E.03, subdivision 5, requires the evaluation of all routes proposed by the Applicant.

Issues Identified with Route Alternative 2: The issues identified with Route Alternative 2 were primarily related to its location adjacent to several utilities (pipelines and transmission lines) and transportation resources (highways and railroads). In many areas this Route Alternative would add yet another easement to properties already encumbered by multiple pipeline easements. Additionally, there may be engineering constraints in some areas due to the number of existing utility and transportation uses in a narrow corridor. Although several flaws were identified with this Route Alternative, Minnesota Statute 216E.03, subdivision 5, requires the evaluation of all routes proposed by the Applicant.

It was concluded that in addition to the Route Alternatives proposed by the Applicants, one additional route, located in the North macrocorridor, should be fully evaluated in the EIS. This Route Alternative avoids the major gateway to the Chippewa National Forest and avoids bisecting the Leech Lake Reservation.

2.2. Alternatives Considered in the EIS

As discussed above, a No-Build Alternative and three Route Alternatives (shown in Figure 2-3) are evaluated in this EIS. Route Alternatives can be summarized as follows:

No-Build Alternative: Under this alternative, no transmission line would be constructed. As discussed in Section 2.1.1, this Alternative does not meet the defined need for the Project. Nevertheless, a No-Build Alternative is evaluated in this document in accordance with the Council on Environmental Quality NEPA regulations (40 CFR 1502.14) requiring review of a no-action alternative.

Route Alternative 1: This route, referred to as Route 1 in the *Route Permit Application*, is approximately 69 miles long and generally follows the Great Lakes Gas Transmission Company pipeline and an 115 kV transmission line ROWs. This alternative would add equipment to the Wilton Substation and expand the Boswell Substation by approximately 1.3 acres to accommodate additional equipment. Under this alternative, a new 230 kV substation would be constructed in Pike Bay Township in Cass County. If certain segment alternatives are used in association with this Route Alternative, a new Nary 115 kV Breaker Station may be constructed.

Route Alternative 2: This route, referred to as Route 2 in the *Route Permit Application*, was proposed by the Applicants as an alternate route in their application to the Commission. This route is approximately 68 miles long and generally follows U.S. Highway 2 and the Enbridge pipeline ROWs. As with Route Alternative 1, this alternative would also entail adding 230 kV equipment to the Wilton Substation and would expand the Boswell Substation to permit the addition of 230 kV equipment.

Under this Route Alternative, the existing Cass Lake Substation would be expanded by approximately 2.2 acres to accommodate new 230kV equipment.

Route Alternative 3: This route follows existing pipeline, transmission, and road ROWs for most of its 116 miles. The route follows a series of transmission lines and roads between the Wilton Substation, northeast to the Blackduck area, east and then south to Deer River, and then southeast to the Boswell Substation. This route avoids a major gateway to the Chippewa National Forest and avoids bisecting the Leech Lake Reservation. This alternative would include improvements to the Wilton and Boswell substations, but no additional substations or breaker stations would be constructed or expanded.

Figure 2-3: Route and Segment Alternative Overview Map

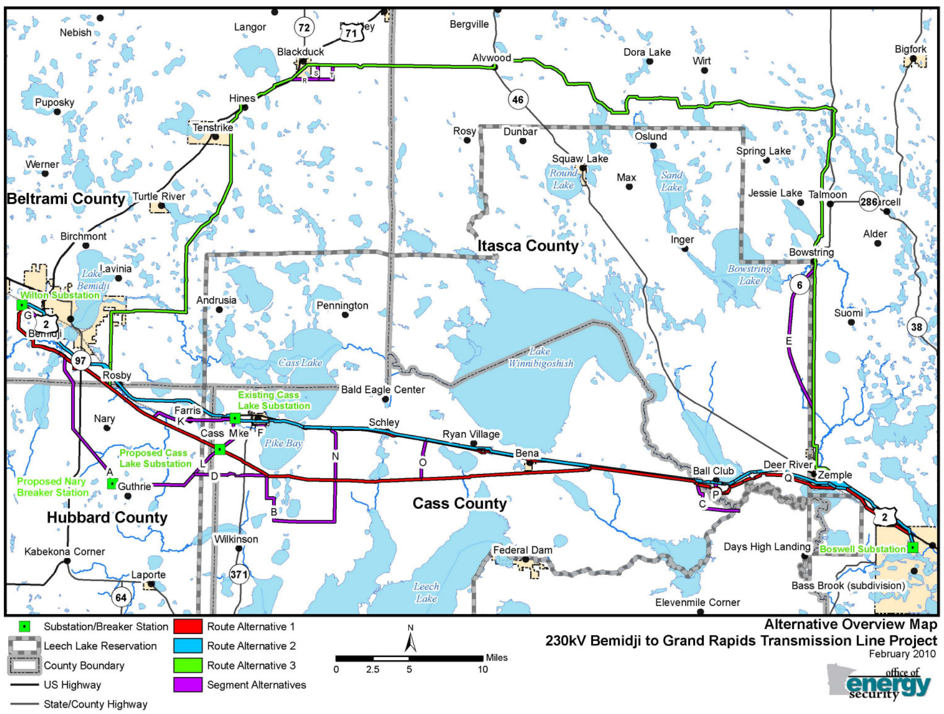


Table 2-1 provides a general comparison of the alternatives.

Table 2-1: Comparison of Route Alternatives

		No-Build Alternative	Route Alternative 1	Route Alternative 2	Route Alternative 3
Meets Identified Purpose and Need for Project		No	Yes	Yes	Yes
Route Length (miles)		N/A	69	68	116
Existing Linear Features (miles)	Transmission Lines	N/A	18	9	91
	Pipelines	N/A	61	48	8
	Highways	N/A	25	60	32
Length of new Corridor (miles)		N/A	5.2	2.6	5.1
New Corridor as a % of Route		N/A	7.5 %	3.8 %	4.4%
Cass Lake Substation		N/A	New (4 acres)	Expand (2.2 acres)	Expand (2.2 acres)
Nary Breaker Station		N/A	Yes, Depending upon Route (2.5 acres)	N/A	N/A
Wilton Substation		N/A	Add new Equipment; no expansion	Add new Equipment; no expansion	Add new Equipment; no expansion
Boswell Substation		N/A	Expand (1.3 acres)	Expand (1.3 acres)	Expand (1.3 acres)
Estimated Cost ($ million)		N/A	$62.6 – $65.3	$65.6	$99..1

In addition to the Route Alternatives, the EIS also evaluates 20 Segment Alternatives, labeled A through T and summarized in Table 2-2. Of the 20 Segment Alternatives, eight were included in the Applicants' *Route Permit Application*, and four were identified in OES's April 2009 *Environmental Report*. The additional eight Segment Alternatives, primarily in the U.S. Highway 2 area, were identified during the course of the EIS development as several areas presenting routing constraints because of engineering difficulty, areas of cultural use and environmental features were identified within the routes identified in the original scope. These Segment Alternatives were identified in OES's revised Scoping Decision, issued February 5, 2010.

Table 2-2: Segment Alternatives Evaluated in the EIS

Segment Alternative	Description (*Source*)	Associated Route Alternatives
A	Bemidji – Nary Alternative (*Route Permit Application*): A 15.7-mile segment from the Wilton Substation, follows an existing 115 kV transmission line, connecting back to Route Alternative 1 through either Segment Alternatives D or L.	1
B	Ten Section Alternative (*Route Permit Application*): A 10.5-mile segment that avoids the Ten Section area and Pike Bay Experimental Forest	1
C	Leech Lake River Crossing Alternative (*Route Permit Application*): A 4.4-mile segment that moves existing 69 kV Mississippi River crossing from U.S. Highway 2 south to Leech Lake River; new 230 kV line would use the existing crossing.	1, 2
D	143rd Street Alternative (*Route Permit Application*): A 5.0-mile segment that continues Segment Alternative A, to the west along 460th S/ 143rd Street NW.	1
E	MN Highway 6 Alternative (*Initial Scope*): A 10.6-mile segment that departs from a cross-county section of an existing 69 kV line to follow MN Highway 6	3
F	Cass Lake Alternative (*EIS Development*): A 1.3-mile segment that skirts the center of the city of Cass Lake and avoids the Superfund site by heading briefly south along MN Highway 371 and then across a CNF parcel	2
G	Bemidji Enbridge/transmission Alternative (*EIS Development*): A 1.6-mile segment that follows the Enbridge pipeline ROW and a 115 kV transmission line from the Wilton Substation to a pipeline/transmission divergence north of Division Street	2
H	Division Street Transmission Alternative (*EIS Development*): A 1.0-mile segment that follows a 115 kV from a pipeline/transmission split to Route Alternative 2.	2
I	Division Street Pipeline Alternative (*EIS Development*): A 0.5-mile segment that follows the Enbridge pipeline from a pipeline/transmission split to Route Alternative 2.	2
J	Bemidji Slough Crossover (*Route Permit Application*): A 0.4-mile segment that connects Route Alternatives 1 and 2 and avoids the Bemidji Slough WMA.	1, 2
K	Midge Lake Crossover (*EIS Development*): A 5.9-mile segment that connects Route Alternatives 1 and 2; ties into the existing Cass Lake Substation.	1, 2
L	Farden – Pike Bay Crossover (*EIS Development*): A 2.5-mile segment that connects Segment Alternative A with a new Cass Lake Substation; follows an existing 115 kV transmission line.	1
M	Pike Bay Crossover (*Route Permit Application*): A 2.4-mile segment that connects Route Alternatives 1 and 2; follows an existing 115 kV transmission line.	1, 2
N	Cuba Hill Road Crossover (*Route Permit Application*): A 3.7-mile segment that connects Route Alternatives 1 and 2 along Cuba Hill Road	1, 2
O	Sucker Bay Road Crossover (*Route Permit Application*): A 2.7-mile segment that connects Route Alternatives 1 and 2 along Sucker Bay Road	1, 2
P	Ball Club Crossover (*EIS Development*): A 0.4-mile segment that connects Route Alternatives 1 and 2	1, 2
Q	Deer River Crossover (*EIS Development*): An 0.2-mile segment that connects Route Alternatives 1 and 2	1, 2
R	Blackduck Alternative 1 (*Initial Scope*): An 1.8-mile segment that would provide an alternative in the Blackduck area.	3
S	Blackduck Alternative 2 (*Initial Scope*): A 1-mile segment in the Blackduck area that would connect Segment Alternative R with Route Alternative 3 along Beltrami County Road 311.	3
T	Blackduck Alternative 3 (*Iniital Scope*): A 2-mile segment in the Blackduck area that would connect Segment Alternative R with Route Alternative 3.	3

* Segment Alternatives A and D were combined in the Applicants' *Route Permit Application* (Otter Tail Power et al., 2008a)

2.2.1. No-Build Alternative

Under the No-Build Alternative the Project would not be constructed. No land would be used for transmission or substation facilities, and there would be no changes to the existing environment in the Study Area. As discussed in Section 2.1.1, above, the No-Build Alternative does not meet the identified purpose and need for the Project. A No-Build Alternative is evaluated in this document in accordance with the Council on Environmental Quality NEPA regulations (40 CFR 1502.14) requiring review of a no-action alternative.

2.2.2. Route Alternative 1

Route Alternative 1, shown in Figure 2.2-1, and in greater detail in the maps in Appendix C, follows the Great Lakes Gas Transmission Company (Great Lakes) pipeline ROW for approximately 61 of its 69-mile total length. The Applicants identified this as their preferred alternative in their *Route Permit Application* to the Commission. This alternative would include improvements to the Wilton and Boswell substations and construction of a new substation near Cass Lake. Depending upon the final routing, this Route Alternative may include a new Nary Breaker Station. The capital cost per mile for Route Alternative 1 is estimated at $788,000 (Otter Tail Power et al, 2008a). Including improvements to the Wilton and Boswell substations and construction of a new Cass Lake Substation, the total total capital cost of this Route Alternative is estimated at approximately $62.6 million. Construction of the Nary Breaker Station would add approximately $2.7 million to this cost.

2.2.2.1. Transmission Line Route

Route Alternative 1 proceeds south overland from the Wilton Substation, along two 69 kV transmission lines for 1.2 miles, then overland for approximately 2,000 feet, before turning southeast to follow the Great Lakes Pipeline through southern Bemidji. Aside from some slight deviations to avoid homes, the Route Alternative continues eastward along the Great Lakes Pipeline for approximately 46 miles until Mud Lake Road. Route Alternative 1 then follows Mud Lake Road north for approximately 0.2 mile, before turning east along Great River Energy's 69 kV line between the Enbridge and Great Lakes pipelines where it would cross the Mississippi River near the existing Great River Energy 69 kV transmission line crossing. After crossing the Mississippi the route would continue to parallel the pipelines and 69 kV transmission line for approximately 0.6 mile to Itasca County Road 119. At County Road 119, the route would head cross-country in a southeasterly direction to Itasca County Road 118. The route would follow County Road 118 for approximately 1,200 feet, continuing east cross country, then north for approximately 1,000 feet before turning northeast for another 2,150 feet before rejoining the Great Lakes pipeline. The route would continue to follow the Great Lakes pipeline for approximately 10.2 miles. The route would then follow a Minnesota Power 115 kV transmission line for the remaining 4.5 miles to the Boswell Substation.

Segment Alternatives associated with this Route Alternative are:

- Segment Alternative A is a 15.7-mile alternative developed by the Applicants to collocate with an existing 115 kV transmission line from Bemidji to Cass Lake, instead of following the Great Lakes pipeline. This segment follows Otter Tail Power's Bemidji to Nary 115 kV transmission line from the Wilton Substation south for approximately 10 miles, then follows Otter Tail Power's Nary-to-Cass Lake 115 kV transmission line east and northeast for approximately 5.7 miles to the intersection of 317th Avenue and 460th Street in Hubbard County. From this point the Segment Alternative could connect with either Segment Alternatives L or D.
- Segment Alternative B was developed by the Applicants to avoid the Ten Section Area and Pike Bay Experimental Forest of the CNF. This Segment Alternative would deviate from Route Alternative 1 between the intersection of Wilkenson Road and Lupine Drive NW (Lake 13 Road) and Cuba Hill Road. The Segment Alternative would proceed south from the Wilkenson Road and Lupine Drive intersection for approximately 3.5 miles, then turn east for approximately 4 miles to Cuba Hill Road, then turn north again for approximately 3 miles before reconnecting with Route Alternative 1. The Segment Alternative would travel cross country and would not follow any existing utility ROWs, but would follow some roads.
- Segment Alternative C was developed by the Applicants to reduce the number of transmission lines that cross the Mississippi River at the preferred river crossing location near Ball Club. This alternative would replace the existing Great River Energy 69 kV line crossing the Mississippi River with the proposed 230 kV transmission line. Great River Energy's 69 kV line would be re-routed to the south along approximately 4.4 miles of new ROW to cross the Leech Lake River. If this Segment Alternative is used, the crossing of the Mississippi River would be similar to what exists there currently, one set of structures, although the structures would be taller.
- Segment Alternative D would connect with Segment Alternative A and proceed for approximately 5 miles east along 460th Street. Use of this segment would preclude connecting the Project to a Cass Lake Substation.
- Segment Alternative J is a 0.4-mile segment connecting Route Alternatives 1 and 2. This segment would avoid the Bemidji Slough Wildlife Management Area.
- Segment Alternative K is a 5.9-mile segment connecting Route Alternatives 1 and 2 between approximately Hubbard County Road 15 and the existing Cass Lake Substation.
- Segment Alternative L is a 2.5-mile segment connecting Segment Alternative A with Route Alternative 1 along Otter Tail Power Company's Nary–to-Cass Lake 115 kV transmission line. This segment would terminate at a new Cass Lake Substation that would be located in Pike Bay Township.

- Segment Alternative M is a 2.4-mile segment connecting Route Alternatives 1 and 2 along the Otter Tail Power Company's Nary-to-Cass Lake 115 kV transmission line.
- Segment Alternative N is a 3.7-mile segment connecting Route Alternatives 1 and 2 along Cuba Hill Road.
- Segment Alternative O is a 2.7-mile segment connecting Route Alternatives 1 and 2 along Sucker Bay Road.
- Segment Alternative P is a 0.4-mile segment connecting Route Alternatives 1 and 2 across U.S. Highway 2 between the Mississippi River and Ball Club Lake.
- Segment Alternative Q is a 0.2-mile segment connecting Route Alternatives 1 and 2 east of Deer River.

Under Route Alternative 1, there are three scenarios for crossing the Mississippi River near Ball Club:

- Route Alternative 1 could cross the river and on a separate ROW parallel to the existing Great River Energy 69 kV crossing. This would result in two crossings to the Mississippi River, essentially adjacent to one another;
- Route Alternative 1 could be consolidated with Great River Energy's existing 69 kV transmission line on a new set of double circuit structures. Under this scenario, there would be one set of structures and two planes of wire crossing the river; and
- If this Route Alternative is used in conjunction with Segment Alternative C (see above), a new set of structures would replace the existing river crossing and Great River Energy's 69 kV transmission line would be relocated along a new ROW to cross the Leech Lake River.

2.2.2.2. Substation Improvements

Substation improvements and construction included with this alternative are described in greater detail in Section 2.4.2. This alternative would include the addition of equipment to both the Wilton and Boswell substations. The improvements at the Wilton Substation would occur within the existing fenced area of the substation. The Boswell Substation would be expanded by approximately 1.3 acres to accommodate the additional equipment.

Route Alternative 1 would also include construction of a new 230/115 kV substation in Section 30 of Pike Bay Township (Township 145N, Range 31W) in Cass County where the Alternative crosses the existing 115 kV transmission line between the Nary Junction and Cass Lake substations. This crossing point is approximately 2.5 miles south of the existing Cass Lake 115/69 kV Substation.

When Segment Alternatives A is used in conjunction with Route Alternative 1, a new Nary 115 kV breaker station would be constructed to provide enhanced transmission security and reliability to address reliability concerns of double circuiting of the portion of existing 115 kV transmission line and the Project between Bemidji and Cass Lake. Building this 115 kV breaker station would sectionalize the 115 kV circuits serving Bemidji, Cass Lake, Akeley, and Badoura. It would also provide for back-up (redundant) transmission in the event of an outage of the proposed 230/115 kV double-circuit transmission line.

2.2.3. Route Alternative 2

Route Alternative 2, shown in Figure 3.2-1 and in the detailed maps in Appendix C, generally follows U.S. Highway 2 and the Enbridge pipeline ROWs across the LLR. This route was identified as an alternative route in the *Route Permit Application* to the Commission. The capital cost per mile for this Route Alternative is estimated at $851,000 (Otter Tail Power et al, 2008a). Including improvements to the Wilton and Boswell substations and the expansion of the existing Cass Lake Substation, the total total capital cost of this Route Alternative is estimated at approximately $65.6 million.

2.2.3.1. Transmission Route

Route Alternative 2 proceeds east from the Wilton Substation along a new corridor for approximately 2,200 feet before turning southeast along the railway to the U.S. Highway 2/U.S. Highway 71 corridor. The route then turns south along U.S. Highway 2/U.S. Highway 71 for approximately 15.5 miles and an Otter Tail Power 69 kV transmission line before turning south along the 69 kV transmission line to the Cass Lake Substation. From the Cass Lake Substation, the route would continue east along the BNSF railway and Enbridge pipeline, passing through the south side of the city of Cass Lake and continuing east along U.S. Highway 2 between Pike Bay and Cass Lake, south of Lake Winnibigoshish and through Bena. The route would cross the Mississippi River north of U.S. Highway 2, continuing east along the highway past Ball Club. The route would cross U.S. Highway 2 east of Cedar Road to follow the Enbridge pipeline. The route then would continue east along the pipeline through Zemple, heading southeast for approximately 0.6 mile along the BNSF railroad, then eastward for approximately 0.7 mile along the Great Lakes pipeline to Itasca County Road 11. From this point it would follow U.S. Highway 2 southeast for approximately 2 miles, breaking off to follow the Great Lakes Pipeline north of U.S. Highway 2 for approximately 3.6 miles, crossing back to the south side of U.S. Highway 2, and following Minnesota Power's 115 kV transmission line into the Boswell Substation.

Segment Alternatives associated with this Route Alternative are:

- Segment Alternative C was developed by the Applicants to reduce the number of transmission lines that cross the Mississippi River at the preferred river crossing location near Ball Club. This alternative would replace the existing Great River Energy 69 kV line crossing the Mississippi River with the proposed 230 kV transmission line. Great River Energy's 69 kV line would be re-routed to the south along approximately 4.4 miles of new ROW to cross the Leech Lake River. If this Segment Alternative is used, the crossing of the Mississippi River would be similar to what exists there currently, one set of structures, although the structures would be taller.

- Segment Alternative F is a 1.3-mile segment that would provide an alternative route through Cass Lake between MN Highway 371 and Pike Bay. The segment would deviate from Route Alternative 2 by heading south along MN Highway 371, then east across a CNF parcel.
- Segment Alternative G is a 1.6-mile segment in the Bemidji area that follows the Enbridge pipeline ROW and a 115 kV transmission line from the Wilton Substation to the point where the pipeline and transmission line diverge north of Division Street.
- Segment Alternative H is a 1-mile segment that could connect Segment Alternative G with Route Alternative 2 along the same 115 kV transmission line followed by Segment Alternative G.
- Segment Alternative I is a 0.5-mile segment connecting Segment Alternative G with Route Alternative 2 parallel to the Enbridge pipeline.
- Segment Alternative J is a 0.4-mile segment connecting Route Alternatives 1 and 2. This segment would avoid the Bemidji Slough Wildlife Management Area.
- Segment Alternative K is a 5.9-mile segment connecting Route Alternatives 1 and 2 between approximately Hubbard County Road 15 and the existing Cass Lake Substation.
- Segment Alternative M is a 2.4-mile segment connecting Route Alternatives 1 and 2 along the Otter Tail Power Company's Nary-to-Cass Lake 115 kV transmission line.
- Segment Alternative N is a 3.7-mile segment connecting Route Alternatives 1 and 2 along Cuba Hill Road.
- Segment Alternative O is a 2.7-mile segment connecting Route Alternatives 1 and 2 along Sucker Bay Road.
- Segment Alternative P is a 0.4-mile segment connecting Route Alternatives 1 and 2 across U.S. Highway 2 between the Mississippi River and Ball Club Lake.
- Segment Alternative Q is a 0.2-mile segment connecting Route Alternatives 1 and 2 east of Deer River.

Under this Route Alternative there are two scenarios for crossing the Mississippi River near Ball Club:

- Route Alternative 2 could cross the Mississippi River near Ball Club at a new crossing north of U.S. Highway 2. The existing Great River Energy 69 kV line would remain in place. Under this Route Alternative there would be two transmission lines crossing the river near Ball Club, the Project on the north side of U.S. Highway 2 and the existing Great River Energy 69 kV transmission line south of U.S. Highway 2.
- When this Route Alternative is used in conjunction with Segment Alternative C (see above), a new set of structures would replace the existing river crossing and

Great River Energy's 69 kV transmission line would be relocated along a new ROW to cross the Leech Lake River.

2.2.3.2. Substation Improvements

Substation improvements and construction included in this alternative are described in greater detail in Section 2.4.2. This alternative would include the addition of equipment to the Wilton and Boswell substations. The improvements at the Wilton Substation would occur within the existing fenced area of the substation. The Boswell Substation would be expanded by approximately 1.3 acres to accommodate the additional equipment. Under this alternative, the existing Cass Lake 115/69 kV substation, located in Section 17 of Pike Bay Township (Township 145N, Range 31W) in Cass County, would be expanded by approximately 2.2 acres to accommodate new 230 kV equipment.

2.2.4. Route Alternative 3

Route Alternative 3 follows existing pipeline, transmission, and road ROWs for 111 of its 116 miles. The route heads southeast out of the Wilton Substation, then northeast to the Blackduck area. There are several route variations around the city of Blackduck. From Blackduck, the route heads east and then south to Deer River, and then southeast to the Boswell Substation. This alternative skirts the Leech Lake Reservation. While it does not avoid the CNF, it avoids the U.S. Highway 2 area, which the CNF considers to be a major gateway to the CNF. As with Route Alternatives 1 and 2, this alternative includes improvements to the Wilton and Boswell substations. This alternative would not include any improvements to the transmission system in the Cass Lake area. The capital cost per mile for this Route Alternative is estimated at $833,000 (OES, 2009). Including improvements to the Wilton and Boswell substations, the total total capital cost of this Route Alternative is estimated at approximately $99.1 million

2.2.4.1. Transmission Route

Route Alternative 3 would follow the same route as Route Alternative 1 for the first 10 miles between the Wilton Substation and North Plantagent Road SE in the Bemidji area. From this point the route would veer north, crossing U.S. Highway 2 and the exit to Paul Bunyan Drive SE. The route then would follow an existing 69 kV transmission line to the northeast between Bemidji and Blackduck. Although some portions of the 69 kV transmission line are cross-country, the route generally parallels Tyler Avenue, east along Power Dam Road, north along Parker's Lake Road NE, and then northeast along Long Lake Drive NE/Marcella Drive NE, 3 Culverts Road, and Carter Lake Road/Forest Road 2419. The route would deviate slightly from the existing 69 kV route, crossing and then rejoining the 69 kV transmission line, briefly following Beltrami County Road 31 before crossing U.S. Highway 71. The route would continue along the north side of U.S. Highway 71 until south of Blackduck, where it would cross U.S. Highway 71 and parallel the Blue Ox Trail northeast before turning eastward along Summit Avenue/Beltrami County Road 30. The route would continue east along Alvwood Road (i.e., Beltrami County Road 30/Itasaca County Road 13). At MN Highway 46, the route would follow an existing 69 kV transmission line, jogging briefly north along MN Highway 46 before continuing east along Itasca County Road 29. The route would continue to follow the 69 kV transmission line east and southeast, crossing the Bowstring River, past Whitefish Lake, until crossing MN Highway 6. The route would then head south, cross-country along a 69 kV transmission line along, roughly parallel to MN Highway 6, before continuing directly south away from the highway for approximately 10 miles through a forested wetland as MN Highway 6 jogs west to avoid the area. The Route Alternative would re-join MN Highway 6 just south of County Road 172 and continue south to Deer River. The route, following an existing 69 kV transmission line, would pass through Deer River on the east, then jog to the east and southeast before joining a 115 kV transmission line north of U.S. Highway 2. From this point the route would follow a 115 kV transmission line east then south across U.S. Highway 2 where it would follow Route Alternative 1 into the Boswell Substation along Minnesota Power's 115 kV transmission line.

Segment Alternatives associated with this Route Alternative are:

- Segment Alternative E is a 10.6-mile segment that would depart from a cross-country section of an existing 69 kV line to follow MN Highway 6.
- Segment Alternative R is a 1.8-mile segment that would provide an alternative in the Blackduck area. This segment would cross U.S. Highway 71 and head eastward overland and then along Forest Road 3415/Beighley Road NE until Beltrami County Road 311.
- Segment Alternative S is a 1-mile segment in the Blackduck area that would connect Segment Alternative R with Route Alternative 3 along Beltrami County Road 311.
- Segment Alternative T is a 2-mile segment in the Blackduck area that would connect Segment Alternative R with Route Alternative 3. This segment would continue eastward along Forest Road 3415/Beighley Road NE from Beltrami County Road 311 for approximately 1 mile and then turn north overland and then along Wernberg Road NE before connecting with Route Alternative 3 along Beltrami County 30.

2.2.4.2. Substation Improvements

Substation improvements and construction included in this alternative are described in greater detail in Section 2.4.2. This alternative would include the addition of equipment to the Wilton and Boswell substations. The improvements to the Wilton Substation would occur within the existing fenced area of the substation. The Boswell Substation would be expanded by approximately 1.3 acres to accommodate the additional equipment. There would be no substation or other improvements to the Cass Lake area under this alternative.

2.3. Alternatives Considered but Not Evaluated

In addition to the alternatives identified in Section 2.2, several alternatives to the Project were considered but were not included in the detailed evaluation presented in this EIS for various reasons.

2.3.1. New Generation Alternative

Both the Certificate of Need process and the *Alternatives Evaluation Study* prepared under the RUS scoping process evaluated a new generation alternative to the Project. Because of the limited transmission capacity for importing energy from other regional generation resources, only dispatchable (i.e., readily available on demand) generation could serve as a replacement to the proposed Project. Intermittent resources, such as wind generation, would not be feasible stand-alone solutions because they are not readily available on demand.

Generators typically have availability in the range of 85 to 95 percent, compared to a 99.9 percent availability factor for a new transmission line. Because of these differences, a generation alternative would have to incorporate a higher rated capacity than the anticipated 76 MW deficit by 2011-2012 noted in planning materials to allow for down time as well as expected load growth beyond that date. This generation could be located at a single site, or at a number of smaller sites disbursed throughout the area.

The Applicants identified two generation scenarios:

- Central Station Alternative: installation of a 180 MW natural gas-fired power plant comprised of three 60 MW gas-fired combustion turbines. The capital cost of this alternative is assumed to be $700/kW, or approximately $126 million.
- Distributed Generation Alternative: installation of 110 MW disbursed across 11 sites. It is anticipated that each 10 MW generation site would be comprised of between five and seven 1.5- to 2-MW diesel or natural gas generators for a total of 55 to 77 individual generators. The capital cost for this alternative is assumed to be approximately $7.65 million for each of the 11 sites, or approximately $84.15 million in total for the 11 sites.

These two generation scenarios were evaluated in the *Environmental Report* prepared under the Certificate of Need docket for the Project.

Adding new generation into a generation-rich area, such as the North Dakota Export (NDEX) boundary where the Project is proposed, requires either displacement of existing generation within the area or increasing the transmission outlet capability to allow continued operation of the existing generation. The existing generation within this boundary is very heavily weighted toward low-cost baseload coal (lignite) and hydroelectric facilities. Because of the cost differential between the existing baseload facilities and the higher cost generators in this alternative, displacement of these sources would increase total system production costs. Because the NDEX boundary is a power transfer-limited interface, adding new generation within its boundaries would require transmission additions to increase the existing generation outlet capability. It is assumed that increased transmission of a length and voltage similar to the Project would be required to support the new generation supplied in the central station alternative.

The distributed generation alternative also faces transmission constraints, as noted in the *Dispersed Renewable Generation Transmission Study* released by the Department of Commerce in July 2008. That study assessed the potential for installing 600 MW of dispersed renewable generation throughout Minnesota in a way that produced minimal impacts on the transmission system. The analysis demonstrated a dispersed renewable generation potential scenario where 600 MW could be sited without significantly affecting any transmission infrastructure. That analysis found that the potential for integrating distributed generation into northern Minnesota was constrained by the existing transmission infrastructure. The study identified a potential for up to 40 MW of distributed generation in the Cloquet area, the only northern Minnesota site identified. In contrast, that study identified the potential for approximately 300 MW of distributed renewable generation in southeastern Minnesota and approximately 160 MW of potential in southwestern Minnesota. Based upon this assessment of transmission potential for distributed generation, it would appear that the distributed generation alternative would also require the addition of transmission to be viable.

It is assumed that the new transmission facilities required for this alternative would be of a similar size and in a similar location to the Project. Because the new transmission lines constructed under this alternative would negate any benefit of a generation alternative over the Project, this alternative was not carried forward for further analysis in the EIS.

2.3.2. Transmission System Alternative

The Applicants identified three transmission alternatives to the Project:

- Adding a second Winger-Wilton 230 kV transmission line on separate structures from the existing 230 kV line (53 miles, with two substation upgrades);
- Adding a Badoura–Wilton 230 kV transmission line on separate structures from the existing 115 kV line (48 miles, with two substation upgrades); and
- A rebuild of two existing 115 kV transmission lines, Badoura–Wilton and Winger–Wilton, (100 miles, with five substation upgrades).

Both the Certificate of Need process and the *Alternatives Evaluation Study* prepared under the RUS scoping process evaluated these transmission system alternatives. The rebuild of existing transmission lines would result in voltage collapse in the event of a Wilton-Winger and Badoura-LaPorte outage. All of the transmission alternatives show inferior electric performance and cost-to-benefit profile compared to the Project. Any of the transmission alternatives would require additional load-serving improvements in the Study Area sooner than the 10- to 15-year window provided by the Project.

2.3.3. Additional Route Alternatives

During the scoping period five route alternatives were considered for inclusion in the EIS. In addition to Route Alternatives 1, 2, and 3 identified in Section 2.2, two additional route alternatives were identified but rejected from further consideration. These alternatives are shown in Figure 2-2, and described below (see also the *Scoping Report/Decision* in Appendix A).

2.3.3.1. Route Alternative 4 (Southern Route)

This Route Alternative would generally follow a pipeline southeast out of the Wilton Substation before turning south following a 115 kV transmission line and MN Highway 4 for several miles. North of Akeley, the route would head east, jogging generally east until reaching MN Highway 200. The route would then generally follow MN Highway 200 to the Remer area before skirting Remer to the north and then generally following MN Highway 6 northeast before turning into the Boswell Substation.

Approximately 11.5 miles of the total 100-mile length of this Route Alternative did not follow existing ROWs associated with other transmission lines, pipelines, roads, or railroads. This Route Alternative was eliminated from further consideration in the EIS process because it did not avoid the LLR or the CNF. Route Alternative 4 has potential for high scenic impacts and, due to the extent of new ROW, would likely have greater wetland impacts than Route Alternative 3.

2.3.3.2. Route Alternative 5 (non-CNF Route)

As with Route Alternative 4, this route would generally follow a pipeline southeast out of the Wilton Substation before turning south, following a 115 kV transmission line and MN Highway 4 for several miles, before turning east and following a series of county roads, 69 kV transmission lines, and overland passages. The Route Alternative would then turn north, eventually following the same route as Route Alternative 4 along MN Highway 6 to the northeast and turning into the Boswell Substation.

Approximately 29 miles of the total 126-mile length of this Route Alternative does not follow existing ROWs associated with other transmission lines, pipelines, roads, or railroads. This alternative has the greatest amount of new corridor of all of the route alternatives reviewed. This route was eliminated from further consideration in the EIS process because it could impact the greatest number of wetlands, including forested wetlands, required the greatest amount of acres to be cleared due to its length, and had the greatest length of new corridor of all the Route Alternatives reviewed.

2.3.4. Underground Transmission Line Alternative

Undergrounding of transmission lines similar in size to the 230 kV Project is seldom used because of the significant construction, operation, and maintenance issues, and the resulting cost. Undergrounding of electric utility infrastructure is a technically feasible option, especially for lower voltage distribution lines. It is common today to see lower-voltage distribution lines that connect to homes and businesses buried directly in the ground using less invasive construction methods. In the case of distribution lines, undergrounding offers aesthetic and environmental benefits while posing relatively few construction, maintenance, and operations challenges.

However, the complexity and cost of undergrounding increases as the voltage increases. As a result, undergrounding is seldom used for transmission facilities of the size of the Project. An OES review of *Route Permit Application* for the Project and other proposed high voltage transmission lines, showed that the cost for underground construction has been between five and 15 times greater than the cost for a similar overhead transmission line. The cost for underground construction depends upon a variety of factors specific to the project, but represents the more complicated engineering, increased construction time, specialized material, and specialized labor requirements.

The Applicants have estimated the cost for the Project to be $675,000 to $915,000 per mile in 2007 dollars (OES, 2009). The estimated cost range for the same voltage line to be placed underground is $10 to $15 million per mile. This cost range for an underground line does not include the cost for substations, with the large inductors that are necessary approximately every 20 miles to counteract the greater line charging currents associated with undergrounding. In addition, there are increased line losses and maintenance expenses incurred throughout the useful life of an underground line that makes its cost versus an overhead line even greater (Otter Tail Power et al., 2008a).

Because of the significantly greater expense, installation of underground transmission has been limited to locations where physical circumstances allow no other option or where overhead construction is prohibited. Examples include congested downtown centers where there is no space available between city streets and adjacent buildings for adequate clearance.

While underground lines reduce visual impacts (other than at the overhead/underground transition locations) and may minimize surface impacts after construction, there are distinct environmental consequences. The predominant environmental impact from the construction, operation, and maintenance of underground transmission lines arises from the need to develop and maintain a ROW totally cleared of woody vegetation. The construction activities for an overhead transmission line, discussed in greater detail in Section 2.4, are typically concentrated around the line's structures, with the areas between structures left relatively undisturbed except for the removal of trees that could interfere with the energized conductors. A narrow pathway between structures is often all that is necessary to string the conductors. With underground construction, however, the entire ROW must be cleared for construction activities along the entire length of the corridor. This increases impacts to wetland areas due to the installation of access roads capable of supporting heavy construction equipment, trenching activities, and cable installation. These wetland impacts would be permanent if a drivable road were constructed to allow quick access to repair the underground line in the event of an incident taking it out of service.

Underground lines also present challenging reliability and service issues. While overhead lines are subject to more frequent outages than underground cables, service is usually quickly restored by the automatic re-closing of circuit breakers, resulting in only a momentary outage of the transmission line. The lower incidence of outages with underground cables is offset by the fact that the outages are much longer. This is because re-closing circuit breakers is not recommended until it is verified that there is no fault in the underground cable (Otter Tail Power et al., 2008a).

Restoration of a faulted underground line also takes much longer due to the difficulty in locating the fault and accessing the site to make repairs. Repairing failures in high voltage extruded dielectric cables is typically not done. Instead, the cable is completely replaced between man-hole splice points that are generally located every 1,500 to 2,000 feet along the cable. This is expensive and very time consuming, with restoration taking several weeks or longer depending upon the location and difficulty of access. Replacing cable involves bringing in heavy equipment, including cable reels weighing 30,000 to 40,000 pounds, during all seasons of the year. If the failure is in a splice, it may be feasible to make a repair at the splice location without having to replace large quantities of cable, but access is still required for equipment and personnel. If the fault occurs in a wetland area where all-season roads are not maintained, restoration can be further delayed as matting is installed to gain access to the manholes used to replace the failed cable (Otter Tail Power et al., 2008a).

2.4. Project Description

Final engineering and design for the Project would not be completed until a Route has been selected. Route Alternatives are described in Section 2.2. The Applicants have requested a 125-foot wide ROW for the Project. The Applicants also have requested a wider route, 1,000 feet in most areas, within which a ROW of up to 125 feet would be located, in order to design the Project around existing constraints (e.g., buildings, roads, railroads, pipelines, and other existing infrastructure). Sections 2.4.5 provides a detailed discussion about the construction methods that would be used.

As described in Section 2.4.1, the Applicants propose to use two-pole, H-frame structures for a majority of the Project length and single-pole structures in more congested areas. The preferred design would utilize either three-pole guyed structures or single-pole self supporting structures at angle locations. At soft ground locations, the two-pole tangent (in-line) H-frame structures may also be guyed. In rare instances, single-pole structures may have to be guyed as well. In addition to the transmission line, the Project would also include installation of new equipment in the Wilton and Boswell substations. Details about the substation design are provided in Section 2.4.2 below. Depending upon the Route Alternative, the Project may also either expand the existing Cass Lake Substation or would involve constructing a new substation in the Cass Lake area.

2.4.1. Transmission Design

The Applicants have proposed using a variety of transmission structure types to address topographic and other considerations present within the Project Study Area. Characteristics of these different structure types are summarized in Table 2-3.

Table 2-3: Proposed Structure Types

Line Type	Structure Type	Structure Material	ROW Width (feet)	Structure Height (feet)	Pole Diameter (inches)	Distance Between Poles (feet)	Span Between Structures (feet)
230 kV Single-Circuit	Single-pole Davit Arm	Steel	125	80 - 100	54 - 72	N/A	400 - 800
	2-pole H-Frame	Wood	125	70 - 90	24 – 36	19.5	600 – 1,000
	3-pole Corner	Wood	125 + guy easement	70 - 90	24 – 36	28	600 – 1,000
230 /115 kV Double-Circuit	Single-pole Davit Arm	Steel	125	95 - 115	72 - 96	N/A	350 - 700
	2-pole H-frame	Wood	125	90 - 125	24 – 36	19.5	400 - 800
230 /69 kV Double-Circuit	Single-pole Davit Arm	Steel	125	95 - 115	72 - 96	N/A	350 - 700

Note: N/A = not applicable

The Applicants propose to construct single-circuit portions of the transmission line using predominantly H-frame 230 kV structures (Figure 2-4). These structures are frequently used in the type of wooded, rugged topography with wetlands typical of much of the Project Study Area. The H-frame structures would be approximately 70 to 90 feet high, with spans of approximately 600 to 1,000 feet between structures. The two poles would be set approximately 20 feet apart in holes augured to a depth of approximately 10 to 15 feet and a diameter of 24 to 36 inches. After the poles are embedded, the holes would then be backfilled with native soils or granular material.

Single-pole self-supporting structures (Figure 2-5) are proposed by the Applicants for single-circuit portions of the transmission line in areas where the available width of the ROW is limited by existing infrastructure or development. The height of single-pole single-circuit structures would range from approximately 80 to 100 feet, with the span between structures of approximately 400 to 800 feet. Corner structures would either be on reinforced concrete drilled shaft foundations or would be directly embedded with guy wires, depending upon soil types and route angles (Figure 2-6). Either single or multiple pole structures may be utilized as angle structures. Angle structures on reinforced concrete drilled shaft foundations would be contained within a 125-foot ROW, while additional easement widths, typically 20 by 70 feet, may be necessary for guyed angle structures.

For any double-circuit portions of the Project, the Applicants propose to use either single-pole self supporting structures (Figure 2-7) or double-circuit H-frame structures (Figure 2-8). These structures would either be directly embedded or set on reinforced concrete drilled shaft foundations. Double-circuit single-pole structures would range in height from approximately 95 to 115 feet, with approximately 350- to 700-foot spans between structures. Double-circuit H-frame structures would range in height between approximately 90 and 125 feet, with a span of approximately 400 to 800 feet between structures.

If steel structures are used, the finish could be galvinaized steel, which would provide a shiny appearance, or Cor-ten,sometimes referred to as self-weathering, which would use an outer coating to retard normal weathering and have a brown, rusty appearance.

For each phase of the 230 kV circuit, the Applicants propose 954 kcmil aluminum conductor steel reinforced (ACSR). The Applicants propose to use 3/8-inch diameter extra high strength steel and fiber optic ground wire for the shield wires.

Figure 2-4: Typical 230 kV H-Frame

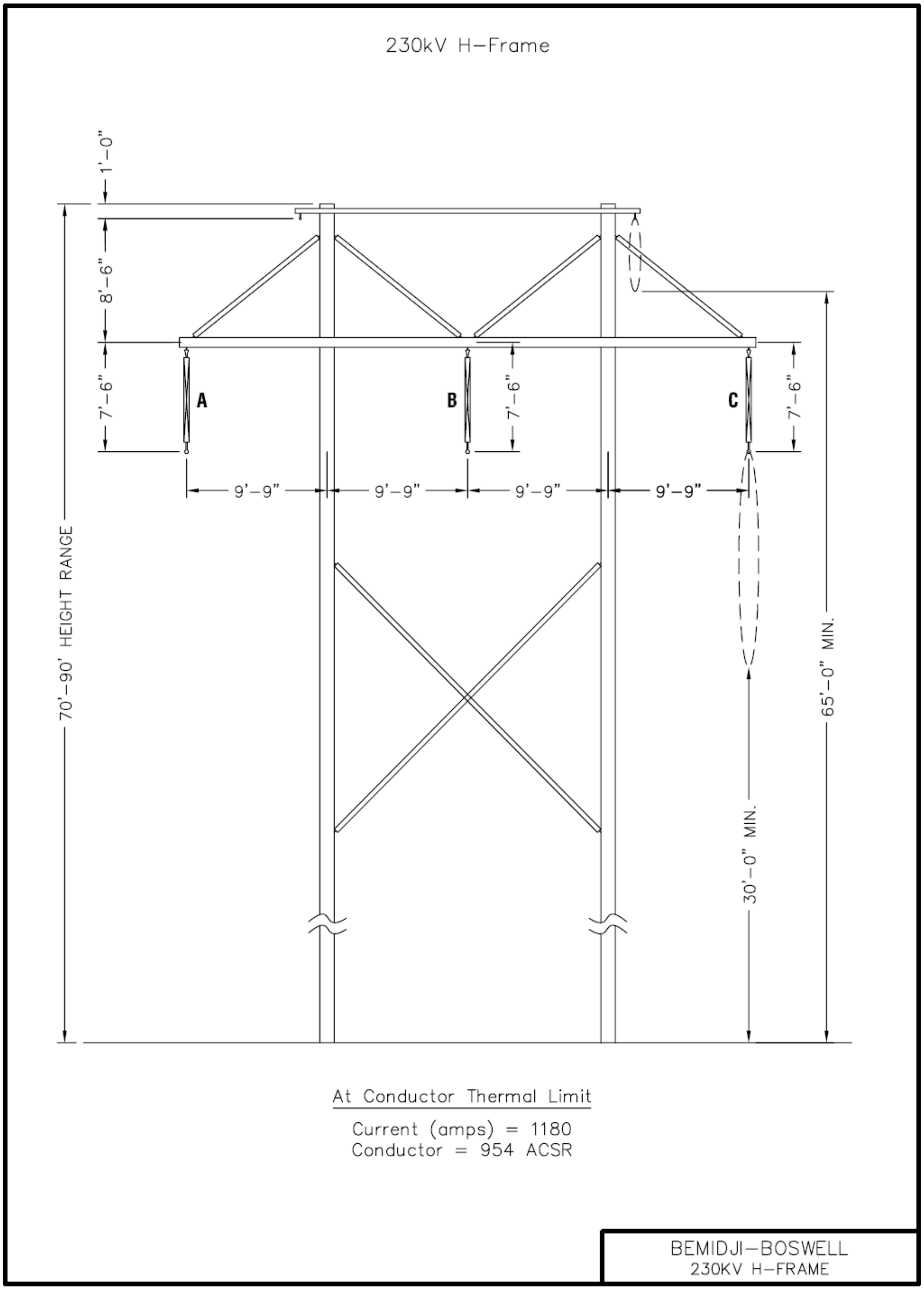


Figure 2-5: Typical 230 kV Single-Pole Structure

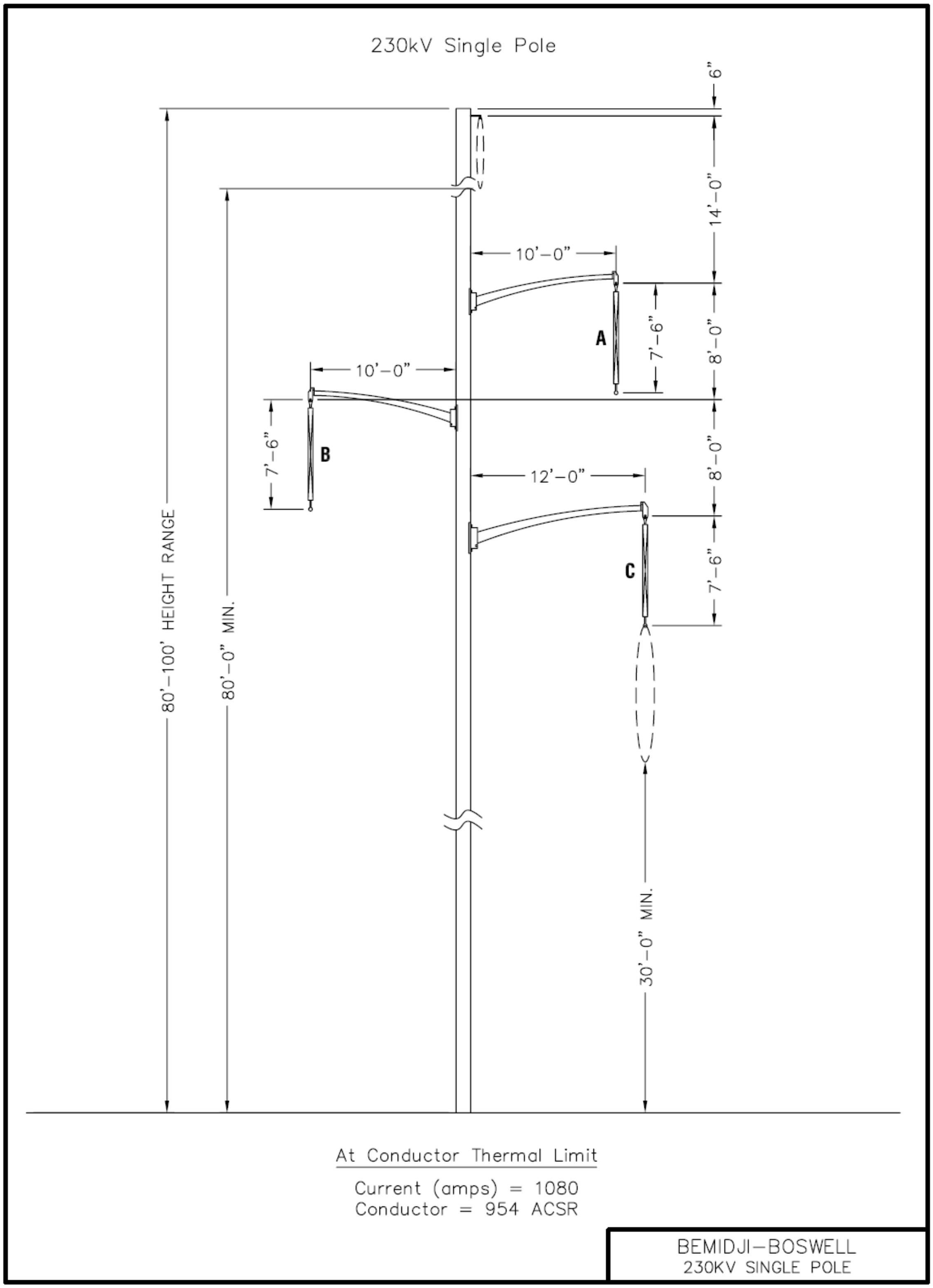


Figure 2-6: Typical 3-Pole Guyed Structure

Figure 2-3 Typical 230 kV Three Pole Dead-End

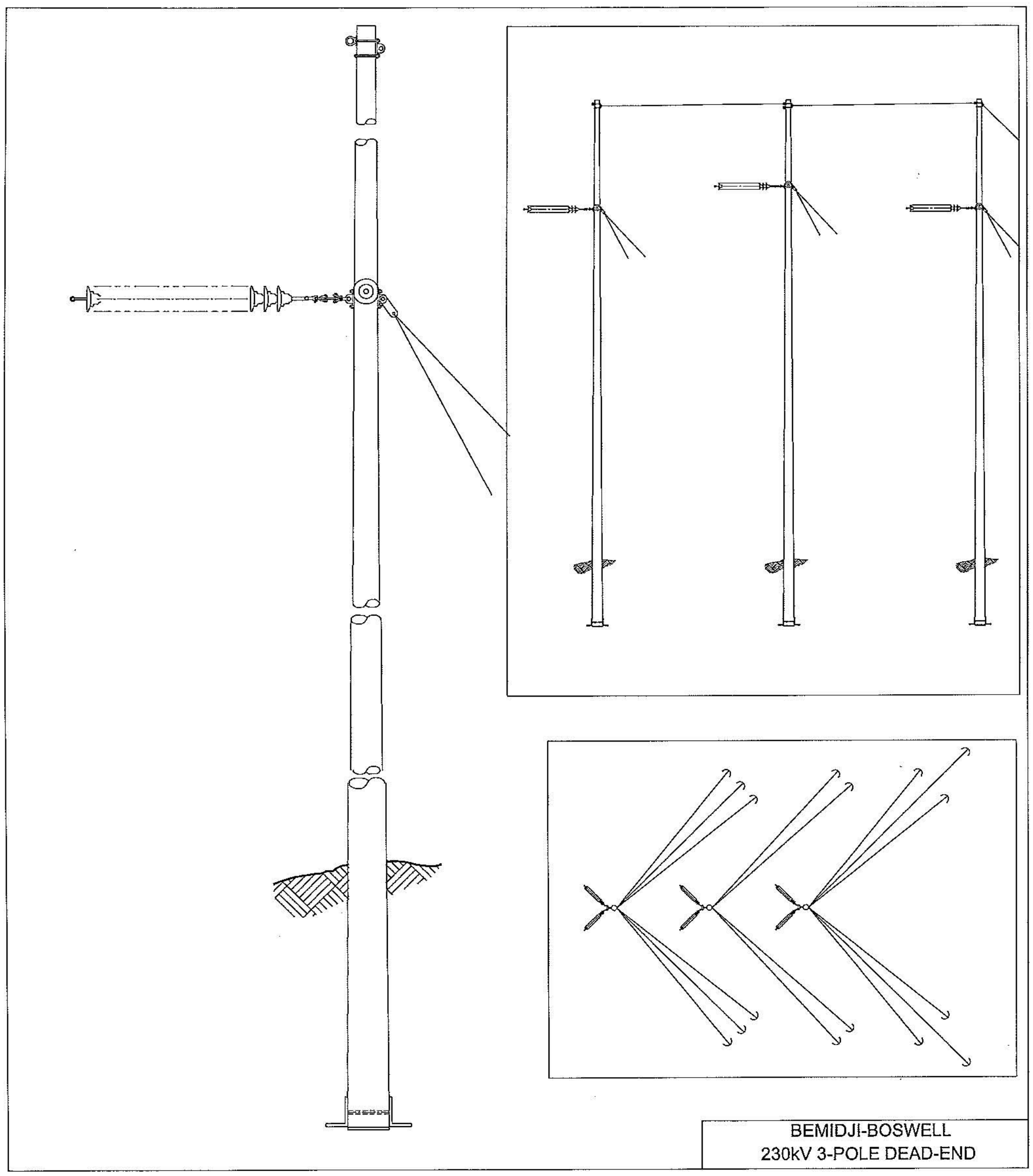


Figure 2-7: Typical 230/115 kV Single-Pole Double-Circuit Structure

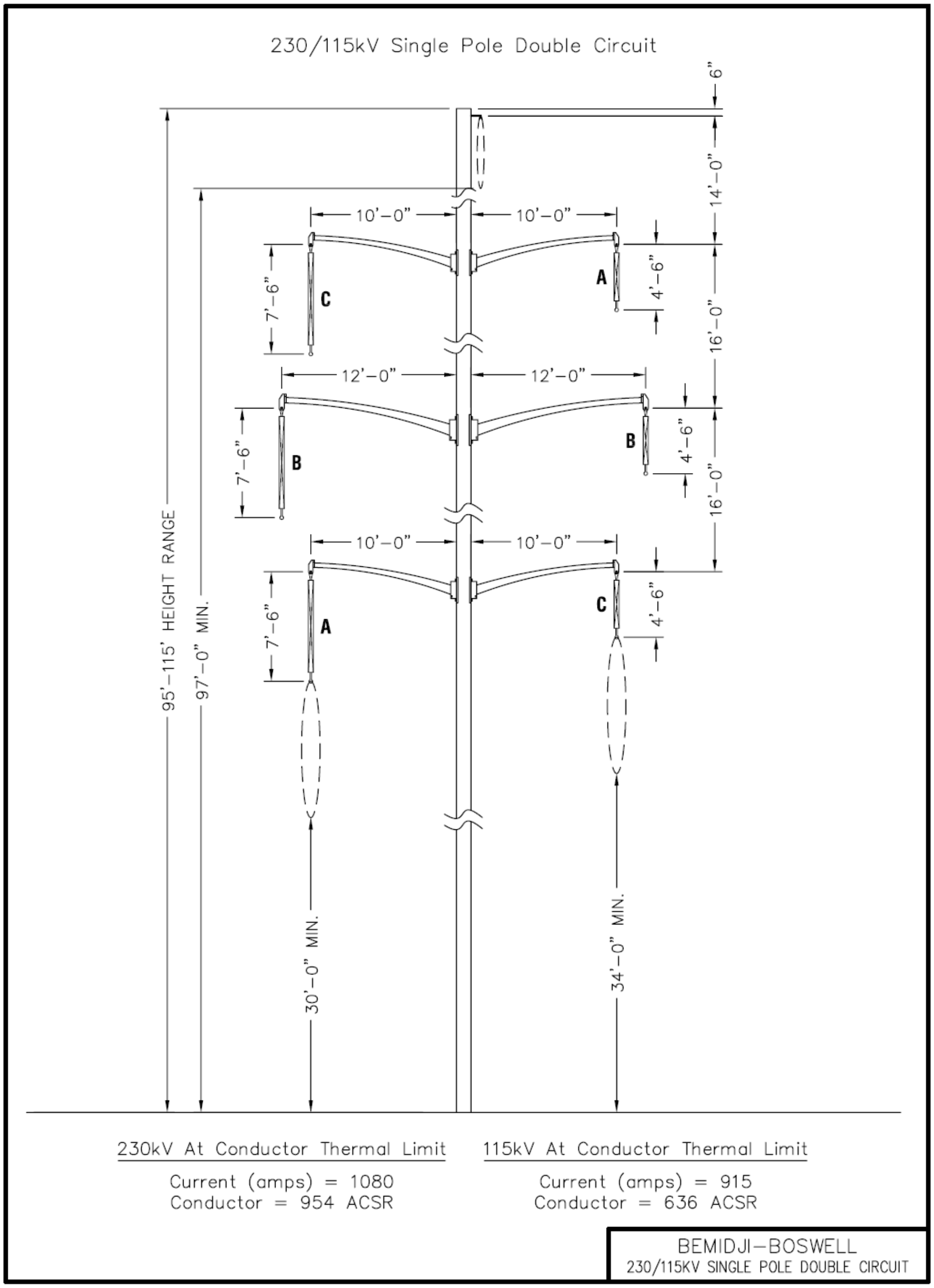
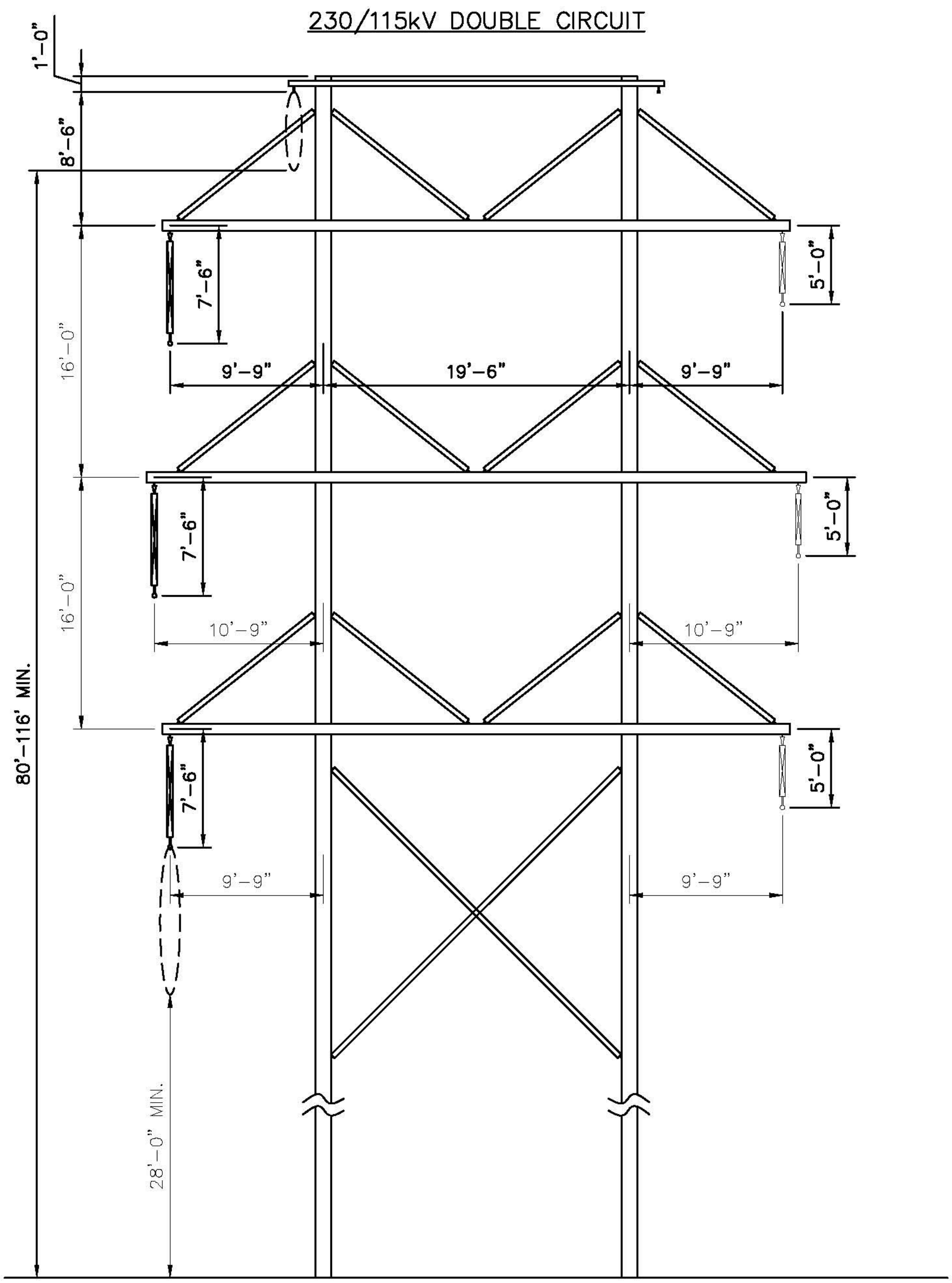


Figure 2-8: H-Frame 230-115/69 kV Structure



2.4.2. Substation Design

The Project would require modifications to the Wilton Substation near Bemidji and the Boswell Substation near Grand Rapids. Without reinforcing the Cass Lake area system, certain contingencies on the transmission system would still result in the Cass Lake area being separated from the Bemidji-Grand Rapids Line source at the Wilton Substation. The Applicants have already undertaken certain improvements to the transmission system in the Cass Lake area which should address the situation in the short-term. Depending upon routing and double-circuit determinations, a new or expanded substation in the Cass Lake area and breaker station at Nary Junction may also be required, as addressed in Sections 2.4.2.3 and 2.4.2.4. Impacts from the substation improvements are discussed in Section 3. Schemtics of the substation improvements are shown in Appendix H.

2.4.2.1. Wilton Substation

Project modification of the existing Wilton 230 kV Substation would not require physical expansion beyond the limits of the existing fenced perimeter. The Wilton Substation is located in a rural area east of Bemidji. Two new 230 kV breakers and a line termination structure would be added as a result of the Project, along with modifications to the existing 230 kV buses and relay panels. The Project would also require completion of a new ring bus section, as well as five new 230 kV switches with foundations, steel structures, and control panels. All of the proposed improvements would be similar in size to existing structures; changes to height and visibility are not anticipated.

2.4.2.2. Boswell Substation

The Project would require expanding the existing Boswell 230 kV Substation by approximately 1.3 acres. The Boswell 230 kV Substation is part of the Boswell Generation Plant and is located on land owned by Minnesota Power; no land procurement is required to accommodate the expansion. The land use at the substation site is industrial, in keeping with its location near the Boswell Generation Plant. The substation additions for the Project would be very similar to the existing Boswell 230 kV Substation. The design would have a similar footprint and height. The following modifications are proposed: 230 kV buses and relay panels; a new 230 kV breaker; and a half bay would be added to the substation. This would involve installing two new 230 kV circuit breakers and 230 kV dead-end structures, a new 230 kV bus, five new 230 kV switches, and associated foundations, steel structures, and control panels. The Boswell Plant and property is on a private road (a section of old MN Highway 6 now owned by Minnesota Power) about 0.75 mile from U.S. Highway 2 and no change in public visibility is anticipated.

2.4.2.3. New or Expanded Substation in the Cass Lake Area

Under Route Alternative 1 (Figure 2.2-1), a new 230 kV substation would be constructed near Cass Lake (Figure 2.2-1b). The new substation would be designed and constructed with a 230 kV three-breaker ring bus with 230 kV line switches. The facility would include a 230/115 kV transformer of approximately 187 MVA that steps down the voltage to a 115 kV three-breaker ring bus to reliably establish a connection to the existing Nary Junction–Cass Lake 115 kV line. The new substation would also require a control house, relay panels, foundations, steel structures, and switches. The substation yard would be approximately 500 by 500 feet of fenced yard and would require access roads. The cost for equipment and construction is estimated to be $5.5 million. Potential locations for a new substation are identified in Section 2.2.

Under Route Alternative 2, the existing Cass Lake 115/69 kV Substation, located in Section 17 of Pike Bay Township (Township 145N, Range 31W) in Cass County, would be upgraded and expanded to include to 230 kV capability. The existing substation would be expanded approximately 320 feet to the west on land currently owned by Otter Tail Power Company. The estimated substation expansion area is approximately 2.2 acres. The new 230 kV equipment would include a 230 kV three-breaker ring bus with line switches, a new 230/115 kV transformer (~187 MVA), and associated 115 kV facilities to integrate this transformer into the existing equipment. It is expected that a new 115 kV four-breaker ring bus with switches would be installed to connect into the 115 kV line back to the Nary Junction, up to the 115 kV line serving Enbridge pumping station load, and into the existing 115/69 kV transformer. Due to the addition of new 230 kV equipment and associated protection facilities, the substation would require a new control house, relay panels, foundations, steel structures, and switches. The existing substation would remain energized during and after the expansion to serve local loads. The estimated cost of the equipment and construction is $5 million.

Under the No-Build Alternative and Alternative 3, no improvements to the load serving capability in the Cass Lake area and no new substation or substation improvements would occur. If Segment Alternatives A and D are used in conjunction with Route Alternative 1, there would be no substation expansion or construction in the Cass Lake area.

2.4.2.4. Nary Breaker Station

If Segment Alternative A is used, a new Nary 115 kV breaker station would be located adjacent to the existing Nary Switch, at the intersection between the existing Nary to Cass Lake 115 kV, the Bemidji to Nary 115 kV, and the Nary to LaPorte 115 kV transmission lines (Guthrie Township, T144N, R33W). The Nary 115 kV Breaker Station would be located on a site of approximately 2.5 acres and consist of a fenced area of approximately 225 by 225 feet, with an additional cleared area of approximately 100 feet around the perimeter. The breaker station would consist of three 115 kV circuit breakers and associated switches, communications, relay and control equipment, three 115 kV line termination structures, and a control house. An improved access road and small parking lot would also be required to move equipment to the site. The estimated cost of the Nary Breaker Station is $2.6 million

2.4.3. Property Acquisition

Construction of the Project would require acquisition of easements for the transmission line portion of the Project and for the land for a new Cass Lake Substation (under Route Alternative 1) and a Nary Substation (under Route Alternative 1 when used in conjunction with Segment Alternative A).

2.4.3.1. Transmission Line Right-of-Way Acquisition

Following issuance of a Route Permit by the Commission, the Applicants would begin the process of acquiring easements for the location and construction of Project. The right-of-way agent would complete a search of the public records of all lands involved with the Project. A title report would be developed to determine the legal description of the property, the owner(s) of record for the property, and information regarding easements, liens, restrictions, encumbrances, and other conditions of record.

Because of the numerous notices published and mailed as well as the public meetings held during the Applicants' development of the Project and the environmental review of the Project, and the hearings held in the Project area as part of the Minnesota route permitting process, it is likely that the majority of landowners would be aware of the Project prior to contact from a right-of-way agent. Once the property owners along the approved route have been identified, a right-of-way agent would inform them of the construction of the transmission line and how it may affect their property. With a property owner's permission, survey crews would enter the property to complete the preliminary survey work and possibly conduct soil investigations for structure location. As the design of the transmission line nears completion, the survey crews would stake the structure locations. The right-of-way representative would show the landowner where the structure was proposed to be located on the property and would discuss any location concerns.

During the acquisition process, the property on which easement rights were required would be evaluated by the agent to determine the amount of just compensation. In the event that a complicated appraisal problem arises, or if a statutory requirement dictates, the Applicants' right-of-way agent would arrange for an appraisal to determine the value of the rights being acquired. Circumstances requiring an appraisal include land that has mining interests, business interests or recreational opportunities, or if condemnation is required. A third party appraisal is generally not used unless there is a dispute over the value of the land. The Applicants would then make an offer to the owner based upon the appraisal.

The right-of-way agent would begin the negotiating process by presenting the required legal documents to the property owner. Property owners would also be provided maps of the transmission line route or site showing the landowner's parcel. The offer of compensation for an easement or for purchase of the property would be explained as requested, and the landowner would be allowed a reasonable amount of time in which to consider the offer, obtain their own appraisal, and present information the owner believes is relevant to determining the value of the property.

The agent would work closely with the landowner to try to arrive at a negotiated settlement that is fair and acceptable to all parties. In most cases, right-of-way agents are able to work with the landowners to address their concerns. In some cases a negotiated settlement is not possible and the Applicants may choose to obtain the ROW by exercising their right of eminent domain (condemnation). Condemnation proceedings would only be initiated by the Applicants if reasonable efforts to negotiate an agreement at what is believed to be just compensation have failed.

Minnesota Statute 216E.12, subd. 4 (sometimes referred to as the "buy the farm" provision) allows landowners of certain classes of land (e.g., homestead, agricultural, or seasonal residential recreational, as defined in Minnesota Statute 273.13) the option of requiring the Applicants to purchase the owner's entire property if the transmission line crosses a portion of the property.

2.4.3.2. Substation Property Acquisition

No additional land is needed for the proposed 230 kV upgrades at the Wilton and Boswell substations, or the possible 230 kV upgrade at the Cass Lake Substation. However, land must be acquired if the route selected requires a new 230 kV substation in the Cass Lake area (for Alternative 1) or the Nary Breaker Station (if Route Alternative 1 is used in conjunction with Segment Alternatives A and L). If the final route permit requires the construction of a new Cass Lake 230 kV Substation or a Nary Breaker Station, the Applicants would contact the appropriate landowners to obtain the property. The Applicants would seek to obtain the property through a voluntary purchase, and if an agreement could not be reached, would consider exercising their right of eminent domain. The "buy the farm" provision of Minnesota Statute 216E.12, subd. 4, would also apply to any substation permitted as part of the Commission's Route Permit.

2.4.4. Preconstruction Activities

Preconstruction activities include preparation and approval of the Certificate of Need and the Route Permit applications, completing the required environmental review, coordinating and obtaining all other necessary permits and approvals, and acquiring ROW easements.

2.4.5. Transmission Line Construction Procedures

Once access to the land is granted, preparation of the ROW for construction begins in coordination with landowners. Underground utilities would be identified and located in cooperation with local utility companies to minimize conflicts with the existing utilities along the route. If necessary, the Applicants would work with local utility owners to relocate existing utilities.

Up to three staging areas of approximately 5 acres each would be established for temporary storage of materials and equipment once a route is chosen, in consultation with local landowners and consistent with local, state, and federal permit requirements. A previously-disturbed or developed area is typically used to minimize impacts to sensitive resources. Such an area includes sufficient space to lay down material and pre-assemble some structural components or hardware. Other staging areas located along the ROW are limited to a structure site for lay down and framing prior to structure installation. Stringing setup areas are also used to store conductors and the equipment necessary for stringing operations.

Preparation for construction begins with development of temporary access points from existing roads. Clearing of all woody vegetation and brush within the 125-foot-wide ROW would be required to facilitate the safe and efficient construction, operation, and maintenance of the transmission line. A reasonably level temporary access path is required to provide for safe passage of construction equipment within the ROW. At structure locations, a stable working surface free of tripping hazards is required for framing and erecting structures, and for the installation of concrete foundations if required.

Vegetation would be cut at or slightly above the ground surface. Rootstock would be left in place to stabilize existing soils and to regenerate vegetation after construction. With the approval of the landowner or land manager, stumps of tall-growing species would be treated with an approved herbicide to discourage re-growth. Within the CNF, alternative means of stump control would be identified in consultation with the land managers.

The CNF would require a timber sale for merchantable timber. Merchantable timber is typically cut to standard log lengths and temporarily stacked along the ROW until transport. Vegetation clearing debris (e.g., unmerchantable trees, brush, and slash) may be cut and scattered, placed in windrow piles, chipped, or burned, depending upon the location and requirements of the land manager or land owner. Material suitable for firewood may be collected and made available to local residents.

To minimize the potential for tire and chassis damage to construction equipment, and to maintain a safe, level access path and structure installation area, incidental stump removal would occur. Stumps that interfere with the placement of mats or movement of construction equipment would be ground down to a point at or slightly below ground level. The stump grinding equipment would mix woody material with soils. This mixture would be evenly spread in the vicinity of the stump to a depth that would allow existing low-growing vegetation to re-establish.

If temporary removal or relocation of fences is necessary, the installation of temporary or permanent gates would be coordinated with the landowner. The right-of-way agent would also work with landowners for early harvest of crops, where possible. During the construction process, the Applicants may ask the property owner to remove or relocate equipment and livestock from the ROW.

Transmission line structures are generally designed for installation at existing grades. However, if vehicles or installation equipment cannot safely access or operate near the structure, minor grading of the immediate terrain would be performed to provide a reasonable level working surface for construction and maintenance of the structure.

Environmentally sensitive areas or areas susceptible to soil erosion would require special construction techniques, including the use of low ground pressure equipment, timber mats, terracing, water bars, bale checks, rock checks, or temporary mulching and seeding of disturbed areas exposed during long periods of construction inactivity. Long-term soil erosion control measures may include permanent seeding, mulching, erosion control mats, or other measures depending on site conditions. Temporary silt fences, sedimentation ponds, and other measures may be utilized to prevent sediment from running off into wetlands or other surface waters.

Construction equipment would be inspected frequently to ensure hydraulic systems and oil pans are in good condition and free of significant leaks. Portable spill containment kits would be required for each piece of construction equipment with the potential to discharge a significant amount of oil to the environment. Operators would be present at the nozzle at all times when refueling is in progress. In the event of a spill, the source of the spill would be identified and contained immediately upon discovery. The spill and contaminated soils would be collected and treated and disposed of in accordance with all applicable federal, state, and local requirements. If a significant spill were to occur to surface waters, methods to contain and recover released material such as floating booms and skimmer pumps would be used. Noticeably contaminated soils would be excavated and placed on and covered by plastic sheeting in bermed areas. An emergency response contractor would be secured, if necessary, to further contain and clean up a severe spill. Refueling of equipment in proximity to sensitive resources, such as lakes and wetlands, would not be permitted.

In the event that protected species or cultural and historical artifacts are likely to be encountered during construction activities, project management personnel would consult with regulatory authorities regarding appropriate construction procedures and mitigation measures.

Construction materials would be hauled either directly from the local highway or railroad network to structure sites, or brought first to material staging areas and then to the structure sites. The transmission line components, including the poles, arms, and hardware, are normally brought to the temporary staging areas on flatbed trucks. These materials are stored until needed and then loaded on flatbed trailers or special pole trailers for delivery to the structure site where they are unloaded for installation.

A stable working surface is required at structure locations. Timber mats are commonly used to provide a working surface in unstable soils. Structures are normally assembled on the ground along with insulator assemblies ropes and then raised into position. For direct embedded structures, the poles are set in augured holes with large rubber-tired or tracked cranes. The annular space between the pole and the augured hole is backfilled with native soils if suitable or with granular materials.

Where reinforced concrete foundations are required, large rubber tired or track mounted auger equipment is used to excavate a circular hole of the appropriate diameter and depth. In upland areas, excavated material would be spread evenly around the structure base to promote site drainage. Reinforcing steel and anchor bolts are set in position. Ready-mixed concrete is then placed in the excavation. In wetland areas, a telescoping temporary steel caisson would be placed in the foundation hole to stabilize the soil walls. Concrete is placed in the excavation. Water pumped from the excavation would be placed into tanker trucks or empty concrete trucks and hauled away to a specially designated upland disposal area, or brought back to the concrete batch plant for discharge. Concrete truck wash water would be discharged only in specially designated upland disposal areas or at the concrete batch plant.

After the concrete is poured, the steel caisson is removed. In some situations, a permanent caisson may be required to stabilize the excavation. During drilling, a minimal amount of granular material (from an outside source) would be placed in the area between the caissons and the timber mats (if required at that location) to provide safe footing for construction personnel. During final restoration, the granular material is leveled or removed to restore the original ground contours for re-vegetation of native species. After the foundation concrete is placed, excess excavated materials would be transported to a suitable upland site by truck for disposal, in compliance with local, state, and federal requirements. After allowing adequate curing time, the steel pole structure base plates are bolted to the concrete foundations.

The wire stringing process starts in a setup area prepared to accommodate the stringing equipment and materials, normally located mid-span on the centerline of the ROW. The rope machine, new conductor wire trailers, and tensioner are located at the wire stringing set-up area. This phase of construction occurs after the structures have been erected, and fitted with stringing blocks (also called dollies or sheaves) and with single-leader "p-line" ropes that reach the ground. Stringing blocks are a type of pulley that attach to the insulator assembly and temporarily support a pulling rope or "p-line" and a wire rope or "hard line," which in turn supports the conductor before it is permanently "clipped in."

The process starts as the construction crew pulls the p-lines toward the first structure beyond the setup area. The p-lines are normally pulled down the ROW with a small wide-track bombardier or other small equipment. At each structure, the ropes are detached from the bombardier and attached to the single leader p-line to lift the ropes up into the dollies. Then the ropes are reattached to the bombardier and driven to the next structure for the same process. After the p-line has been strung through all the structures for all phases within the stringing interval, the pulling ropes are attached to a hard line and pulled, one at a time, back through the dollies to the beginning of the interval. A hard line set-up is located at the opposite end of the interval from the wire stringing setup area. Each hard line is then attached to the conductor wire with an attachment called a "sock," which is pulled back through the dollies to the end of the interval. Crewmembers travel along the access route in a pickup truck and follow the "sock" as it is being pulled to make sure it does not get hung up in the dollies. One at a time, the conductor wires are then pulled to the appropriate tension and clipped into place utilizing permanent suspension hardware.

Wire stringing and hard line set-up areas are normally located in upland areas during spring, summer, or fall conditions. During winter when frozen conditions provide a stable working surface, set-ups may be located in wetland areas. If set-ups in wetlands are required when surface conditions are not stable, extensive use of timber matting is required. All activities associated with jurisdictional wetlands would be conducted in accordance with local, state, and federal (i.e., USACE) regulations and permitting.

Spanning streams and rivers by placing structures above the normal high water level is the most effective means to minimize impacts to water areas during construction. In general, construction equipment is not permitted to be driven across waterways except under special circumstances, and then only after discussion with the appropriate resource agency. Where waterways must be crossed by construction equipment, the Applicants would use temporary clear span bridges to minimize the impact on the waterway. For those waterways that cannot be crossed with construction equipment, workers might walk across or use boats during wire stringing operations to pull in the new conductors and shield wires or in the winter drive equipment across the ice. In areas where construction occurs close to waterways, appropriate measures would be employed to minimize soil erosion and prevent sedimentation of the waterways. The Applicants would ensure that equipment fueling and lubricating occur at locations that prevent contamination of waterways.

2.4.6. Substation Construction Procedures

The substation upgrades involve adding new equipment, modifying existing equipment, or replacing existing equipment with new equipment. All construction work for the Wilton, Boswell, and the possible upgrading of the existing Cass Lake substation would occur within the existing substation property. Construction work on a new possible Cass Lake Substation and Nary Breaker Station would occur on newly acquired property.

The substations would be built or upgraded in compliance with the applicable requirements of the National Electrical Safety Code (NESC), Occupational Safety and Health Act (OSHA), and state and local regulations. The final design of new or upgraded substations would take the local conditions of the sites into consideration and, where warranted, would include safety provisions beyond the minimum requirements established in the various applicable safety codes. Contractors would be required to adhere to all such safe working practices. The new and upgraded substations would be designed to allow future maintenance to be done with minimum impact to substation operation and with the necessary clearance from energized equipment to ensure safety.

Construction of a new substation or breaker station, as well as expansion of existing substations, would include site grading, installation of concrete foundations for substation equipment, installation of a fence along the substation perimeter to contain substation equipment and secure the facility, installation of gravel surfacing material within the fenced area, and installation of substation equipment. Sites for a new substation, substation expansion area, or breaker station would be graded and leveled to ensure both a stable base for the substation equipment and proper drainage and runoff control in accordance with the Stormwater Pollution Prevention Plan. Depending upon soil characteristics specific to each site, soil may need to be replaced to ensure stability and drainage. Topsoil would be removed, stockpiled, and re-spread on-site. Excess soil would be removed from the site. Once the site is graded, a perimeter fence, typically a chain link fence, is installed to contain the substation equipment. After installation of the fence, concrete foundations are placed to support the substation equipment and gravel is laid throughout the fenced area. After the surface area is prepared, substation components would be delivered on tractor-trailer trucks and installed on their foundations.

2.4.7. Restoration Procedures

Unless otherwise agreed upon by the landowner, all storage and construction buildings, including concrete footings and slabs and all construction materials and debris, would be removed from the site once construction is complete. Post-construction reclamation activities involve restoring the areas to their original condition to the extent practicable, including removing and disposing of debris; removing all temporary facilities, including staging and laydown areas; employing appropriate erosion control measures; and reseeding areas disturbed by construction activities with vegetation similar to that which was removed. Seed mixture would be certified as free of noxious or invasive weeds. In cases where soil compaction has occurred, the construction crew or a restoration contractor uses various methods to alleviate the compaction, or as negotiated with landowners.

Once post-construction reclamation is completed, landowners are contacted by the right-of-way agent to determine if the clean-up measures have been finished to their satisfaction and if any other damage may have occurred. If damage has occurred to crops, fences, or the property, the Applicants would negotiate with the affected landowner, under terms outlined in the easement agreement, to determine an acceptable compensation for the damage. Depending upon the wishes of the landowner, compensation may be monetary or may involve hiring a contractor to restore the damaged property as near as possible to its original condition.

2.4.8. Transmission Line Maintenance and Operation

Access to the transmission line ROW is required to perform periodic inspections, conduct maintenance, and repair damage. Regular maintenance and inspections would be performed during the life of the transmission line to ensure its continued integrity. Inspections would be limited to the ROW and to areas where obstructions or terrain may require off-right-of-way access. All inspection and maintenance activities would be conducted consistent with local, state, and federal regulations and permits. If problems are found during inspection, repairs would be performed and the landowner would be compensated for any loss.

The ROW would be managed to control vegetation that interferes with the operation and maintenance of the transmission line. Portions of the Project route would be in forested areas, requiring tree maintenance to maintain the integrity of the transmission line. Native shrubs that would not interfere with the safe operation of the transmission line would be allowed to reestablish in the ROW. The Applicants' practice provides for the inspection of major transmission lines every year to determine if clearing is required. Other transmission lines are typically reviewed on a two-year cycle. Right-of-way clearing practices include a combination of mechanical and hand clearing, along with herbicide application where allowed, to remove or control vegetation growth. Noxious weed control with herbicides would be conducted on a two-year cycle around structures and anchors, where approved for use and consistent with the Applicants approved operation and maintenance plans for private and public (i.e., CNF, MnDNR, and County) lands.

2.4.9. Substation Maintenance and Operation

Inspections would be performed regularly over the life of the substations to maintain equipment and make necessary repairs. Routine maintenance would be conducted as required to remove undesirable vegetation that may interfere with the safe and reliable operation of the substations.

2.4.10. Construction Schedule and Workforce

The Applicants require an in-service date of December 2011. Project construction would commence once the permitting and final design is completed. The anticipated construction schedule and workforce requirements are shown in Table 2-4.

Table 2-4: Construction Schedule and Workforce Estimates

Task	Schedule	Workforce
Permitting	January 2007 - Summer 2010	27*
Land Acquisition	Spring 2010 - Fall 2010	6
Project Design	January 2010 - Fall 2011	6
Project Construction	Fall 2010 - Fall 2011	75
In-Service Date	December 2011	N/A

Note: * The Applicants have 15 persons assigned to work on the Project (i.e., utility staff and engineering/environmental/legal consultants), with another 12 persons retained to conduct biological/archeological field work.

2.4.11. Future Plans and Abandonment

The expected lifespan for the Project is over 50 years, provided that the Project's components are maintained. If the Project were to be abandoned, transmission structures would be removed, substation components would be removed and, without vegetation management along the transmission ROW or substation sites, surrounding vegetation would reclaim the area disturbed by the Project. In practice, transmission lines are seldom abandoned.

3. Affected Environment, Impacts, and Mitigation

This section describes the environmental setting as it relates to each alternative considered under the proposed Project. The resources and environmental settings included for analysis within this section were identified during the scoping process for the Project. The following subsections are divided into discussions about the affected environment, potential direct and indirect impacts from the Project, and potential mitigation measures.

The discussion of affected environment describes the resources and environmental settings found in the Study Area. For purposes of analysis, the Study Area is defined as the generally 1,000-foot wide route proposed for each of the build alternatives (Route Alternatives 1, 2, and 3 and their associated Segment Alternatives A through T).

The discussion about direct and indirect impacts describes the potential effects from the Project alternatives, including the No-Build Alternative. For each of the Route Alternatives, the Applicants identified a feasible 125-foot wide Right of Way (ROW) that could be located within the 1,000-foot wide route. Analysis of direct and indirect impacts was conducted assuming the placement of the feasible 125-foot wide ROW identified by the Applicants. For those Segment Alternatives for which a feasible ROW has not been identified, analysis was conducted assuming the placement of the ROW along the centerline of the 1,000-foot wide route. A comparison of the Project alternatives is presented in Section 5, Comparison of Alternatives.

The actual location and width of a ROW for the Project is unknown at the time this document was prepared, and will be determined in the Commission's High Voltage Transmission Line (HVTL) Route Permit for the Project.

The potential effects of the Project on resources within the boundaries of the Leech Lake Reservation and Chippewa National Forest are described separately for each resource, to identify unique potential impacts to those geographic areas.

The mitigation discussion provides potential measures to reduce or eliminate anticipated direct and indirect impacts identified for each resource area. Mitigation measures are not discussed for identified potential direct and indirect effects that are either not anticipated to occur under construction or operation of the Project or are anticipated to result in a positive effect. The mitigation discussion includes typical High Voltage Transmission Line (HVTL) permit conditions issued by the Commission, mitigation strategies proposed by the Applicants in the Application for a Route Permit, and additional mitigation measures that may be warranted. For mitigation measures that have been proposed or agreed to by the Applicants, the text specifies that these mitigation measures "would" occur. For all other mitigation measures, including those that may be required by the HVTL permit or imposed by regulating agencies, the text specifies that these mitigation measures "could" occur.

3.1. Aesthetics

This section provides information about the existing visual landscape in the Study Area and describes identified scenic areas and sensitive visual receptors. For the purposes of this analysis, the Study Area is comprised of each of the 1,000-foot-wide Route Alternatives and Segment Alternatives. The potential aesthetic impacts would occur to viewers (e.g., residents, historical users of the Study Area, recreational users, and those traveling on area highways and roads) that could view the newly cleared Project right-of-way (ROW) of up to 125 feet and associated transmission line structures from within and outside of the Project ROW. For purposes of analysis, potential impacts to the ROW were calculated using the feasible 125-foot ROW identified by the Applicants for each of the Route and Segment Alternatives. The focus of this analysis is placed upon visual experiences, which are the ways in which people view the landscape. The active recreational use of these resources is discussed within Section 3.13, Recreation and Tourism.

Potential impacts of each of the Route and Segment Alternatives were evaluated based upon two methods, overall impacts to visual resources/users and to Chippewa National Forest (CNF) scenic integrity objective (SIO) classifications. With the former method of analysis, visual simulations were evaluated for the Study Area. The Applicants commissioned a visual impact assessment in 2008 that incorporated methods commonly used by the Minnesota Department of Transportation (MnDOT) for linear projects. For that assessment, the MnDOT Visual Impact Assessment (VIA) process was augmented to include VIA techniques developed by the Federal Highway Administration (FHWA) and scenic management practices developed by the USFS (FHWA, 1981; MnDOT, 2009d). As part of the visual impact assessment, visual simulations of the Project's potential infrastructure were created. The visual simulations were used to determine the effects of the Project, which include whether or not residents and visitors to the Project area would be able to see the transmission lines and other infrastructure from common vantage points (see Appendix E). As indicated in Section 2.4.1, Transmission Design, the typical structure material would be either wood or steel. The visual simulations appear to utilize a wood structure. Where available, photographs are provided to analyze typical urban/highway settings within the Study Area, locations within an existing utility ROW for transmission lines and/or a pipeline, and in locations where a new ROW would have to be created for the Route Alternatives.

For the second method, the U.S. Forest Service (USFS) *Handbook for Scenery Management* and the concept of "landscape visibility" discuss the relative scenic importance of locations within the Study Area. The CNF SIO classifications were used to classify visual resources for the alternatives both within and outside of the CNF. The definitions of high, moderate, and low SIO values were used within a geographic information systems (GIS) program to determine the percentage of each Route and Segment Alternative located within an area of a particular SIO value. The GIS program also matched the existing land cover and use to the various categories to determine the amount of land acreage with High, Moderate, and Low SIO values.

The model also was extrapolated and applied to the Study Area outside of the CNF. For Route Alternatives of outside the CNF, the following categories were evaluated:

- High SIO: U.S. and MN roads, Lakes with Public Access, the Mississippi River, the Paul Bunyan Trail, and the Heartland Trail;
- Moderate SIO: County State Aid Highways and Municipal Areas; and
- Low SIO: All areas not identified according to the aforementioned criteria (Otter Tail Power et al., 2008a).

Determining the potential impacts to the SIO ratings is difficult to do because the ratings are based upon the overall characteristic of an entire roadway, landform, location, or in the case of the CNF, a management area. Therefore, as described in Section 3.1.2, it could only be stated the Route Alternatives generally would not directly alter the overall SIO rating of a particular resource, the impacts would be localized and would be minimal in scale. For instance, Route Alternatives 1 and 2 cross the Mississippi River west of Ball Club, but the overall SIO value of this resource (i.e., the Mississippi River) would not be impacted, because only a minimal portion of the river's total length would be affected by the construction and operation of the Project.

3.1.1. Affected Environment

The area in northern Minnesota that the Route and Segment Alternatives cross tends to be positively valued for the "scenic" quality of its forests, lakes, and unique natural resources. These landscapes are often viewed from individual homes by residents in the area. For visitors, these landscapes are typically experienced from the vantage point of a road, trail, or body of water. United States highways, state highways, large bodies of water, and municipal areas are the most frequently used vantage points within the Study Area. Additional information about these types of resources is provided in Section 3.13, Recreation and Tourism. Section 3.13 provides information about both the active and passive uses of resources located within the Study Area.

This section describes the current conditions within the Study Area and provides assessments of the existing scenic character and viewer sensitivity in the Study Area. It includes a general overview of the alternatives, specific information for each alternative, and a brief overview of the Chippewa National Forest.

3.1.1.1. Overview of the Study Area

The Study Area consists of a mixture of forested areas, with areas of residential settlement and agriculture. The Project also would require crossing of the Mississippi River, and would cross or pass near a number of other water bodies and recreational trails, important focuses of recreational use throughout the Study Area. The area is crossed by transportation and utility corridors, including U.S. Highway 2, county roads municipal roads, forest roads, pipelines, transmission lines, and railroads. Important characteristics of these users and features are highlighted below.

Outside of the CNF, many of the forests have been fragmented by development and may not offer a landscape that is as visually "complete" as the CNF. The Study Area outside of the CNF tends to be more densely populated than the CNF Study Area. Despite these differences, the Study Area outside of the CNF has some areas of high scenic integrity, including areas near Bemidji, Cass Lake, and Nary, and at the eastern terminus near Deer River and Zemple.

Portions of three highways withn the Study Area have received special designations because of their importance as aesthetic resources, the Great River Road National Scenic Byway, the Ladyslipper National Forest Scenic Byway and Minnesota Scenic Byway, and the Avenue of the Pines Minnesota Scenic Byway. Scenic byways are designated by federal or state agencies because of their intrinsic qualities including scenic, cultural, recreational, natural, historic, and archaeological characteristics.

Overall, U.S. Highway 2 serves as a major commercial corridor and supports oversized loads. However, portions of U.S. Highway 2 have been designated as the Great River Road National Scenic Byway, as discussed in Section 3.19, Traffic and Transportation. The Great River Road travels from Lake Itasca, through Cass Lake, near the communities of Bena and Ball Club, to the Mississippi River, and then parallels portions of the Mississippi River (MRPC, 2009). Cass County Road 10/39 also is designated by the USFS as a National Forest Scenic Byway and by the State of Minnesota as the Ladyslipper Scenic Byway (Ladyslipper Scenic Byway, 2009). Also, Minnesota (MN) Highway 46, between Deer River and Northome, is designated as the Avenue of the Pines Minnesota Scenic Byway (MnDOT, 2009a).

The Mississippi River runs through the Study Area. Although the portion of the Mississippi River in the Study area does not have special status, it is an important part of the area's identify. The Big Fork River is located within Itasca County northeast of Dora Lake, outside of the Study Area. The Big Fork River is an Eligible Scenic River within the Wild and Scenic River Federal designation system (USDA, 2004). This river runs to the north of Route Alternative 3. Route Alternative 3 crosses Bowstring River, a downstream tributary of Big Fork River (between milepost [MP] 3-66 and 3-67). .

Table 3.1-1 provides a general description of each Route Alternative, including its length, roadway inventory, and general characteristics of the visual resources included within the routes.

Table 3.1-1: Route Alternatives Comparison Table

		No-Build Alternative	Route Alternative 1	Route Alternative 2	Route Alternative 3
Roadway Inventory	**Total length**	0 miles	69 miles	68 miles	116 miles
	Distance Route Alternative parallels highway (fully visible and screened)	0 miles	25 miles Primarily Highway 2	60 miles Primarily U.S. Highway 2	32 miles Primarily U.S. Highways 2 and 71 and MN Highway 6
	Overall, relative amount that Route Alternative is visible from road	No change in visibility	Primarily visible intermittently and in the distance along U.S. Highway 2 and briefly along Pike Bay Loop, along western portion of U.S. Highway 2	Full, unscreened views in and near city of Cass Lake, possibly on U.S. Highway 2 between Cass Lake and Pike Bay. Intermittent views along western portion of U.S. Highway 2	A mix of fully screened, intermittently screened, and clear, unscreened views
	Number of times the Route Alternative crosses or intersects any road that is at least 0.5 miles long	0	30 Almost all crossings are very low volume roads	30 Variety of road types and volumes	49 Majority of crossings are low volume roads
	Crosses or intersects primary or secondary highway	0	6	6	16
Land Use and Landscape Character	**Relative amount of residential context**	None	Minimal percentage of residential context: Includes portions of Ball Club	Highest percentage of residential context: Includes Cass Lake, Bena, Ball Club, and Deer River	Minimal percentage of residential context: Includes lakeshores, northern Deer River, and Blackduck environments
	Relative amount of developed (non-residential) context	Low amount of non-residential context	Low amount of non-residential context	High amount of non-residential context: Railroad, utility, and other businesses in Cass Lake and Deer River	Minimal amount of non-residential context
	Relative amount of natural, agricultural, or recreational context	No natural, agricultural, or recreational context: Existing generating station	Highest amount of natural, agricultural, or recreational context: Large natural forest area; currently interrupted mainly by pipeline corridor	Moderate amount of natural, agricultural, or recreational context: Recreational uses dominate. Roadway injects transportation context into natural	Low amount of natural, agricultural, or recreational context: Mixed land use

		No-Build Alternative	Route Alternative 1	Route Alternative 2	Route Alternative 3
				setting. An underground pipeline also is present	
Recreational Inventory	**Number of water bodies crossed**	0	18, including, but not limited to Moss Lake, Twin Lake, Mississippi River, Ball Club Lake, and White Oak Lake	13, including, but not limited to Midge Lake, Cass Lake, Pike Bay, Mississippi, and Ball Club Lake	46, including, but not limited to the Mississippi, parallels Stump Lake, Turtle River Lake, Whitefish Lake, and Jessie Lake
	Boat access points	0	3, including the White Oak boat ramp and 2 carry-in sites	3, including the Ball Club boat ramp and 2 carry-in points	1, including the Carry-in canoe
	Recreational trails crossed by power line	0	5 CNF bike/walk trails; 4 snowmobile trails; and 3 state trails	2 CNF bike/walk trails; 9 snowmobile trails; and 1 state trail	3 CNF bike/walk trails; 15 snowmobile trails; and 1 state trail

Source: HNTB, 2008

3.1.1.2. Route Alternative 1

Route Alternative 1 and its associated Segment Alternatives contain a variety of features that are described as aesthetically pleasing. A majority of these features consist of water resources, such as lakes and rivers, and forested areas. A number of managed land areas also are present, including wildlife management areas (WMA), the Leech Lake Reservation (LLR), the CNF, and state forests.

Scenic Road Vantage Points in the Study Area of Route Alternative 1 and its associated Segment Alternatives are the Great River Road Scenic Byway, MN Highway 6, Forest Service Roads 2102 and 2127 (Winnie Dam Road), MN Highway 371, U.S. Highway 71, and the Avenue of Pines Scenic Byway.

Water bodies that are considered scenic resources in the Study Area of Route Alternative 1 and its associated Segment Alternatives are the Mississippi River, Pike Bay, and Leech Lake River.

Trails located within the Study Area of Route Alternative 1 and its associated Segment Alternatives that are considered Scenic Resource Vantage Points are the Lake 13/Pike Bay bike route, Mi-Ge-Zi Trail, Moss Lake/South boundary bike route, pipeline snowmobile trail, North County Trail, Cass County Trail, Becida Trail, Paul Bunyan State Trail, Heartland State Trail, and Soo Line North State Trail.

A detailed listing of the resources included within this alternative is provided in Table 3.1-2. The location of the Project alternatives relative to these resources and a description of the potential view of the Project from these scenic resources are discussed in Section 3.1.2.3.

3.1.1.3. Route Alternative 2

Route Alternative 2 contains a number of resources similar to Route Alternative 1, because of the proximity of the two Route Alternatives. This Route Alternative generally parallels U.S. Highway 2 and the Enbridge pipeline ROWs. Portions of the U.S. Highway 2 ROW also contain existing transmission lines. Near the city of Bemidji, this highway also crosses railroad tracks. At the western terminus, the 1,000-foot route includes U.S. Highway 2. This continues until Cass Lake, where the Route Alternative travels to the south of the highway; once outside of the city, the alternative again includes U.S. Highway 2. The same occurs near the cities of Deer River and Zemple. Near the Boswell Substation, the alternative lies just to the north of the highway.

Scenic Road Vantage Points in the Study Area of Route Alternative 2 and its associated Segment Alternatives are the Great River Road Scenic Byway, MN Highway 6, Forest Service 2102 and 2127 (Winnie Dam Road), MN Highway 371, U.S. Highway 71, and the Ladyslipper NF/MN Scenic Byway.

Water bodies that are considered scenic resources in the Study Area of Route Alternative 2 and its associated Segment Alternatives are the Mississippi River, Cass Lake, Pike Bay, Portage Lake, Lake Winnibigoshish, and Leech Lake River.

Trails that are considered Scenic Resource Vantage Points located in the Study Area are the Mi-Ge-Zi Trail, Norway Beach Interpretive Trail, Winnie Snowmobile Trail, North County Trail, Blue Ox Trail, Cass County Trail, Heartland Trail, and Soo Line North State Trail.

A detailed listing of the resources included within this alternative is provided in Table 3.1-2. The location of the Project alternatives relative to these resources and a description of the potential view of the Project from these scenic resources are discussed in Section 3.1.2.4.

3.1.1.4. Route Alternative 3

The 1,000 foot-wide route for Route Alternative 3 follows existing transmission lines for a total of 91.3 miles. Similar to the other alternatives, it also contains a variety of visual resources including water features and managed land areas.

Scenic Road Vantage Points in the Study Area of Route Alternative 3 and its associated Segment Alternatives are the Ladyslipper NF/MN Scenic Byway, MN Highway 6, U.S. Highway 71, and Avenue of Pines Scenic Highway.

Water bodies that are considered scenic resources in the Study Area of Route Alternative 3 and its associated Segment Alternatives are the Bowstring River, Mississippi River, Turtle River, Turtle River Lake, Bowstring Lake, and Jessie Lake.

Trails that are considered Scenic Resource Vantage Points located in the Study Area of Route Alternative 3 and its associated Segment Alternatives are the North County Trail, Blue Ox Trail, Paul Bunyan State Trail, Bushwacker Trail, Northland Trail, Marcell Trail, and West Bowstring.

A detailed listing of the resources included within this alternative is provided in Table 3.1-2. The location of the Project alternatives relative to these resources and a description of the potential view of the Project from these scenic resources are discussed in Section 3.1.2.5.

3.1.1.5. Leech Lake Reservation

Route Alternatives 1 and 2 cross the width of the Leech Lake Reservation (LLR). The LLDRM places a high value on maintaining undisturbed landscapes to the extent possible on the LLR.

3.1.1.6. Chippewa National Forest

The CNF is generally considered to be one of the more highly valued scenic resources in the area, especially as seen from U.S. Highway 2, which serves as a gateway for visitors to the CNF. While portions of the U.S. Highway 2 ROW contain existing infrastructure, such as transmission lines and a pipeline, specific locations within the CNF are considered to be of high scenic integrity according to CNF visual standards. The CNF selected the use of the scenery management system (SMS) to manage scenic resources within the Forest. The SMS is a system that was developed by the Forest Service and is used for National Forests across the country. It specifically was adapted in the 2004 *Forest Plan* for use in this part of northern Minnesota (CNF, 2004a).

The 2004 *Chippewa National Forest Management Plan* directs the management of areas of high scenic value or integrity, including those located within the Study Area. For example, the Mississippi River crossing near Ball Club and the landscapes surrounding other bodies of water, such as Cass Lake, Pike Bay, and Lake Winnibigoshish, are considered to be of high scenic integrity.

The *CNF Land and Resource Management Plan* outlines desired conditions and objectives, as well as standards and guidelines, for scenic resources within the forest. SIOs guide management activities to achieve the desired scenic conditions. They are characterized as High SIO Areas, Moderate SIO Areas, and Low SIO Areas and are defined as follows:

High SIO: Landscapes where the valued landscape character appears intact. Deviations may be present, but must repeat the form, line, color, texture, and pattern common to the landscape character, so completely and at such a scale that they are not noticeable.

Moderate SIO: Landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.

Low SIO: Landscapes where the valued landscape character appears moderately altered. Deviations begin to dominate the valued landscape character being viewed, but they have similar valued attributes to the outside of the landscape being viewed, such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles (CNF, 2004a).

SIO boundaries lie at least 0.25 mile from the actual location of travel ways, recreation sites, and bodies of water with access (CNF, 2004a). Areas within the CNF that are classified as having a High SIO typically occur within 0.25 mile from the location of viewing areas of relatively high importance, usually along major travel ways and lakeshore areas. Moderate SIO classifications are given to forest areas that display scenic value along secondary travel ways and recreational use areas. Low SIO classifications generally are given to less visible forest areas and to clearings and open areas (Otter Tail Power et al., 2008a). Table 3.1-2 summarizes the SIO rating of major scenic resource types and features within each Route Alternative.

Table 3.1-3 provides the percentage of each Route and Segment Alternative by the SIO classifications. Of the Route Alternatives, Route Alternative 2 contains the greatest percentage of high SIO rated areas and the lowest percentage of low SIO areas. Route Alternative 3 contains the greatest percentage of moderate SIO areas, while Route Alternative 1 includes the greatest percentage of low SIO areas.

Table 3.1-2: Scenic Integrity Objective Rating of Scenic Resources within Route Alternatives

Scenic Resource[3]	Route Alternative 1	Route Alternative 2	Route Alternative 3
Vantage Point - Water Resources			
Mississippi River[1]	High	High	High
Cass Lake[1]	N/A	High	N/A
Pike Bay[1]	High	High	N/A
Portage Lake[1]	N/A	High	N/A
Lake Winnibigoshish[1]	N/A	High	N/A
Ball Club Lake[1]	N/A	Moderate	N/A
Leech Lake River[1]	N/A	N/A	N/A
Turtle River	N/A	N/A	Moderate
Turle River Lake	N/A	N/A	Moderate
Bowstring River[1,2]	N/A	N/A	Moderate
Jessie Lake[2]	N/A	N/A	Moderate
Vantage Point – Roads			
Ladyslipper NF/MN Scenic Byway[1, 2]	N/A	High	High
Great River Road Scenic Byway[1, 2]	High	High	High
MN HIghway 6	High	High	High
Forest Service Roads 2102 and 2127 (Winnie	High	High	N/A
Dam Road)[1, 2]	High	High	N/A
MN Highway 371	High	High	High
U.S. Highway 71	N/A	N/A	High
Avenue of Pines Scenic Byway[1, 2]			
Vantage Point – Trails			
Lake 13/Pike Bay bike route[1]	High	N/A	N/A
Mi-Ge-Zi Trail[1,2]	High	High	N/A
Moss Lake/South Bndry bike route[1]	Moderate	N/A	N/A
Norway Beach Interpretive Trail[1,2]	N/A	High	N/A
Pipeline Snowmobile Trail[1,2]	Moderate	N/A	N/A
Winnie Snowmobile Trail[1,2]	N/A	Low	N/A
North Country Trail (GIA)[1]	Moderate	Moderate	Moderate
Blue Ox Trail (GIA)	N/A	Moderate	Moderate
Cass County Trail(GIA)[1]	Moderate	Moderate	N/A
Becida Trail (GIA)	N/A	N/A	N/A
Paul Bunyon State Trail	High	N/A	High
Heartland State Trail	High	High	N/A
Soo Line North State/CNF Trail[1]	Moderate	Moderate	N/A
Bushwacker Trail[2]	N/A	N/A	Moderate
Northland Trail[2]	N/A	N/A	Moderate
Marcell Trail[1,2]	N/A	N/A	Moderate
West Bowstring[1,2]	N/A	N/A	Moderate
Vantage Point – Municipal Area			
Bemidji	Moderate	Moderate	Moderate
Cass Lake	Moderate	Moderate	N/A
Bena	Moderate	Moderate	N/A
Deer River/Zemple	Moderate	Moderate	Moderate

Notes: N/A = not applicable
1. Resource occurs within the LLR
2. Resource occurs within the CNF
3. Definitions for high, moderate, and low SIO areas can be found in Section 3.1.1.5.

Table 3.1-3: Percentage of Scenic Integrity Objective Areas within Route and Segment Alternatives

Route and Segment Alternatives	Associated Route Alternatives	SIO Rating – Percentage		
		High	Moderate	Low
Route Alternatives				
1		33.0	20.7	46.3
2		88.3	3.5	8.3
3		38.9	44.1	17.0
Segment Alternatives				
A	1	11.3	29.8	58.8
B	1	2.2	31.2	66.6
C	1, 2	24.0	43.0	33.0
D	1	13.4	16.5	70.1
E	3	99.9	0.0	0.1
F	2	66.2	33.8	0.0
G	2	0.0	34.4	65.6
H	2	86.6	13.4	0.0
I	2	56.7	43.3	0.0
J	1, 2	46.3	0.6	53.1
K	1, 2	26.7	17.0	56.3
L	1	0.0	27.0	73.0
M	1, 2	0.6	19.4	80.0
N	1, 2	11.1	0.0	88.9
O	1, 2	11.9	86.2	1.9
P	1, 2	80.3	0.0	19.7
Q	1, 2	8.3	0.0	91.7
R	3	45.3	25.4	29.3
S	3	26.9	5.8	67.2
T	3	14.1	26.8	59.1

3.1.2. Direct/Indirect Effects

This section provides a discussion about the potential aesthetic impacts from the Project and its alternatives. Potential direct impacts include the following:

- Loss of trees
- Disruption to the existing landscape from the addition of transmission lines and the expansion of the substations
- Devaluation of high-value or sensitive scenic resources

Indirect impacts primarily are associated with construction. Construction of the transmission line could restrict access to scenic resources, create additional noise and dust in areas, and disrupt passive experiences felt by visitors to this region of the State. More long-term indirect impacts would be associated with the loss of forest land and as a result, the sentiments associated with these resources.

Overview of Direct Effects

For the purposes of determining the direct and indirect impacts to the visual and scenic resources, the Study Area includes routes that are 1,000 feet wide. As discussed in the introduction to Section 3, the final location and width ROW within the selected Route and Segment Alternatives is unknown. The ROW would be determined after selection of a final Route Alternative and allows for flexibility to avoid sensitive resources. For purposes of analysis and consistency with evaluation of other resources throughout this document, potential impacts to the ROW were calculated using a feasible 125-foot-wide ROW each of the Route and Segment Alternatives.

As indicated in Section 2.4.1, Transmission Design, and Table 2-3, the pole types would consist of steel or wood poles. Depanding upon the structure type, heights would range from 70 to 125 feet. Steel poles could have a galvanized or Cor-ten finish. Galvinized poles have a shiny finish, while cor-ten poles would have a brown, rusty appearance. The structure material and height are relevant because of their visibility within a landscape. For instance, a steel structure would be more noticeable in a forested area than a wooden frame. Steel would be used for single-pole Davit arm structures for the 230 kV single circuit, 230 kV/115 kV double circuit, and 230 kV/69 kV double circuit lines. Wood would be used for all other poles types, including the 2-pole H-frame and 3-pole corner. Furthermore, structures that are over 100 feet tall would be more noticeable to the casual observer than one that was 70 feet tall. Structures would be placed between 350 and 1,000 feet apart.

In general, the following impact assessment describes the potential impacts of each Route Alternative from west to east. Descriptions for the majority of each alternative begin approximately six miles west of the Chippewa National Forest boundary and end at the Boswell Substation near Cohasset. Where available, visual simulations were analyzed to determine the potential impacts of the transmission line and structures in typical urban settings, in locations within an existing utility ROW for transmission lines and/or a pipeline, and in locations where a new ROW would need to be created for the Route Alternatives.

The Project likely would be visible to many residents located near it, as well as those traveling on highways and county, township, and forest roads. Two Mississippi River crossings would also likely be visible, one as the Project leaves the Bemidji area and another as the Project approaches the Boswell Substation. Frequently used vantage points include, from west to east, the Mississippi River, U.S. Highway 71, Paul Bunyan State Trail, MN Highway 371, the Heartland Trail, the Pike Bay area, Forest Service Road 2102, Forest Service Road 2127, U.S. Highway 2, a second vantage point at the Mississippi River, and MN Highway 6. The primary visual intrusion of the transmission line at these vantage points would occur at the location where the transmission line crosses each feature. Recreational areas in the Study Area are shown in Figure 3.13-1. Additional vantage point locations are shown in the Route Alternative maps included in Appendix D.

If a feature is parallel to the vantage point such that the transmission line would be viewed for a longer time, then the impact is considered greater than if the transmission line runs perpendicular to the vantage point. A perpendicular crossing of a vantage point minimizes the effects of the transmission line for the viewer. For example, erecting the transmission line within the Pike Bay area along the corridor viewable from U.S. Highway 2 likely would cause a greater visual intrusion than crossing the corridor, because the transmission line would be continually visible from many vantage points (HNTB, 2008).

Overview of Indirect Effects

In addition to these direct impacts, indirect effects also may occur. As indicated in Sections 3.10, Land Use, and Section 3.13, Recreation and Tourism, access to forested areas and recreational resources would be temporarily restricted on a site-specific basis to allow for the construction of the Project. Also, the current forested and open settings often provide a sense of calm and serenity, as well as an association with nature. Construction activities would generate additional noise and dust not normally present within the potentially affected areas and would negatively affect these calm and serene settings. As indicated in Section 3.21, Noise, short-term changes from noise generated by construction equipment and worker presence would likely constitute the greatest noise impact as a result of the Project. Earth moving machinery (e.g., bulldozers and backhoes) or supporting equipment (e.g., air compressors and concrete mixers) would generate temporary noise. As discussed in Section 3.2, Air Quality and Climate, potential short-term impacts to air quality from construction of the Project could include temporary degradation of air quality from the emission of air pollutants during the operation of construction equipment and vehicles.

This discussion about the potential direct effects includes a description of the No-Build Alternative, impacts that would be similar for all of the Route Alternatives, and impacts specific to a particular alternative. Generally, potential effects of the Segment Alternatives do not significantly differ from comparable portions of the Route Alternatives and, thus, are not discussed. Specific impacts to the Leech Lake Reservation and Chippewa National Forest are also discussed.

3.1.2.1. No-Build Alternative

The No-Build Alternative would not impact the existing visual and scenic resources directly or indirectly. This alternative would not introduce new transmission lines into the existing landscape. As such, trees would not be cleared, and there would be no substation construction or expansion. Impacts to high-value or sensitive scenic resources are not expected. Residents and visitors within northern Minnesota would continue to view and use the visual resources in a manner similar to their current means.

3.1.2.2. Route Alternative 1

As previously indicated, the Route Alternatives have the potential to disrupt the existing landscape through the removal of trees, with the addition of the transmission line and the expansion of the substations, and by devaluing high-value or sensitive scenic resources. The following discussion provides an overview of the locations in which these potential impacts may occur based upon the path of Route Alternative 1. The impacts primarily would be considered long-term impacts because they would be present throughout the lifespan of the transmission line.

Route Alternative 1 contains a total 4,856 acres of forested land, which includes conifer, conifer-deciduous, and deciduous forest. Of this total, construction of Route Alternative 1 would permanently convert an estimated 579 acres of forested area. Impacts would occur primarily to deciduous forest (approximately 78 percent of total forest conversion). In areas where forest cover would be removed, the transmission lines and poles likely would be more visible to visitors and residents than in locations where the forest cover is maintained, especially if a steel pole is utilized. The Project would add a vertical component to the existing landscape; while at the same time vegetative cover that typically would shield the infrastructure would be removed. With the removal of trees, open space would take on a disturbed/developed appearance, as opposed to the natural setting associated with a forested environment.

Crossing a central portion of CNF and bisecting the LLR, Route Alternative 1 is the most visually isolated from highways and residential areas.

The LLDRM has indicated that Route Alternative 1 may disrupt important traditional gathering areas within the LLR through impacts to aesthetics and other resources. Of particular importance to the LLBO is the Ten Section Area of the CNF, which would be traversed by Route Alternative 1. Addition discussion of aesthetic impacts within the LLR is presented in Section 3.1.2.5.

The alternative generally would be adjacent to an existing pipeline corridor, which largely is cleared of trees, allowing unobstructed views of the structure primarily at road crossings. In these locations, the existing landscape would be directly impacted because the transmission line would be in full view of residents and visitors. These intrusions would primarily be vertical in nature and would create a contrast to the cleared area. New visual intrusions along the pipeline alignment would be buffered by forest areas throughout much of Route Alternative 1 and its associated Segment Alternatives.

When following pipeline ROWs along the southern portion of the route, Route Alternative 1 would be fully visible at several road crossings. Direct impacts in these locations would include a disruption to the existing landscape and interruptions of the natural view within wildlife management lands. When the Project would closely follow roadways, the transmission line would be visible among the trees and tall grasses. However, this type of vegetation would provide some screening and allow for the structures to blend into the surrounding somewhat, thereby creating a minimal to moderate visual intrusion.

Where open wetlands would intersect Route Alternative 1, low-lying vegetation would not provide a sufficient screen for the transmission structures and conductor, and a minimal to moderate vertical intrusion would be occur. The line of sight for visitors and residents within this area would be drawn to these vertical transmission structures and conductor. Therefore, this would disrupt the typical visual setting associated with wetland areas.

Potential Impacts to Visual Resources/Users

The westernmost area of the route near the Wilton Substation has the greatest concentration of residential properties, and is close to Lake Marquette and agricultural areas. Thus, the Project would be visible to a number of residents and other viewers in these open areas (HNTB, 2008).

Near the cities of Bemidji and Wilton, the route would run in a northwest-southeast direction along existing and proposed pipeline corridors in the Necktie River vicinity. This western portion of the Route Alternative is more than half forested, which would fairly effectively screen the line, except at crossings, where an agricultural area offers a longer, open view. Because fewer trees are located at these crossings, the viewshed would be impacted directly by the construction and placement of the Project.

South of Bemidji, as Route Alternative 1 heads east, the ROW generally would follow the existing Great Lakes pipeline ROW. This pipeline corridor is largely clear of trees, contains no large-scale structures, and is very evident to viewers. The clearing currently interrupts the notion of an unending forest and is a departure from a setting associated with varying types and heights of vegetation. Additional clearing of vegetation would be required for the Project, but the perceived width to viewers of the new clearing would not be much greater than the existing space. As previously indicated, in areas where an existing pipeline ROW is present, the construction of the 230 kV H-frame would be a departure from the existing setting. The transmission line structures and conductor would be clearly visible, dominate the setting, and provide a strong contrast to the open space (to see a visual simulation that was created for a typical pipeline corridor, see the photograph labeled "Typical pipeline corridor" in Appendix E). Several existing pipeline ROWs are used as dedicated snowmobile trails; in these location, the Project would be visible to snowmobile riders.

Further east, Route Alternative 1 includes old-growth forest, which also provides aesthetic value, in the area called Ten Section, which is located from milepost (MP) 1-21 to 1-24 (HNTB, 2008). In this area, both deciduous and coniferous trees line the roadway. The Ten Section area is known as the core of the CNF and originally was set aside to protect the few remaining old-growth pine trees from timber cutting in the early 1900s. The LLBO has identified the Ten Section Area as a unique forest community, as well. This unique forest community supports rare species, as well as areas of cultural importance to the Band. It is now used primarily for recreation and interpretive purposes. This area has a high SIO value because of these characteristics.

Route Alternative 1 crosses the Ten Section area near Pike Bay Loop, south of Pike Bay in Cass County, affecting approximately 31 acres of forest land. The use of Segment Alternative B would deviate to the south side of the Ten Section Area, reducing direct impacts to 9 acres in the management area (MA). Route Alternative 1 would impact these forested areas to a greater extent than Route Alternatives 2 and 3, which avoid this area. Within the Ten Section MA, some trees would have to be removed to accommodate the transmission structures and conductor. The removal of trees would represent an aesthetic change for users of the Ten Section Area, which could alter the user's experience. For example, a viewer's focus may be directed to the cleared area and may be drawn to the difference in scale between the structures and the surrounding vegetation. The horizontal quality of the background, therefore, may be disrupted. In addition, the scale, form, and function would interrupt settings typically associated with a forested landscape. However, the forest cover would shield the transmission structures and conductor from viewers located outside of the forest area.

For approximately 9 miles between Twin Lake and Sucker Bay Road (MP 1-23 to MP 1-32.5), Route Alternative 1 would follow land characterized by heavy forest cover, visible only to off-trail recreational users and those using any of three unimproved roads, including Cuba Hill Road (MP 1-26.5). The Project would be briefly visible where it and the existing Enbridge pipeline cross Sucker Bay Road, a major thoroughfare. Based upon information provided by the LLDRM, this Route Alternative would be noticeable and disruptive to members of the LLBO who utilize this area extensively for traditional gathering.

Four miles east of Bena, west of Nushka Lake, Route Alternative 1 veers north to U.S. Highway 2. The Project would either parallel or be consolidated with the existing 69 kV transmission line located south of U.S. Highway 2. Either way the new structures would be taller than the existing 69 kV structures, which are approximately 40 feet tall This line is located within 300 feet of the highway but, because of some screening vegetation and a railroad grade, it would be only intermittently visible for about 8 miles along U.S. Highway 2 to the Mississippi River (HNTB, 2008).

In locations where Route Alternative 1 would parallel the existing 69 kV transmission line, the existing transmission line would appear subordinate to the Project. The combination of the different types of utility structures and conductor would increase the visual dominance of the combined transmission line infrastructure against the sky and the horizontal line of the low wetland vegetation. However, as aforementioned, the land use contrast would be less than creating a new, stand-alone transmission line.

Route Alternative 1 would cross fewer navigable water bodies than Route Alternative 3, but a greater number of navigable water bodies than Route Alternative 2. A half-mile south of Pike Bay, the alternative may affect views around Moss and Twin Lakes (MP 1-22 to 1-24). While the area near the lakes is heavily forested, ensuring some screening, the Project could be visible from both of the lakes, depending upon the precise placement of the structures within the 1,000-foot-wide route (HNTB, 2008). Visual simulations were not created to depict a crossing near a lake. However, the structures likely would create a minimal vertical intrusion in areas that were heavily forested, and a more moderate intrusion in those areas with low-lying vegetation.

All Route Alternatives would cross the Mississippi River in the Bemidji area. Route Alternative 1 would cross at the existing Great Lakes Pipeline and 115 kV transmission line crossing north of Carr Lake Road SW. Under Route Alternative 1, there are three scenarios for crossing the Mississippi River near Ball Club:

- **Parallel 230 kV and 69 kV Mississippi River Crossings**: Route Alternative 1 could cross the river on a separate ROW parallel to the existing Great River Energy 69 kV crossing south of U.S. Highway 2. This would result in two crossings to the Mississippi River, essentially adjacent to one another. Both crossings would be visible to those traveling along U.S. Highway 2. The existing river crossing uses wood single pole 69 kV structures, approximately 40 feet tall. Structures for the Project at this location would be either wood H-frame structures (Figure 2-3), approximately 70 to 90 feet tall, or steel single-pole davit arm structures (Figure 2-4), approximately 80 to 100 feet tall. As aforementioned, in locations where the Project would parallel existing transmission lines, the combination of the parallel utility lines and repeated pattern of pole placement would increase the visual dominance of the transmission structures and their contrast with the vertical and horizontal line of the background trees and other low-lying vegetation.
- **Double-Circuit 230kV/69kV Mississippi River Crossing**: Route Alternative 1 could be consolidated with Great River Energy's existing 69 kV transmission line on a new set of double circuit structures. Under this scenario, there would be one set of structures and two planes of conductor crossing the river. The crossing would be visible to those traveling along U.S. Highway 2. Structures for the Project at this location would be either double-circuit wood H-frame structures (Figure 2-7), approximately 90 to 125 feet tall, or double-circuit steel single-pole davit arm structures (Figure 2-6), approximately 95 to 115 feet tall, considerably taller than the existing 69 kV structures.
- **230 kV Crossing of Mississippi and 69 kV Crossing of Leech Lake River**: If Route Alternative 1 is used in conjunction with Segment Alternative C, a new set of structures (either wood H-frame or steel single-pole, as discussed above) would replace the existing river crossing. Great River Energy's 69 kV transmission line would be relocated 4.4 miles south and then east along a new ROW to cross the Leech Lake River, using similar structures to those that currently exist. Those traveling along U.S. Highway 2 would notice only one set

of structures, albeit considerably taller than those that exist currently. The re-routed 69 kV transmission line along Segment Alternative C would not be visible from surrounding roadways and is not near any residential areas. The new crossing of the Leech Lake River would be visible from a water access point north of the river crossing.

While a new transmission line within the corridor for Route Alternative 1 would affect fewer heavily populated areas than Route Alternative 2, the impact would be more marked for visitors to the Study Area, because of the structure's contrast to the pristine natural context. Based on comments received from LLDRM, Route Alternative 1 also would have the most severe negative impact to members of the LLBO, who utilize areas contained within this Route Alternative for traditional gathering and spiritual activities.

Potential Impacts to SIO

The overall SIO value would not be impacted directly, because the SIO rating is based upon the character of the Ten Section area as a whole. The impacts would be localized and would be minimal in scale. For instance, the overall SIO value of this resource (i.e., the entire Ten Section area) would not be impacted, because only a minimal portion of the Ten Section's total area would be affected by the construction and operation of the Project.

3.1.2.3. Route Alternative 2

Route Alternative 2 parallels U.S. Highway 2 for most of its length. As shown in Figure 3.1-1, the portion of the route through the CNF is located in a CNF-identified high SIO area. However, much of the U.S. Highway 2 corridor is disturbed with a major highway, railroad, pipeline, and power line. While partially buffered from U.S. Highway 2 by forested areas, erecting a transmission line within Route Alternative 2 likely would create a noticeable visual impact along much of the route.

Route Alternative 2 contains approximately 3,845 acres of forested land (e.g., conifer, conifer-deciduous, and deciduous forest). Of this amount, construction of Route Alternative 2 would permanently convert an estimated 439 acres of forested area. In areas where forest cover would be removed, the transmission structures and conductor likely would be more visible to visitors and residents than in locations where the forest cover is maintained, especially if steel structures were utilized. The Project would add a vertical component to the existing landscape; while at the same time vegetative cover that typically would shield the infrastructure would be removed. With the removal of trees, open space would take on a disturbed/developed appearance, as opposed to the natural setting associated with a forested environment.

As previously indicated, the Route Alternatives have the potential to disrupt the existing landscape directly with the addition of the transmission structures and conductor and the expansion of the substations, through the removal of trees, and by devaluing high-value or sensitive scenic resources. The following discussion provides an overview of the locations in which these impacts may occur based upon the path of Route Alternative 2. The impacts primarily would be considered long-term impacts because they would be present throughout the lifespan of the transmission line.

Potential Impacts to Visual Resources/Users

From vantage points in the westernmost area, Route Alternative 2 would be closest to Lake Irving and the more populous parts of the city of Bemidji. As a result, it would be visible to more nearby residents than Route Alternatives 1 and 3 (HNTB, 2008).

The visibility of the remaining Project would vary along U.S. Highway 2. Existing infrastructure and development already dominate the scenic character of residential and commercial areas within the Study Area. In areas where there was less forest cover and fewer trees would be removed, such as between the cities of Bemidji and Cass Lake, the Project would be more visible from open vantage points along U.S. Highway 2 (Otter Tail Power et al., 2008a).

A visual simulation of the Cass Lake/Pike Bay Area created by the Applicants (see Appendix E) shows that along the frontage road south of U.S. Highway 2, vegetation consists of a mixture of grasses and forest cover. This simulation shows that the Project H-frame structures would dominate the view along the roadway segment. Based upon the simulation, the structures and conductor would be taller than the existing tree line and would draw the attention of viewers. The wood structures would appear to blend slightly into the background, due to the forest lined roadway, however the vertical structures would detract from the horizontal scale of the existing setting. However, it should be noted that the visual simulation provided in Appendix E was created during the fall/winter season, when much of the surrounding vegetation was dead. It is likely that during the spring and summer when there would be more screening vegetation, the Project still would be visible but the wooden structures would tend to blend more into the background and create only a minimal visual impact. In addition, the high speeds of vehicular travel on the highway would make these poles perceptively less visible, as well.

Route Alternative 2 would present a new visual feature in the city of Cass Lake. Depending upon its proximity to Railroad Street, which essentially forms the southern boundary of city, the Project would be seen either in close proximity, with several support structures providing visual punctuation, or in its entirety as a somewhat distant feature. The Project would be noticeable to residents and visitors traveling south on most residential and commercial streets in the downtown district of Cass Lake. Route Alternative 2 would be located in an industrial part of Cass Lake, which already contains transmission and pipeline infrastructure.

The area between the cities of Cass Lake and Ball Club likely would have the greatest visual impact because the transmission line would be located in a relatively "complete" natural landscape. Route Alternative 2 would introduce a visual impact between the cities of Cass Lake and Bena, where the alternatives follow the existing pipeline corridor, because portions of this area would be cleared of trees. This area includes the landscape just east of the city of Cass Lake, which offers a viewshed between the Cass Lake and Pike Bay water bodies (Otter Tail Power et al., 2008a).

As shown in Appendix E, an existing 69 kV line is present along the south side of the U.S. Highway 2 between Bena and the Mississippi River. The feasible ROW evaluated for Route Alternative 2 shows the Project on the north side of U.S. Highway 2 in this area, resulting in transmission lines on both sides of U.S. The structures used for the Project would be considerably taller, 70 – 100 feet, than the existing 40-foot structures used by the 69 kV transmission line.

From Bena to Deer River, the landscape character is more open, with large wetlands and sparse trees to screen the Project structures and conductor. While the Project would not be located directly adjacent to Lake Winnibigoshish, some open landscape areas south of the lake may afford distant views of the transmission line. Near the city of Deer River, the line would be visible, with some potential tree screening from a concentrated residential area (HNTB, 2008).

While this Route Alternative crosses fewer navigable water bodies than the other alternatives, the majority of these are major recreational lakes with nearby boat launches. In addition, while this alternative requires fewer road crossings, it would affect more people, including both area residents and park visitors, because of the high-volume road, proximity to the city of Cass Lake, and the recreational context (HNTB, 2008).

Route Alternative 2 would cross the Mississippi River in the Bemidji area along the south side of U.S. Highway 2. Under Route Alternative 2, there are two scenarios for crossing the Mississippi River near Ball Club. They are provided, as follows:

- **Separate 230 kV and 69 kV Mississippi River Crossings**: Route Alternative 2 could cross the river north of U.S. Highway 2, leaving the existing 69 kV transmission line crossing unchanged to the south of U.S. Highway 2. Both crossings would be visible to those traveling along U.S. Highway 2, one along either side of the highway. The existing river crossing uses wood single pole 69 kV structures, approximately 40 feet tall. Structures for the 230 kV crossing would be either wood H-frame structures (Figure 2-3), approximately 70 to 90 feet tall, or steel single-pole davit arm structures (Figure 2-4), approximately 80 to 100 feet tall.

- **230 kV Crossing of Mississippi and 69 kV Crossing of Leech Lake River**: If Route Alternative 2 is used in conjunction with Segment Alternative C, a new river crossing, as described above, would be established north of U.S. Highway

2. The existing Great River Energy 69 kV transmission river crossing would be abandoned and the line would be relocated 4.4 miles south and then east along a new ROW to cross the Leech Lake River, using similar structures to those that currently exist. Those traveling along U.S. Highway 2 would notice only one set of structures, now on the north side of the highway and considerably taller, between 70 and 100 feet, than the 40-foot structures that exist currently. The re-routed 69 kV transmission line along Segment Alternative C would not be visible from surrounding roadways and is not near any residential areas. The new crossing of the Leech Lake River would be visible from a water access point north of the river crossing.

Potential Impacts to SIO

As previously indicated, the SIO values associated with various resources management areas both within and outside the CNF would not be directly impacted. Because the overall SIO rating is based upon the particular resource in its entirety, the impacts would be local and minimal in terms of acreage as compared to entire resource.

3.1.2.4. Route Alternative 3

At 116 miles, Route Alternative 3 would be the longest and northernmost Route Alternative, with the second greatest number of power line road crossings. Sixteen of these roads would be primary or secondary highways. The Route Alternative would follow existing pipelines, transmission, and road ROWs for 111 of its 116 miles. Twenty-five water bodies likely would be crossed or would be located immediately adjacent to the Project. One carry-in boat access point and three recreational trails would be in the transmission line's immediate vicinity (HNTB, 2008). In these locations, the view would be impacted directly by the placement of the Project.

Route Alternative 3 contains 7,599 acres of forested land (e.g., conifer, conifer-deciduous, and deciduous forest). Of this total, construction of Route Alternative 3 would permanently convert approximately 813 acres of forested area, the most of the Route Alternatives evaluated. In areas where forest cover would be removed, the transmission structures and conductor likely would be more visible to visitors and residents than in locations where the forest cover is maintained, especially if a steel structure was used. The addition of these two types of infrastructure would add a vertical component to the existing landscape; while at the same time vegetative cover that typically would shield the infrastructure would be removed. With the removal of trees, open space would take on a disturbed/developed appearance, as opposed to the natural setting associated with a forested environment.

As previously indicated, the Route Alternatives have the potential to disrupt the existing landscape with the addition of the transmission structures and conductor and the expansion of the substations, through the removal of trees, and by devaluing high-value or sensitive scenic resources. The following discussion provides an overview of the locations in which these impacts may occur based on the path of Route Alternative 3. The impacts primarily would be considered long-term impacts because they would be present throughout the lifespan of the transmission line.

Potential Impacts to Visual Resources/Users

Route Alternative 3 would exit the Wilton Substation in a path similar to that of Route Alternative 1. This Route Alternative would follow the path of Route Alternative 1 for its first 10 miles through developed areas of Bemidji. Emerging from the Bemidji-Wilton area, the Route Alternative would largely parallel an existing 69 kV transmission line and local roads before reaching Blackduck. In locations where the Route Alternative would parallel an existing transmission line, the combination of parallel utility lines and a repeated pattern of pole placement would increase the visual dominance of the transmission structures against the sky and their contrast with the horizontal line of the background trees and other low-lying vegetation. The land use contrast of the Project would be reduced because of the presence of the existing line. Therefore, the addition of the Project would alter the existing landscape only minimally. The Project would be most noticeable where it crossed roads at an oblique angle (HNTB, 2008). The visual simulations included in Appendix E suggest that the 230 kV H-frame would blend somewhat with trees that line existing roadways. The high speeds of vehicular travel, however, would make these poles perceivably less visible, as well.

Route Alternative 3 would depart from the existing transmission line south of Blackduck (near MP 3-39), where it would take an eastern path through sparsely populated and intermittently wooded land or by-pass the city of Blackduck to the south and east before rejoining the existing transmission line. Route Alternative 3 would parallel the existing transmission line and several county roads heading east, where the line would be visible to motorists. As indicated above, the view of the travelling public would be only minimal because of the high speeds of travel along the county roadways.

Heading south in the eastern portion of the Study Area, Route Alternative 3 would be adjacent to an existing 69 kV transmission line and cross wetlands, unimproved roads, and trails. The Project transmission line, although taller than the existing transmission line, would likely be screened by tall vegetation in this area (HNTB, 2008). The difference in height would draw attention to the Project, but the contrast between the line and the surrounding land use would not be perceived as great because of the presence of the existing transmission line.

Route Alternative 3 would cross the Bowstring River (between MP 3-66 and 3-67), the northern shore of Whitefish Lake (near MP 3-71), and Jessie Lake (near MP 3-90) where it would be visible to a small concentration of residents and recreational visitors to the lake (HNTB, 2008). Although a visual simulation was not created for a water resource, it is anticipated that the addition of a transmission structures and conductor would detract from the horizontal scale of the lake setting. The visual intrusion would be vertical in nature and would draw attention upward away from the lake and toward the individual structures within the transmission line.

As indicated in Section 3.4, all of the Route Alternatives would cross the Mississippi River. Route Alternative 3 would cross the Mississippi River at its western end near Parker's Lane Road. Specific crossing scenarios were not provided for Route Alternative 3 (see Section 2.2.4.1 for additional information).

Potential Impacts to SIO

As previously indicated, the SIO values associated with various resources management areas both within and outside the CNF would not be directly impacted. Because the overall SIO rating is based upon the particular resource in its entirety, the impacts would be local and minimal in terms of acreage as compared to entire resource.

3.1.2.5. Leech Lake Reservation

The LLBO maintains its own scenic integrity objectives for areas within the LLR. According to representatives of the LLDRM, the LLBO scenic integrity objectives differ from those developed by the CNF. The LLBO objectives do not take into account the number of visitors to the area. Instead, the LLBO scenic integrity objective account for the type of user of scenic areas. For example, an undisturbed area used for traditional hunting and gathering or spiritual activities would have a higher scenic integrity objective than an undisturbed area used for snowmobiling. The primary objective of the LLBO is to contain visual impacts. Representatives of the LLDRM have stated that the LLBO has a preference to consolidate impacts to previously disturbed areas and protect undisturbed forest.

Due to the difference in scenic integrity objectives between the LLBO and CNF, the SIO ratings developed by the CNF are not an appropriate measure of scenic impacts to areas within the LLR.

LLR residents in the vicinity of the Project primarily would be affected by a loss of scenic resources. This loss could alter the experience of conducting traditional tribal ceremonial or hunting/gathering activities in areas where they have historically occurred.

Route Alternative 1 would require the longest and highest percentage of new ROW through undisturbed areas within the LLR, compared to Route Alternatives 2 and 3. The LLBO has indicated that certain areas located along Route Alternative 1 and to a lesser extent Route Alternative 2, including the Ten Section area and Guthrie Till Plain, have cultural significance for tribal members. Tribal members who use these areas for hunting, gathering, or cultural practices would be disproportionately affected by the placement of the ROW through these areas, since their experience would be altered by the visual intrusion of the ROW and overhead transmission line.

3.1.2.6. Chippewa National Forest

Table 3.1-4 summarizes the visual quality of those portions of the Route and Segment Alternatives that would traverse CNF land based upon the *2004 CNF Land and Resource Management Plan* SIO model. The visual effects of the alternatives would be similar to those discussed for the overall Route Alternatives, above.

Table 3.1-4: Scenic Integrity Objective Areas within the CNF

Route and Segment Alternatives	Associated Route Alternatives	SIO Rating (acres)			
		High	Moderate	Low	Total
Route Alternatives					
1		1,528.1	678.8	2,135.2	4,342.1
2		3,906.0	33.9	58.9	3,998.8
3		1,791.5	4,485.6	1,071.3	7,348.4
Segment Alternatives					
B	1	28.3	22.9	736.7	787.9
C	1, 2	130.0	233.4	179.3	542.7
D	1	16.7	0.1	0.1	16.9
E	3	1,298.1	0.0	1.6	1,299.7
F	2	45.1	53.3	0.0	98.4
N	1, 2	52.0	0.0	416.3	468.3
O	1, 2	42.2	305.1	6.8	354.1
P	1, 2	51.3	0.0	12.6	63.9
R	3	50.7	59.5	2.7	112.9
S	3	0.0	8.0	1.1	9.1
T	3	0.0	72.3	8.0	80.3

As previously noted, Route Alternative 2 would have a greater potential to affect scenic resources because the transmission line would be visible for a considerable length along U.S. Highway 2. Anticipated changes to the SIO ratings from the Project are difficult to predict because the rating is based upon the overall characteristic of a specific resource, rather than one location or area which would be crossed by the Project. The Route Alternatives, therefore, would not directly alter the overall SIO rating of a particular resource. Therefore, the impacts would be localized and would be minimal in scale. As a result, the SIO rating would not have to be amended to account for these minimal impacts.

New visual intrusions along the pipeline alignment would be buffered by forest areas throughout much of Route Alternative 1 and its associated Segment Alternatives, especially in the heavily wooded CNF and state forest areas (Otter Tail Power et al., 2008a). As compared to the other Route Alternatives, Route Alternative 3 would primarily travel along county roads and existing utility lines.

As indicated in Table 3.1-4, Route Alternative 2 contains the greatest number of acres of high SIO areas within the CNF, while Route Alternative 3 contains the greatest number of acres of moderate SIO areas. Route Alternative 1 contains the greatest number of acres of low SIO areas.

The proposed locations of substations in the Bemidji and Cohasset areas would be outside of the CNF.

3.1.3. Mitigation

The Project would present a contrast to the surrounding landscape in most if not all locations, although this contrast would be incremental where the transmission line would follow existing transmission lines. For example, in areas located within the forest, a transmission line is not a typical view associated with this setting (see Section 3.10 for a discussion about land use in the Study Area). In general, mitigation would include enhancing positive effects, as well as minimizing or eliminating negative effects. As per the CNF management goals, in Moderate and High SIO areas, the Project should try to minimize the negative visible impacts of overhead utilities, if they could be seen from travel ways, recreation sites, and bodies of water with access (CNF, 2004a).

The following mitigation strategies to minimize impacts could be included as conditions in the High Voltage Transmission Line (HVTL) permit:

- Vegetation Removal - The permit could limit vegetation removal and require the Applicants to minimize the number of trees removed during construction of the Project in its selection of the specific ROW for the transmission line and through the use of existing ROW. Although the ROW would need to remain free of trees throughout the construction and operation of the Project, the ROW could be replanted with bushy shrubs and low-growing vegetation to reduce, though not eliminate, the contrast.
- Cleanup – The permit could require the Applicants to remove construction waste and scrap on a regular schedule or at the end of each construction phase.
- Waterway Avoidance – The permit could require the Project to span certain waterways, where possible, to minimize effects on aesthetics, recreation, and water quality. In addition, the permit could require that the Project cross waterways in more compatible locations to minimize impacts, such as at existing utility water crossings.
- Restoration – The permit would require restoration for ROWs, access roads, temporary work spaces, and other private lands affected by construction of the Project. Decisions about restoration activities could be coordinated with the

MnDNR, CNF, LLBO, private land owners, and others with aesthetic concerns that might be addressed during the restoration process.

- Route Location - The permitted route could be specific in the location and width of ROW to minimize the visibility from highway, waterway, and trail crossings, within the limits of the structures' design.
- Co-location - The Project could be double-circuited with existing transmission lines to the extent practicable and consistent with sound engineering principles or system reliability criteria. The permit could identify areas where the Project could be double-circuited with existing transmission lines (Otter Tail Power et al., 2008a).

The following additional mitigation strategies would be implemented by the Applicants to further minimize impacts:

- The location of structures, ROWs, and other disturbed areas would be determined by considering input from landowners, the LLDRM, and the CNF to minimize visual impacts.
- Structure types (designs) would be uniform, to the extent practical. The Project proposes to primarily use wood poles, which tend to blend into the surrounding wooded landscape, although taller single-pole structures may be used for double-circuit and angle structures. Descriptions of the structure types are provided in Section 2.4.1, Transmission Design.
- The height of the structures may be reduced, as feasible, to minimize impacts within areas of high scenic importance. Use of H-frame structures for the Mississippi River crossing would have a lower profile than single pole structures.
- Care would be taken to preserve the natural landscape; construction and operation would be conducted to prevent unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the work.

3.2. Air Quality and Climate

This section describes the overall climate and air quality within the Study Area. Representative climate data and potential climate change issues are discussed and analyzed to determine the Study Area existing condition and the Project environmental effects on the local climate. The current air quality status of the Study Area also is presented, with an analysis of how the Project could impact the air quality status along with potential mitigation measures.

3.2.1. Affected Environment

The affected environment for air quality and climate for the Study Area is less variable across specific locations than other resources because ambient air, unlike land or water, generally does not follow fixed natural boundaries. Thus, any discussion related to climate or air quality impacts is generally applicable to all of the build alternatives (i.e., Route Alternatives 1, 2, and 3 and Segment Alternatives A through T) or geographic areas (i.e., the Chippewa National Forest and Leech Lake Reservation) with a few noted differences. The affected region for the climate and air quality analysis is focused primarily on the area covering Beltrami, Hubbard, Cass, and Itasca counties in north-central Minnesota.

Areas of special concern related to air quality are locations designated by the Clean Air Act as Federal Class I areas. Class I areas have been designated as requiring special attention in regards to protecting and even improving the visibility in these areas. A Class I area is defined as national parks greater than 6,000 acres, national wilderness or memorial parks greater than 5,000 acres, and inter-nation parks that have been in existence since August 1977. The state of Minnesota contains two Class I areas, Voyageurs National Park (100 miles NE of the center of the Study Area) and Boundary Waters Canoe Area Wilderness (150 miles ENE of the Study Area). Two additional Class I areas, Isle Royale National Park and Seney Wilderness Area, reside in Michigan, and are 250 and 390 miles away from the Study Area, respectively. There are no Class I areas within the Study Area.

The following discussion about climate is based upon review of climate trends and locally and regionally representative historical temperature and precipitation records. The air quality discussion is based upon the air quality and attainment designations of the area, as determined by Minnesota Pollution Control Agency (MPCA) air quality monitoring data (MPCA, 2009b).

3.2.1.1. Climate: Precipitation and Temperature

The Midwestern Regional Climate Center (MRCC), which is a joint program of the Illinois State Water Survey and the National Climatic Data Center, maintains a climate monitoring network across the Midwest. This network includes three climate monitoring sites within or near the Study Area. These three sites are located near the cities of Bemidji (MRCC, 2009a), Cass Lake (MRCC, 2009b), and Walker/Ah Gwah Ching (MRCC, 2009c). All three stations have complete monthly and yearly datasets for temperature and precipitation dating back nearly 100 years. Their proximity to the Study Area provides an appropriate representation of the climate in that area.

The climate records from the three monitors exhibit some local variations; therefore, discussion of weather norms is based upon an average of the three sites. Averaging the historical temperatures over the three stations for the 1971-2000 period indicates that the average annual daily maximum temperature is 49.8 degrees Fahrenheit (°F), and the average annual daily minimum temperature is 29.1°F. Historically, January is the coldest month, with an average daily maximum temperature of 15.9°F and an average daily minimum temperature of -5.4°F. The month of July is typically the warmest, with an average daily maximum temperature of 78.7 °F and an average daily minimum temperature of 57.0 °F. (MRCC, 2009a, 2009b, and 2009c)

Precipitation data collected from the three sites suggest more variation because of the localized nature of some precipitation events, but overall the data are relatively consistent. For the 1971-2000 period the normal yearly rainfall is 26.3 inches. July is historically the wettest month, averaging 4.3 inches (16 percent of normal annual total) of precipitation, while February is typically the driest month, averaging 0.6 inch of precipitation (2 percent of normal annual total). For annual snowfall, the area typically averages about 43.0 inches of snow per year, with the greatest average monthly snowfall of 10.6 inches (approximately 25 percent of the annual total) occurring in December. (MRCC, 2009a, 2009b, and 2009c)

Based upon an examination of historical temperature extremes across the three sites, the Project Study Area can usually expect 4 to 5 days annually with daily maximum temperatures in excess of 90°F, while winter nights with daily minimums below 0°F can occur for 55 to 60 days annually. For precipitation, the region can expect daily rainfall totals in excess of 1 inch for about 5 days annually, and daily snowfall events of greater than 2.0 inches can occur for approximately 8 days annually. (MRCC, 2009a, 2009b, and 2009c)

3.2.1.2. Air Quality

Pursuant to the requirements of the 1990 Clean Air Act (CAA), the United States Environmental Protection Agency (USEPA) was tasked with setting National Ambient Air Quality Standards (NAAQS) as defined in Title 40, *Code of Federal Regulations*, Part 50 (40 CFR 50) for pollutants that are considered harmful to public health and the environment (USEPA, 2009b). The USEPA's Office of Air Quality Planning and Standards (OAQPS) subsequently sets the standards for six principal pollutants, which are called "criteria pollutants" (Table 3.2.1). These pollutants are sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM_{10}/$PM_{2.5}$), ozone (O_3), carbon monoxide

(CO), and lead (Pb). The original CAA established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. These standards are mathematically defined using both parts per million (ppm) by volume and micrograms per cubic meter of air ($\mu g/m^3$).

Table 3.2-1: National Primary and Secondary Ambient Air Quality Standards

Emission Type	Averaging Period	NAAQS Primary μ/m^3 (ppm)	NAAQS Secondary μ/m^3 (ppm)
Carbon Monoxide (CO)	8-hour [a]	10,000 (9)	10,000
	1-hour [a]	40,000 (35)	40,000
Sulfur Dioxide (SO_2)	Annual	80 (0.03)	--
	24-hour [a]	365 (0.14)	--
	3-hour [a]	--	1,300 (0.5)
	1-hour [a,e]	1,300 (0.5)	
Nitrogen Dioxide (NO_2)	Annual	100 (0.05)	100
Ozone (O_3)	8-hour [b]	(0.075)	(0.075)
PM_{10}	Annual [e]	50	50
	24-hour [a]	150	150
$PM_{2.5}$[d]	Annual [d]	15	15
	24-hour [c]	35 65 [e]	35 65 [e]
Lead (Pb) [f]	Rolling 3-Month Average	0.15	--

Notes: a. Not to exceed more than once per year, per monitor location, averaged over a three year period.

b. As of May 27, 2008, the 8-hour ozone standard is met if the 3-year average of the fourth highest 8-hour ozone concentration at each monitor is not greater than 0.075 ppm.

c. In September 2006, EPA revised the 24-hour $PM_{2.5}$ standard from 65 to 35 $\mu g/m^3$, but the previous standard is currently applicable until EPA completes the attainment designation and implementation process. During any 12 consecutive months, 98 percent of the values shall not exceed 35 $\mu g/m^3$ under the new standard, and 65 $\mu g/m^3$ under the currently applicable standard. Minnesota has retained the 65 $\mu g/m^3$ standard.

d. Spatial average standard, applied by EPA over a neighborhood scale.

e. Standard is only a Minnesota standard.

f. The final rule for new lead standard was signed on October 15, 2008.

Source: USEPA, 2009b

The MPCA operates a network of 45 air quality monitoring sites throughout the state (MPCA, 2009b). The agency also supports operation of additional sites at three tribal sites, six $PM_{2.5}$ speciation sites, and 10 National Acid Deposition Program (NADP) sites. The air quality data collected from these monitors are analyzed to determine compliance with the NAAQS. The nearest MPCA ambient air quality monitors to the Study Area are located near the cities of Detroit Lakes (60 miles southwest of Bemidji; $PM_{2.5}/O_3$), Brainerd (84 miles southeast of Bemidji; $PM_{2.5}/O_3$), and Cloquet (120 miles east of

Bemidji; NO_2). Monitors are also located in "hotspot" urban areas such as Minneapolis-St. Paul and Duluth. As reported in the MPCA Annual Air Monitoring Network Plan for the State of Minnesota (MPCA, 2009a), the entire state of Minnesota has been in compliance with the NAAQS since 2002.

The Leech Lake Band of Ojibwe Air Quality Program operates a FRM PM 2.5 monitor (AQS monitor number 270210001881011). This would be the nearest PM 2.5 monitor to the Study Area. The monitor is not part of the MPCA network, but is an independent, tribally operated monitor within the USEPA network.

3.2.2. Direct/Indirect Effects

This section discusses the potential direct and indirect impacts to air quality and climate for the Project alternatives. As discussed in Section 3.2.1, the potential impacts to climate and air quality from construction and operation of the transmission line for all build alternatives (Route Alternatives 1, 2, and 3, and Segment Alternatives A through T), including segments traversing the Leech Lake Reservation (LLR) and Chippewa National Forest (CNF), would be generally similar. The direct and indirect effects of the No-Build Alternative are presented in Section 3.2.2.1, and potential impacts from the Project across the various Route and Segment Alternatives are discussed in Section 3.2.2.2.

Potential direct effects from the Project include:

- Change in air quality
- Contribution to climate change

Potential indirect effects from the Project include:

- Decrease in carbon sequestration
- Increase in fugitive dust

3.2.2.1. No-Build Alternative

Under the No-Build Alternative, the Project would not be constructed. No new transmission lines, land use changes, additional new access roads, or other Project related activities would occur. Consequently, there would be no direct impacts to local and regional climate or air quality.

3.2.2.2. Route Alternatives

Construction and operation of the Project would have some minor direct and indirect impacts on air quality and climate, as described below. Although the magnitude of ambient air quality impacts would generally be similar for all build alternatives, the duration, extent, and particular location of potential impacts would vary to some extent by alternative. Both Route Alternative 1 and Route Alternative 2 are of similar length, 69 and 68 miles respectively, and cross portions of the CNF and LLR. Route Alternative 3 traverses 116 miles, the greatest distance, but avoids a majority of the CNF and LLR lands. Evaluation of feasible 125′ rights of way for all three Route Alternatives show , Route Alternative 3 with the highest potential to remove tree cover, 813 forested acres, Route Alternative 1 would remove an estimated 579 forested acres and Route Alternative 2 would remove an estimated 439 forested acres. Thus, relative to the Route Alternatives 1 or 2, Route Alternative 3 would likely create the greatest magnitude and duration of construction related air quality impacts across its area and greatest reduction in carbon sequestration. However, Route Alternative 3 mostly avoids air quality impacts to the sensitive lands of the CNF and LLR.

Air Quality

Potential short-term impacts to air quality from construction of the Project could include temporary degradation of air quality from the emission of air pollutants during the operation of construction equipment and vehicles.

Black Carbon is a dust particulate emitted into the ambient air as a product of incomplete combustion of heavy petroleum products, fossil fuels, and biofuels. Black Carbon could be emitted during operation of heavy construction equipment and vehicles, or open burning of certain construction materials. Black Carbon can contribute to global warming because it can absorb heat in the atmosphere. Unlike carbon dioxide, which can remain in the atmosphere for years, Black Carbon is typically deposited within days to weeks. Upon deposition, it can also contribute to warming by reducing the albedo (the ability to reflect sunlight) of land surfaces, especially snow covered areas.

Minnesota Statute 88.171 addresses the issue of open burning in the state. Open burning of rubber, plastics, or chemically treated materials such as tires, lumber, composite shingles, paper, insulation, paint, and other material are prohibited. The Minnesota Department of Natural Resources handles open burning issues in the state and requests to open burn any material are subject to a ruling from the commissioner.

Localized air quality impacts also could occur from re-suspension of dust (i.e., particulate) in the ambient air as a consequence of earth moving activity and travel on unpaved roads. During construction activities, dust particulates have the potential to deposit on nearby or adjacent surfaces. However, for all of the alternatives, the air quality impacts are expected to be intermittent, to occur only during construction of the Project, and to remain within levels protective of the NAAQS.

The long-term primary air quality concerns related to transmission lines are emissions of ozone and nitrogen oxide near the conductor due to the development of a corona during Project operation. Physical damage, dust buildup, or water buildup may induce conductor irregularity, and potentially some corona discharge. The ionization of air results in an energy loss that creates audible noise, radio noise, light, heat, and small amounts of ozone. Corona consists of the breakdown or ionization of air within a few centimeters or less of the conductors. It usually occurs when the electric field intensity, or surface gradient, on the conductor exceeds the breakdown strength of air. Usually some imperfection, such as a scratch on the conductor or a water droplet, is necessary to cause corona. Corona discharges can be minimized by the proper selection of conductors.

Ozone is a very reactive form of oxygen and combines readily with other elements and compounds in the atmosphere. Ozone forms naturally in the lower atmosphere from lightning discharges, and in the presence of sunlight from chemical reactions between ozone precursors such as nitrogen oxides and hydrocarbons. The natural production rate of ozone is directly proportional to temperature and sunlight, and inversely proportional to humidity. Humidity (or moisture), the same factor that increases corona discharges from transmission lines, inhibits the production of ozone.

The USEPA has regulations regarding the permissible concentrations of ozone and oxides of nitrogen (62 Federal Register 38856) in the atmosphere. As shown in Table 3.2.1, the national standard is 0.075 parts per million (ppm) over a rolling 8-hour averaging period (40 CFR 50). This standard is based upon the measured fourth greatest 8-hour daily maximum average for ozone at each monitor in one year, average over a 3-year period.

Studies of monitored concentrations of ozone due to corona show no major incremental ozone concentrations at ground level, and minimal (0.001 to 0.008 ppm) concentrations at an elevation nearer to the transmission line. Typically, the greater level of ozone concentration would only be detected during heavy corona in foul weather, often a time with low background ozone levels. Additional testing showed that production of nitrogen oxides due to corona would be approximately one-fourth of the production of ozone due to corona. Relative to the NAAQS, increased concentrations of ozone due to corona would likely be on the order of one–hundredth to one-tenth of the standard near the elevated transmission line, and would be temporally or spatially negligible. Thus, the Project would likely have a negligible impact on air quality during operation on any of the Route or Segment Alternatives.

Climate Change

Climate change refers to an emerging consensus within the scientific community which indicates that global climate, particularly changes in temperatures, are affected by human activities. As described in the USDA Forest Service report, "*Interim Update of the 2000 Renewable Resources Planning Act Assessment*" (2007), it is widely acknowledged that climate variability influences the health of plant, insect, and animal ecosystems. The concern is that anthropogenic (man-made) greenhouse gas emissions such as carbon dioxide, methane, and nitrous oxides contribute to the altering of climate and ecosystems globally. Anthropogenic activities such as burning of fossil fuels and the coincidental land surface changes due to deforestation, reforestation, and urbanization, directly or indirectly add quantities of greenhouse gases into the atmosphere, particularly carbon dioxide. The magnitude of the increased greenhouse gas emissions due to these activities is often quantified in terms of their "carbon footprint." The carbon footprint can increase or decrease from activities that indirectly increase or decrease the atmospheric load of these greenhouse gases, which affect mechanisms that sequester carbon in other forms.

According to the MPCA Report to the Minnesota Legislature, "*Air Quality in Minnesota: Emerging Trends*" (2009a), emissions of CO_2 in Minnesota increased by 50 percent from 1970 to 2006. This increase was largely due to an increased reliance on the combustion of coal to generate electricity to handle increased load demand. As a result, the Minnesota legislature and the Governor signed the Next Generation Energy Act (2007) which initiated efforts to increase renewable energy use in the state, increase energy conservation, and decrease greenhouse gas emissions, especially CO_2. The Act also set specific greenhouse gas emissions reductions percentages from a 2005 baseline date for the years 2015, 2025, and 2050.

Construction of the Project would reduce current energy losses resulting from transmission system inefficiency. Energy losses can be expressed as CO_2 emissions, a source of greenhouse gas emissions. As part of the *Macrocorridor Study* for the Project (Otter Tail Power et al., 2008b) the Applicants evaluated the annual CO_2 reduction associated with the following four options for meeting electrical need: 1) rebuilding the existing 115 kV transmission line; 2) construction of a second Winger-Wilton 230 kV transmission line; 3) construction of the Badoura-Wilton 230 kV line; and 4) construction of the Project. Construction of the Project would result in improving voltage and efficiency in meeting power supply needs. It was determined that the Project would result in an estimated annual CO_2 reduction of 72,000 metric tons. The CO_2 loss reduction for the Project was determined to be 10 times greater than the rebuild option, 40 times greater than the Winger-Wilton option, and six times greater than the Badoura-Wilton option (Otter Tail Power et al., 2008b). The reduction in transmission line losses (CO_2 emissions) is greatest for Route Alternatives 1 and 2 due to their shorter length.

Construction of the Project may result in a minor decrease in terrestrial carbon sequestration (CO_2) potential due to the removal of existing tree cover along all build alternatives, with the greatest magnitude experienced over the alternative which requires the most temporary and permanent tree removal (USEPA, 2009a). However, this effect is expected to be negligible because the Applicants would be required by the *HVTL Route Permit* to restore cleared ROW, storage areas, and access roads with a suitable vegetative species.

In summary, the proposed alternatives and associated net change in air emissions are expected to be negligible. In addition, it is unlikely that temperature and precipitation climatology would deviate from the current natural trend as a result of the Project activities.

3.2.3. Mitigation

As construction of the Project proceeds, several mitigation measures could be implemented to minimize the short-term magnitude and spatial impact of off-site re-suspended dust into the atmosphere. Because the effects of the Project on air quality are expected to be minor, air quality mitigation measures specific to controlling emissions would typically not be included in the HVTL permit. Direct and indirect impacts (discussed below) would instead be addressed through best management practices (BMPs) and adherence to federal, state, and local regulations.

Temporary impacts from fugitive dust would be minimized or avoided by using BMPs to control dust during construction of the Project. During the construction phase, construction and traffic activities could be monitored for dust generation. To minimize dust particle displacement on unpaved roads, vehicle traffic could be operated at reduced speeds. Water and other dust abatement methods could be used to wet down dust-laden roadways. Oil and other petroleum derivatives are not generally recommended for dust control as they can potentially increase runoff rates and contribute to water quality issues. MPCA air quality rules (Minn. R. 7011.0150) acknowledge the need to avoid release of fugitive particulate matter to the air and require reasonable control measures such as regular clearing of roadways, application of dust-free surfaces, water application or planting of vegetation.

Restoration of cleared ROWs, storage areas, and access roads would be a condition in the HVTL permit issued by the Commission. Minimizing the extent of disturbed areas in the Project area would limit the potential for dust generation. Restoration of the natural landscape would commence shortly upon cessation of construction activities, as is typically required as a condition of the HVTL permits issued by the Commission.

The permitting agencies could require that vehicles used during construction be well maintained in compliance with Federal and State air quality regulations. Equipment and vehicles that showed excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, could be removed from service until repairs or adjustments were made. Limiting idle times and performing shutdowns of equipment when not in use could be practiced. LLDRM has requested that idle times be monitored and limited, and that construction contractors use 15 ppm ULSD in on and off-road equipment.

LLDRM has stated that slash piles will not be burned on or near the boundaries of the LLR in order to reduce the potential for black carbon and other emissions within the LLR.

Decreases in terrestrial carbon sequestration from the clearing of ROW could be substantially offset by the re-planting of new growth vegetation (USEPA, 2009a).

3.3. Geology and Soils

This section describes the topographic, geologic, and soils resources that are crossed by the Route and Segment Alternatives, the potential impacts of the Route and Segment Alternatives on those resources, and potential mitigation measures to reduce or eliminate those potential impacts.

3.3.1. Affected Environment

This section describes the topography, geography, and soils present within the Study Area. The Study Area is defined as the 1,000-foot-wide route proposed by the Applicants for Route Alternatives 1, 2, and 3 and Segment Alternatives A through T. Only potential effects to soils will be discussed. Background information on topography and geology are presented here to provide context for the soils effects discussion.

3.3.1.1. Topography

Surface topography in the Study Area is flat to gently rolling, with slopes generally ranging from 4 to 8 percent. Slopes may be infrequently as steep as 16 percent. The Study Area is characterized by low relief, where undulating plains are marked by gently sloping swells, sags, and depressions (Carney and Mooers, 1998). Surface elevations range from 1,250 to 1,450 feet above sea level in the Study Area (Otter Tail Power et al., 2008a).

The Study Area includes many lakes; rivers, streams, and creeks; and marshes and wetlands, which are typical of terrain subjected to geologically recent glacial occupation. The Mississippi River generally parallels the alternatives, running through Lake Bemidji, Cass Lake, and Lake Winnibigoshish. Other large bodies of water in the vicinity of the alternatives include Pike Bay, Portage Lake, and portions of Cass Lake, Lake Winnibigoshish, Ball Club Lake, Big Fork River, Bow String Lake, Sand Lake, Rice Lake, Turtle River, Turtle Lake, and Little Jesse Lake (Otter Tail Power et al., 2008a).

3.3.1.2. Geology

Approximately 100 to 600 feet of glacially derived sediments overlie the bedrock within the Study Area (MnDNR, 2009b). Approximately half of the Study Area is covered with glacial outwash, consisting of sands and gravels deposited during glacial melting, with approximately 40 percent covered by ground moraines, which are sandy loam to clay loam till deposits that were deposited at the base of a glacier. Discontinuous sand lenses may also be present in the Study Area (Otter Tail Power et al., 2008a).

Due to the thickness of the glacial sediment deposits, it is appropriate to describe the geology of the Study Area based upon glacial sediment rather than bedrock geology. Transmission line structures and underlying foundations would be installed at depths of 10 to 15 feet below ground surface. As such, it is not expected that bedrock would be encountered during construction. Due to the surficial boundaries of construction, this discussion is limited to an overview analysis of geological conditions.

The ecological land classification system was used to describe the Study Area. The ecological land classification system is used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features. The Study Area is located within the northern Minnesota Drift and Lake Plains Ecological Section and covers portions of the Chippewa Plains and St. Louis Moraines subsections (MnDNR, 2009b; MnDNR, 2009d). The Chippewa Plains subsection covers most of the Study Area. This subsection is characterized by ground moraines, stagnation moraines, a lake plain, and an outwash plain. Moraines are topographically diverse deposits of mixed glacial till, left behind by retreating glaciers. Glacial outwash and lake plains are typically flat, comprised of finer sediments deposited by flowing or standing glacial melt water (Otter Tail Power et al., 2008a). The St. Louis Moraines subsection consists of ground moraines and a pitted outwash plain (MnDNR, 2009b). A cap of calcareous gray sediment from 1 to 10 feet in depth covers most of the subsection. Coarse loamy sediments underlie the cap (MnDNR, 2009b).

Bedrock in the Study Area is primarily composed of Pre-Cambrian aged granite-greenstone in a belt that formed 2.5 to 2.9 billion years ago. The dominant bedrock type is of granitic composition, occupying approximately two-thirds of the Study Area. Bedrock in the remainder of the Study Area is composed of basalt and monzonite, with minor greywacke sandstone. (Morey and Meints, 2000) There are several small faults that run east-west within or on the edge of the Study Area. However, there is only a minor seismic hazard in Minnesota as a whole (USGS, 2007).

3.3.1.3. Soils

The U.S. Department of Agriculture Natural Resource Conservation Service (NRCS) Soil Survey Geographic (SSURGO) database describes the soil resources within the Study Area. Soils are generally grouped into categories known as associations. A soil association has a distinctive pattern of soils, relief and drainage, and is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. The soils in the Study Area are grouped into 11 soil associations, as shown in Tables 3.3-1 and 3.3-2 and in Figure 3.3-1. Generally, the soils found along the Route and Segment Alternatives are moderately well-drained to excessively well-drained sandy loams or loamy sands on uplands, with poorly-drained muck soils found in the large wetland depressions, peatlands, and bogs. Route Alternatives 1 and 2 consist generally of well drained soils, approximately 81 and 86 percent, respectively. Route Alternative 3 has a somewhat larger representation of poorly drained soils, resulting in approximately 73 percent well drained soils. Prime farmlands located in the Study Area and for each alternative are described in Section 3.14, Agriculture.

Table 3.3-1: Soil Associations for the Route Alternatives

Soil Associations	Route Alternative 1	Route Alternative 2	Route Alternative 3
Andrusia-Graycalm-Marquette (MN027) The Association consists of very deep, well drained and somewhat excessively drained soils. They formed in sandy and gravelly sediments and deposits on glacial outwash plains, glacial lake beaches, outwash plains, glacial stream terraces, and moraines, kames, and stream terraces.	3.7	0.0	2.2
Cathro-Seelyeville-Markey (MN065) The Association consists of very deep; very poorly drained organic soils moderately deep to loamy materials. They formed in organic material 16 to 51 inches thick overlying loamy glacial or sandy deposits on ground moraines, end moraines, outwash plains, lake plains, stream/river terraces, flood plains, and valley trains.	1.2	0.0	0.0
Cutaway-Sandwick-Greenwood (MN279) The Cutaway-Sandwick series consists of very deep, moderately well to poorly drained soils formed in a sandy glacial outwash or eolian mantle and underlying calcareous, loamy till. These soils are on moraines, lake washed till plains and glacial beach ridges. The Greenwood series consists of very deep, very poorly drained soils formed in organic deposits more than 51 inches thick on outwash plains, till floored lake plains, or lake plains.	0.2	0.0	1.1
Greenwood-Rifle-Cathro (MN473) The Association consists of very deep, very poorly drained soils formed in organic deposits more than 51 inches thick on outwash plains, till floored lake plains, lake plains, ground moraines, end moraines, or in bogs and depressional areas.	10.2	6.8	12.5
Indus-Taylor-Dalbo (MN277) The Association consists of deep, poorly and somewhat poorly to moderately well drained soils formed in clayey calcareous, glacial lacustrine sediment on lake plains.	3.0	6.3	10.2
Menahga-Graycalm-Mooselake (MN026) The Association consists of very deep, excessively drained to well drained soils that formed in sandy glacial outwash sediments on outwash plains, valley trains, and some moraines, drumlins, kames, and stream terraces. Some components consist of very poorly drained organic soils that formed mostly in hemic organic soil material with woody fiber.	16.6	42.5	18.6
Nebish-Shooker-Beltrami (MN045) The Association consists of very deep, well drained to poorly drained soils formed in calcareous loamy glacial till on glacial moraines and till plains.	8.1	2.3	29.8
Rifle-Tacoosh-Seelyeville (MN066) The Association consists of very deep, very poorly drained soils formed in organic deposits more than 51 inches thick in bogs and depressional areas within ground moraines, end moraines, outwash plains, lake plains, till plains, valley trains, and flood plains.	3.7	1.4	0.0

Soil Associations	Route Alternative 1	Route Alternative 2	Route Alternative 3
Sol-Nary-Stuntz (MN055) The Association consists of very deep, well drained to somewhat-poorly drained soils that formed in loamy or calcareous glacial till on moraines. They are on glaciated ground moraines and end moraines.	0.0	0.3	4.0
Warba-Cutaway-Stuntz (MN015) The Association consists of very deep, moderately well and well drained soils formed in loamy calcareous glacial till on moraines, sandy glacial outwash or eolian mantle, lake washed till plains, and glacial beach ridges.	20.6	6.9	0.0
Zimmerman-Cowhorn-Mooselake (MN272) The Association consists of very deep, excessively drained soils that formed in sandy glacial outwash or eolian sediments on glacial outwash plains, stream terraces, deltas, lake terraces, dunes, beach deposits and valley trains. Some components consist of very poorly drained organic soils that formed mostly in hemic organic soil material with woody fiber.	32.7	33.6	0.9

Sources: U.S. Department of Agriculture, NRCS. 2003. State Soil Survey Geographic (SSURGO) Data Base for Minnesota.

Table 3.3-2: Soil Associations for Segment Alternatives

Soil Associations	Segment Alternatives																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Cathro-Seelyeville- Markey (MN065) The Association consists of very deep; very poorly drained organic soils moderately deep to loamy materials. They formed in organic material 16 to 51 inches thick overlying loamy glacial or sandy deposits on ground moraines, end moraines, outwash plains, lake plains, stream/river terraces, flood plains, and valley trains.	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Greenwood-Rifle- Cathro (MN473) The Association consists of very deep, very poorly drained soils formed in organic deposits more than 51 inches thick on outwash plains, till floored lake plains, lake plains, ground moraines, end moraines, or in bogs and depressional areas.	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indus-Taylor-Dalbo (MN277) The Association consists of deep, poorly and somewhat poorly to moderately well drained soils formed in clayey calcareous, glacial lacustrine sediment on lake plains.	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Menahga-Graycalm- Mooselake (MN026) The Association consists of very deep, excessively drained to well drained soils that formed in sandy glacial outwash sediments on outwash plains, valley trains, and some moraines, drumlins, kames, and stream terraces. Some components consist of very poorly drained organic soils that formed mostly in hemic organic soil material with woody fiber.	7	49	0	16	0	100	100	100	100	0	65	0	51	0	0	0	0	0	0	0
Nebish-Shooker- Beltrami (MN045) The Association consists of very deep, well drained to poorly drained soils formed in calcareous	75	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	43	65	49

Soil Associations	Segment Alternatives																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
loamy glacial till on glacial moraines and till plains.																				
Warba-Cutaway-Stuntz (MN015) The Association consists of very deep, moderately well and well drained soils formed in loamy calcareous glacial till on moraines, sandy glacial outwash or eolian mantle, lake washed till plains, and glacial beach ridges.	11	51	0	84	0	0	0	0	0	0	27	100	49	100	100	0	0	0	0	0
Zimmerman- Cowhorn-Mooselake (MN272) The Association consists of very deep, excessively drained soils that formed in sandy glacial outwash or eolian sediments on glacial outwash plains, stream terraces, deltas, lake terraces, dunes, beach deposits and valley trains. Some components consist of very poorly drained organic soils that formed mostly in hemic organic soil material with woody fiber.	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0

Sources: U.S. Department of Agriculture, NRCS. 2003. State Soil Survey Geographic (SSURGO) Data Base for Minnesota.

3.3.2. Direct/Indirect Effects

Potential effects on soils from the Project build alternatives on the 125-foot right-of-way (ROW) are discussed below. No changes to topography or geology are expected and will not be discussed further.

Potential direct effects to soils include:

- Soil movement and displacement

Potential indirect effects to soils include:

- Changes in plant and wildlife habitat
- Changes to water quality from erosion and sedimentation if best management practices (BMPs) are not followed during construction
- Changes to land use

3.3.2.1. No-Build Alternative

The No-Build Alternative would result in no additional transmission line development and, as such would not impact area soils.

3.3.2.2. Route Alternatives and Alternative Route Segments

Surface soils would be disturbed by site clearing, grading, and excavation activities at structure locations, pulling and tensioning sites, setup areas, and during the transport of crews, machinery, materials, and equipment over access routes (primarily along the transmission ROW).

Disturbed soils can be subject to erosion, defined as the detachment and transport of individual soil grains by wind or water. Erosion by wind is related to soil moisture, soil texture, organic matter content, soil structure, vegetative cover, and climate. Wind erosion often occurs on dry, fine sandy soils when vegetation cover is sparse and strong winds are prevalent. Water erosion is related closely to a soil's infiltration capacity and the coherence of the soil particles that comprise the soil. Soil properties that influence water erosion include soil texture, percent organic matter, soil structure, soil infiltration capacity, and soil permeability. Soils containing high proportions of silt and very fine sand are most erodible. Well-drained and well-graded gravels and gravel sand mixtures with little or no silt are the least erodible soils. Water erosion is also influenced by slope length and gradient, as well as frequency, intensity, and duration of rainfall and the amount of time bare soils are exposed (USDS, 2008). Erosion in the Study Area could be caused by site clearing and earthmoving in addition to natural processes. However, analysis of the soil types in the Study Area indicates that there are no soils in the Study Area that are considered highly erodible by wind or water.

During extended periods of saturation, poorly drained soils can be prone to compaction and rutting. If construction activities, particularly the operation of heavy equipment, occur when these soils are saturated, compaction and rutting could occur. Soil compaction is defined as the packing of soils by the application of loads or pressure, such as by the movement of heavy construction equipment over the soils. This is primarily expected to occur during construction, but could also occur if heavy equipment is driven over ROWs for maintenance during operation of the Project. Soil compaction has a restrictive action on water penetration, root development, and the rate of oxygen diffusion into soils. Low density and change of vegetation types may be an indirect effect of soil compaction. Soil characteristics that affect soil compaction include soil texture, soil moisture, and grain size. All soil types are susceptible to compaction and would also be susceptible to rutting if construction occurs when the upper layers of these soils are moist or near saturation. Wet organic soils pose a challenge for construction and are most susceptible to compaction (USDA, 2001).

Construction of the Project is expected to disturb approximately 879 to 1,075 acres of soil, depending upon the Route Alternative. Long-term impacts from the placement of Project structures were calculated for a feasible 125-foot ROW assuming an impact area of approximately 300 square feet per structure. Long-term impacts are defined as soils removed for pole placement where vegetation would not return during the Project lifetime due to the placement of structures. Temporary impacts were assumed to occur along the entire ROW evaluated, except in locations where the ROW would be reduced to 30 feet to reduce crop damage (Otter Tail Power et al., 2008a). Temporary impacts are defined as the disturbance of soils during Project construction, which could lead to erosion or compaction. These impacts are considered temporary, as the ROW would largely be returned to pre-construction conditions, as possible, during restoration. However, in some areas, temporary impacts such as soil compaction would be prolonged if heavy equipment is driven over the ROW for maintenance purposes during operation of the Project. The vast majority of impacted acreage, from 876 acres for Route Alternative 1 to 1,070 acres for Route Alternative 3, would be related to construction equipment and clearing of the ROW and thus temporary impacts. Depending upon the Route Alternative, approximately 3 to 5 acres would undergo long-term conversion from current cover types due to the installation of pole structures (Table 3.3-3).

For the ROWs evaluated, Segment Alternative A would impact the greatest amount of acreage (181 acres) on both a long-term and temporary basis, while Segment Alternative Q would impact the least amount of acreage (2 acres) on both a long-term and temporary basis. This analysis assumes that setup and staging sites would be limited to existing disturbed areas; temporary or long-term impacts are not accounted for in Table 3.3-3. If non-disturbed areas are used for set-up and staging, including existing ROWs that have been restored, these areas could experience temporary impacts from construction activities.

Table 3.3-3: Effects upon Soils within a Feasible 125-foot Right-of-Way

Route and Segment Alternatives	Acres of Long-Term Impacts	Acres of Temporary Impacts	Total Impact Acres	Total ROW Acres
Route Alternatives				
1	3	876	879	1,046
2	3	931	934	1,032
3	5	1,070	1,075	1,761
Segment Alternatives				
A	0.71	181	181.71	1,901
B	0.48	154	154.48	1,271
C	0.20	67	67.02	525
D	0.23	49	49.23	591
E	0.48	119	119.48	1,299
F	0.06	18	18.06	179
G	0.07	15	15.07	199
H	0.05	12	12.05	121
I	0.02	3	3.02	59
J	0.02	8	8.02	53
K	0.27	71	71.27	735
L	0.11	27	27.11	298
M	0.11	34	34.11	296
N	0.17	56	56.17	441
O	0.13	42	42.13	325
P	0.02	5	5.02	64
Q	0.01	2	2.01	5
R	0.08	14	14.08	233
S	0.04	7	7.04	133
T	0.09	19	19.09	262

Route Alternative 1 would require construction of a new substation located in the Cass Lake area and construction of a Nary Breaker Station at the existing Nary Junction (under Segment Alternative A). Route Alternative 2 would require the expansion of an existing Cass Lake Substation. The location proposed for the new Cass Lake substation associated with Route Alternative 1 consists of approximately four acres of forested land. The Nary Breaker Station would require the removal of approximately 2.5 acres of woody vegetation. The Cass Lake Substation expansion would be constructed on previously disturbed land owned by Otter Tail Power. All acreage used for substation construction or expansion would represent a long-term impact to soils.

3.3.2.3. Leech Lake Reservation

Soil types within the Leech Lake Reservation (LLR) are consistent with those found throughout the Study Area. Table 3.3-4 summarizes potential soil impacts for the feasible 125-foot ROW evaluated within each Route Alternative and Segment Alternative. Temporary impacts associated with construction, as described above, within the ROW evaluated would range from 4 acres with Route Alternative 3 to 631 acres with Route Alternative 2. No Project structures would be placed within the LLR for Route Alternative 3; thus, Route Alternative 3 would result only in temporary impacts to the LLR during the construction phase. Route Alternatives 1 and 2 would both have approximately 2 acres of long-term impacts within the Leech Lake Reservation from placement of Project structures.

Segment Alternative E would impact the greatest amount of acreage (1,268 acres) within the 125-foot ROW. However, Segment Alternative B would impact the greatest amount of acreage (154 acres) during construction on a temporary basis for the ROW evaluated. Segment Alternative Q would impact the least amount of acreage (2 acres) due to construction and pole placement within the ROW evaluated.

Table 3.3-4: Effects upon Soils within a Feasible 125-foot Right-of-Way within the LLR

Route and Segment Alternatives	Acres of Long-Term Impacts	Acres of Temporary Impacts	Total Impact Acres	Total ROW Acres
Route Alternatives				
1	2	618	620	662
2	2	631	633	660
3	0	4	4	4
Segment Alternatives				
A	N/A			
B	0.48	154	154.48	1,270
C	0.18	61	61.18	482
D	0.21	45	45.21	536
E	1,161	107	1,268	1,161
F	0.06	18	18.06	179
G	N/A			
H	N/A			
I	N/A			
J	N/A			
K	0.10	29	29.10	285
L	0.08	20	20.08	206
M	0.11	34	34.11	296
N	0.17	56	56.17	441
O	0.13	42	42.13	325
P	0.02	5	5.02	64
Q	0.01	2	2.01	5
R	N/A			
S	N/A			
T	N/A			

3.3.2.4. Chippewa National Forest

Soil types within the Chippewa National Forest (CNF) are consistent with those found throughout the Study Area. Table 3.3-5 summarizes potential soil impacts for the ROW evaluated within each Route and Segment Alternative. Construction impacts would range from 281 acres with Route Alternative 2 to 846 acres with Route Alternative 3. Long-term impacts from structure placement would be considerably smaller; approximately 1 acre with Route Alternatives 1 and 2 and 3 acres with Route Alternative 3. Segment Alternative E would impact the greatest amount of acreage both long-term (0.48 acre) and temporarily (119 acres), while Segment Alternative S would not affect any acreage.

Table 3.3-5: Effects upon Soils within a Feasible 125-foot Right-of-Way within the CNF

Route and Segment Alternatives	Acres of Long-Term Impacts	Acres of Temporary Impacts	Total Impact Acres	Total ROW Acres
Route Alternatives				
1	1	341	342	348
2	1	281	282	284
3	3	846	849	920
Segment Alternatives				
A	N/A			
B	0.23	77	77.23	619
C	0.05	16	16.05	125
D	0.01	2	2.01	19
E	0.48	119	119.48	1,163
F	0.06	18	18.06	179
G	N/A			
H	N/A			
I	N/A			
J	N/A			
K	N/A			
L	N/A			
M	N/A			
N	0.17	56	56.17	27
O	0.13	42	42.13	325
P	0.02	5	5.02	64
Q	N/A			
R	0.04	7	7.04	110
S	0.00	0.00	0.00	8
T	0.03	6	6.03	73

3.3.3. Mitigation

The following section summarizes the mitigation measures that could be implemented to reduce the potential impacts from construction equipment and activities. Mitigation measures that are typically included in permits are noted. Cases where additional mitigation measures may be incorporated as a permit condition are also noted.

Areas disturbed during construction would be re-graded to reflect topography existing prior to construction to the extent practicable; this is typically included as a HVTL permit condition. The Applicants have also agreed to evenly spread within the ROW, in an upland topographic position, any soil material that had been removed for pole installation (Otter Tail Power et al., 2008a). If topsoil is removed from the CNF, which may affect surficial topography, it must be salvaged and reused in accordance with the 2004 *Forest Plan*.

Avoidance of soil disturbance and excavation activities in steep slope areas, to the extent possible, is the preferred mitigation strategy to minimize the potential for erosion during construction and operation of the Project. Where disturbance and excavation cannot be avoided entirely, it could be minimized using Best Management Practices (BMPs).

Under the HVTL permit conditions, the Applicants would be required to develop a Soil Erosion and Sediment Control Plan. Additionally, the Applicants would be required to obtain coverage under the state general permit for storm water discharges associated with construction activities, and to develop a Storm Water Pollution Prevention Plan (SWPPP) prior to the start of construction. These plans are required to outline the BMPs that would be used during construction, especially focusing upon periods of major precipitation events. The plans require visual inspections of affected areas to ensure that the BMPs stated in the plans are conducted. To minimize runoff and soil erosion, BMPs would include one or more of the following: the installation of silt fencing, straw bales or ditch blocks and/or covering bare soils with mulch, plastic sheeting, or fiber rolls to protect drainage ways and streams from sediment runoff from exposed soils.

The following BMPs are often used to minimize effects on soils that may result from construction of high voltage transmission lines. The Applicants (Otter Tail Power et al., 2008a) have agreed to implement the following mitigation measures:

- to restore compacted soils to their native state through tillage operations, using a subsoiler;
- limit setup and staging sites to previously disturbed areas;
- identification of wet organic soils through mapping and, if necessary on-site investigations and soil borings;
- to the extent practicable, to complete construction in the wet organic soils when the ground is frozen; and
- to revegetate all disturbed areas once construction is complete. Seed mixes could be specified based upon site characteristics and in accordance with regulatory permits.

If topsoil is removed from the CNF, it must be salvaged and reused in accordance with the 2004 *Forest Plan*.

Additional mitigation measures that could be implemented include:

- In the event that previously contaminated soils are discovered during construction, the Applicants could stop work immediately, contact the appropriate state or tribal agency, and consult with the agency with respect to an acceptable plan of action.
- The SWPPP could also include procedures for proper storage and disposal of all hazardous and non-hazardous wastes generated during the construction process.

- Use controlled staging areas for refueling and hazardous material loading/unloading operations, and provide adequate spill cleanup materials and equipment. In the event that a spill did occur and cause damage to soil productivity, the Applicants could restore the productivity of the ROW. Any spill impacts would have to be mitigated in compliance with applicable federal, state, tribal, and local cleanup standards.

3.4. Water Resources

Hydrologic features, such as, lakes, rivers, streams, wetlands, and floodplains perform important functions within a landscape, including flood attenuation, groundwater recharge, water quality protection, and wildlife habitat production. This section provides a summary of surface water, water quality, and groundwater resources present in the Study Area, which is defined as the 1,000-foot-wide route for each Route and Segment Alternative. Floodplains are discussed in Section 3.5, while wetlands are addressed in Section 3.6.

Information about Public Waters in Minnesota was obtained from the Minnesota Department of Natural Resources (MnDNR). Information about surface and groundwater quality was obtained from the Minnesota Pollution Control Agency (MPCA). Information about Public Waters obtained from the MnDNR and MPCA was supplemented with information regarding waters of the United States from the U.S. Army Corps of Engineers (USACE), as needed. This information was analyzed to determine the location and condition of surface and groundwater resources within the Study Area and potential effects of the Project on those conditions.

3.4.1. Affected Environment

The following sections provide a summary of the existing surface water, water quality, and groundwater resources present in the Study Area.

3.4.1.1. Surface Waters

Numerous streams, rivers, and lakes are present within the Study Area. The Study Area includes 99 Public Water Inventory (PWI) basins (i.e., lakes and ponds) and 32 PWI watercourses (i.e., rivers and streams) (MnDNR, 2009m). Waters of the U.S., as defined by the USACE, are included in the state's PWI database and are incorporated in the discussion of PWI basins and watercourses. The locations of the PWI water bodies in the Study Area are summarized by county in Table 3.4-1.

Table 3.4-1: PWI Water Bodies within the Study Area Counties

PWI Type	Beltrami County	Cass County	Hubbard County	Itasca County	Totals
Basins*	21	37	9	32	**99**
Watercourses**	7	4	5	16	**32**

Notes: * Two of these basins overlap county boundaries.
** The Mississippi River forms portions of the Cass County and Itasca County borders.
Source: MnDNR, 2009m

The Study Area lies within the Mississippi River Headwaters and the Leech Lake River watersheds of the Upper Mississippi River Basin. Surface waters within the Mississippi River-Headwaters watershed flow towards the Mississippi River, and surface waters within the Leech Lake River watershed flow towards the Leech Lake River. The Leech Lake River generally flows in an easterly direction, reaching a confluence with the Mississippi River at the Itasca-Cass County line, about 1.5 miles south of Ball Club Lake. The Study Area also includes areas within the Big Fork River and Upper and Lower Red Lake watersheds.

Major streams and rivers within the Study Area include the Mississippi River, Schoolcraft River, Necktie River, Leech Lake River, Ball Club River, Deer River, Turtle River, Gull River, Bowstring River, and Big Fork River. Large lakes include Cass Lake, Pike Bay, Leech Lake, Lake Winnibigoshish, Ball Club Lake, and Jessie Lake. Most of these lakes are hydrologically connected to nearby streams and rivers. Figure 3.4-1 illustrates the locations of water resources identified within the Study Area.

State-protected Public Waters are water basins and watercourses in Minnesota with significant recreational or natural resource value, as defined in Minnesota Statutes § 103G.005. The MnDNR has regulatory jurisdiction over these waters.

The USACE has regulatory jurisdiction over waters of the United States including many lakes, rivers, streams, and wetlands pursuant to Section 404 of the Clean Water Act, and jurisdiction over Navigable Waters of the United States pursuant to Section 10 of the 1899 Rivers and Harbors Act. The placement of transmission line pole structures, land clearing that involves soil disturbance, or placement of construction mats may be considered a discharge of fill material that would require a permit from the Department of the Army pursuant to Section 404 of the Clean Water Act. In addition, the placement of a transmission line in, on, or over a navigable water body (i.e. Mississippi River) would require a permit pursuant to Section 10. A description of this permit and other federal, state, and local permits and regulatory approvals that may be required for construction and operation of the Project are discussed in Section 6.0, Regulatory Permits.

Transmission lines that cross Navigable Waters of the United States, as defined by Section 10 of the 1899 Rivers and Harbors Act, which includes the Mississippi River, must maintain a minimum height requirement above that required for bridges. For a 230 kV transmission line, the minimum height requirement is 26 feet above required bridge height, as stated in 33 CFR 322.5.

Route Alternatives and Segment Alternatives

PWI rivers and streams within or adjacent to the Route Alternatives are shown in Table 3.4-2. Route Alternative 3 has more stream crossings, 27, than Route Alternatives 1 or 2, 12 and 7, respectively. Route Alternatives 1 and 2 do not follow existing transmission lines for the majority of their length; thus, the majority of river and stream crossings listed would represent new crossings. Route Alternative 3 would follow an existing 69 kV transmission line easement for 79 percent of its length; thus, the majority of river and stream crossings listed for Route Alternative 3 would represent existing crossings. The introduction of new crossings is discussed as a potential impact in Section 3.4.2.1.

The locations of the PWI wetlands are described in Section 3.6, Wetlands.

Table 3.4-2: Rivers and Streams Crossed by Route Alternatives

PWI Watercourses	Route Alternative 1	Route Alternative 2	Route Alternative 3
Mississippi River	X	X	X
Schoolcraft River	X	-	X
Necktie River	X	-	X
Unnamed Necktie Tributary	X	-	-
Unnamed Tributary at Pike Bay/Cass Lake	X	X	-
Sucker Creek	X	-	-
Portage Creek	X	-	-
Ball Club River	X	X	-
Deer River	X	X	X
Blackwater Creek	X	X	X
Turtle River	-	-	X
Gull River	-	-	X
Skimmerhorn Creek	-	-	X
Spring Creek	-	-	X
Moore Creek	-	-	X
Popple River	-	-	X
Wagner River	-	-	X
Bowstring River	-	-	X
Hinken Creek	-	-	X
Unnamed stream	-	-	X
Big Fork River	-	-	X
Little Turtle Creek	-	-	X
Unnamed Tributary at Jessie Lake	-	-	X
Unnamed Tributary at Four Town Lake	-	-	X
Deer River	-	-	X
Unnamed Tributary at Deer River	-	-	X
Total Crossings	**12**	**7**	**27**

Notes: 1. X indicates that part of the PWI watercourse is crossed by the right-of-way.
2. Route Alternatives 1 and 2, cross the Mississippi River in multiple locations. Route Alternative 3 crosses the Turtle River and Bowstring River in multiple locations. The calculated Total Crossings presented in the table reflect the total number of crossings, not the number of individual rivers and streams crossed. Those rivers and streams that are crossed in multiple locations are accounted for in the number of total crossings.

Source: MnDNR, 2009m

PWI basins within or adjacent to the Route Alternatives are shown in Table 3.4-3. As with the water crossings, Route Alternative 3 has more PWI basins, 19, compared to Route Alternatives 1 and 2, which both have six. The water bodies identified in Tables 3.4-2 and 3.4-3 are all Minnesota Protected Waters.

Table 3.4-3: PWI Basins Identified within the Route Alternatives

PWI Basin	Route Alternative 1	Route Alternative 2	Route Alternative 3
Marquette Lake	X	-	-
Moss Lake	X	-	-
Twin Lake	X	-	-
Nushka Lake	X	-	-
White Oak Lake	X	X	-
Blackwater Lake	X	-	-
Strawberry Lake	-	X	-
Pike Bay	-	X	-
Unnamed Lake near Winnibigoshish Lake	-	X	-
Midge Lake	-	X	-
Ball Club Lake	-	X	-
Bemidji Lake	-	-	X
Unnamed Lake near Bemidji Lake	-	-	X
Turtle River Lake	-	-	X
Gallagher (Rhoda) Lake	-	-	X
Carter Lake	-	-	X
Erickson Lake	-	-	X
Crandall Lake	-	-	X
Natures Lake	-	-	X
Whitefish Lake	-	-	X
Holloway Lake	-	-	X
Unnamed Lake (Just south of Spur Lake)	-	-	X
Unnamed Lake (Just north of Crooked Lake)	-	-	X
Big Rose Lake	-	-	X
Unnamed Lake (Just south of Big Rose Lake)	-	-	X
Big Too Much Lake	-	-	X
Jessie Lake	-	-	X
Total Crossings	**6**	**6**	**19**

Notes: 1. X indicates that part of the PWI basin is within the right-of-way.
2. Route Alternative 3 crosses the Unnamed Basins (3) west of Route 6 in multiple locations. This has been accounted for in the calculation of Total Crossings presented in the table.

Source: MnDNR, 2009m

PWI water crossings for Segment Alternatives are shown in Table 3.4-4.

Table 3.4-4: Segment Alternative Water Crossings

Segment Alternatives	PWI Rivers and Streams Crossed	PWI Water Basins
A	3	N/A
B	N/A	N/A
C	1	N/A
D	N/A	N/A
E	2	N/A
F	N/A	N/A
G	N/A	N/A
H	N/A	N/A
I	N/A	N/A
J	N/A	N/A
K	1	1
L	N/A	N/A
M	N/A	N/A
N	N/A	N/A
O	N/A	N/A
P	N/A	N/A
Q	N/A	N/A
R	N/A	N/A
S	N/A	N/A
T	N/A	N/A

Leach Lake Reservation

Route Alternative 1 would cross the following rivers, streams, and water basins within the LLR: Moss Lake, Twin Lake, an unnamed wetland south of Portage Water Basin, an unnamed stream north of Moss Water Basin, Sucker Creek, Portage Creek, Mississippi River, and Deer River.

Route Alternative 2 would cross the following rivers, streams, and water basins within the LLR: Pike Bay, an unnamed connector stream near Pike Bay, Mississippi River, and Ball Club River.

Route Alternative 3 was designed to largely avoid the LLR and would not cross any rivers, streams, and water basins within the boundaries of the LLR.

The following Segment Alternatives would cross rivers, streams, and water basins within the LLR:

- Segment Alternative C would cross the Leech Lake River.
- Segment Alternative E would cross an unnamed stream and Grouse Creek.
- Segment Alternative K would cross Spike Wetland.
- Segment Alternative M would cross an unnamed wetland directly west of Pike Bay.

Chippewa National Forest

Route Alternative 1 would cross the following rivers, streams, and water basins within the CNF: Moss Lake, Twin Lake, White Oak Lake, an unnamed wetland directly south or Portage Water Basin, an unnamed stream north of Moss Lake, Sucker Creek, Portage Creek, Mississippi River, and Deer River.

Route Alternative 2 would cross the following rivers, streams, and water basins within the CNF: Pike Bay, White Oak Lake, an unnamed connector stream near Pike Bay, and the Mississippi River.

Route Alternative 3 would cross the following rivers, streams, and water basins within the CNF: Carter Lake, Jessie Lake, Whitefish Lake, Natures Lake (multiple crossings), an unnamed wetland east of Long Water Basin, an unnamed wetland north of Crooked Water Basin, an unnamed connector stream to the west of Gull Water Basin (multiple crossings), an unnamed stream east of Erickson Water Basin, Popple River (multiple crossings), Wagner Creek, Big Fork River (multiple crossings), an unnamed stream of Big Fork River Branch, Hinken Creek (west and east branches), Fletcher Creek, Little Turtle Creek, and an unnamed stream out of Jessie Lake (multiple crossings).

The following Segment Alternatives would cross rivers, streams, and water basins within the CNF:

- Segment Alternative C would cross the Leech Lake River.
- Segment Alternative E would cross an unnamed stream and Grouse Creek.

3.4.1.2. Water Quality

MPCA oversees water quality studies and regulations in Minnesota. Table 3.4-5 displays the water bodies within the Study Area that the MPCA has identified as impaired. In total, eight water bodies exceed total maximum daily load (TMDL) levels for mercury and two exceed TMDLs for dissolved oxygen. All three alternatives cross the Mississippi River and the Leech Lake River where dissolved oxygen levels are exceeded. Similarly, Carr Lake, where mercury levels are exceeded, is part of all three Route Alternatives.

In addition, Route Alternatives 1 and 2 contain Blackwater Lake, Pike Bay, and Ball Club Lake, which exceed TMDL levels for mercury. Route Alternative 3 contains the Turtle River, Jessie Lake, Blackduck Lake, and Stump Lake where TMDL mercury levels are also exceeded.

Table 3.4-5: Water Resources with Designated Impairments in the Study Area

Water Resource	Route Alternative	Type of Impairment*
Mississippi River, south of Bemidji	1, 2, 3	Dissolved Oxygen
Carr Lake, located about 1 mile south of Bemidji)	1, 2, 3	Mercury
Blackwater Lake	1, 2	Mercury
Leech Lake River, south of Ball Club Lake	1, 2, 3	Dissolved Oxygen
Pike Bay	1, 2	Mercury
Ball Club Lake	1, 2	Mercury
Turtle River	3	Mercury
Jessie Lake	3	Mercury
Blackduck Lake	3	Mercury
Stump Lake	3	Mercury

Note: *Impairment is defined as exceeding the MPCA TMDL levels.
Source: MPCA, 2009c

3.4.1.3. Groundwater

Groundwater resources in the Study Area include a Quaternary aquifer (comprised of glacial outwash-derived sand and gravel deposits) and to a much lesser extent, Cretaceous and Precambrian bedrock aquifers that are scattered throughout. In general, the glacial aquifers provide abundant groundwater resources throughout the region, and groundwater quantity and/or accessibility is not a problem in the Study Area.

Depths to the water table vary throughout the Study Area, from less than 5 feet to over 50 feet. Generally, groundwater in the Study Area is within 25 feet of the surface. Groundwater quality in the Study Area is relatively good, with water quality indicators similar or better than those found in similar aquifers elsewhere in Minnesota (MPCA, 1998).

3.4.2. Direct/Indirect Effects

This section identifies potential direct and indirect effects of the Project on water resources. Potential direct effects from the Project include:

- Changes in surface water quality or flow that exceed applicable MPCA standards
- Changes in groundwater quality that exceed applicable MPCA standards
- Loss of groundwater table height or localized loss of groundwater

Potential indirect effects from the Project include:

- Soil erosion and sedimentation resulting in changes in water turbidity, which can affect vegetation, aquatic, and wildlife habitat
- Changes in watershed function
- Fuel and chemical spills in water resources that could adversely affect surface water quality
- Increased potential for runoff from cleared right-of-ways (ROWs) that could adversely affect surface water quality

If pole placement were to occur within a water basin or watercourse, temporary direct impacts may include soil erosion along the shoreline and sedimentation caused by construction. The deposition of sediment could result in a long-term impact to water turbidity. Changes in water quality due to pole placement could result in a change in the watershed function. The Project has been designed to span surface water bodies, such that these potential impacts can be avoided.

The Applicants propose to use two-pole, H-frame wood structures for a majority of the Project length and single steel pole structures in more congested areas. The two H-frame poles would be set approximately 20 feet apart in holes augured to a depth of approximately 10 to 15 feet and a diameter of 24 to 36 inches. After the poles are embedded, the holes would then be backfilled with native soils or granular material. The exposure of Project materials (e.g., wood poles, native soil, and granular material) to storm water runoff is not expected to adversely affect surface water or groundwater in the Study Area.

Due to the depth of groundwater in the Study Area (between 5 and 50 feet below ground surface), groundwater resources may be encountered during excavations for transmission line structures or surface grade changes in low-lying and/or wet areas. In areas where shallow groundwater is encountered, dewatering prior to structure installation may be required. Depending on the scale of dewatering activities, it would be possible that shallow groundwater levels could be directly affected from dewatering. However, because installation of structure foundations would be installed at depths of 10 to 15 feet below ground surface, changes in groundwater levels would be confined to shallow groundwater with no resulting effect on deep water aquifers.

Indirect impacts are possible due to construction activity within or adjacent to water bodies. Construction activities, including use of heavy equipment on sloped shore banks, could result in erosion along the shoreline and increased runoff into water resources from cleared ROWs. Additionally, fuel or chemical spills from construction equipment could degrade storm water runoff quality. The potential likelihood of fuel or chemical releases would be reduced through implementation of Best Management Practices (BMPs) as required to be contained in the Applicants' Storm Water Pollution Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasures (SPCC) Plan. Impacts to surface water quality could result from the use of herbicides or pesticides in maintaining the transmission line ROW during operation; however, use of these substances would be limited because the CNF would not allow for the application of herbicides or pesticides on CNF land.

3.4.2.1. Surface Water

Temporary or long-term direct impacts to surface water resources are unlikely to occur to PWI basins or watercourses. This discussion excludes potential impacts to wetlands, which are addressed separately in Section 3.6, Wetlands. Route and Segment Alternatives have been located to avoid surface water features to the extent practicable. In areas where surface water features are present, it is anticipated that ROW alignments could be directed to avoid surface water or that water bodies could be spanned. All water crossings under all of the alternatives, including the Mississippi River crossing west of Deer River, would be spanned by poles placed from 800 to 1,000 feet apart. All stream and river crossings within the Study Area can be spanned, and the feasible 125-foot ROWs evaluated avoid crossing larger water bodies.

Table 3.4-6: PWI Water Resources Crossed by Feasible 125-Foot Right-of-Way

Route and Segment Alternatives	Associated Route Alternatives	Leech Lake Reservation	Chippewa National Forest	Water Basin Crossings	Water Course Crossings
Route Alternatives					
1		Yes	Yes	4	6
2		Yes	Yes	2	7
3		No	Yes	9	27
Segment Alternatives					
A	1	No	No	1	1
B	1	Yes	Yes	0	0
C	1, 2	Yes	Yes	0	2
D	1	Yes	Yes	0	0
E	3	Yes	Yes	0	2
F	2	Yes	Yes	0	0
G	2	No	No	0	0
H	2	No	No	0	0
I	2	No	No	0	0
J	1, 2	No	No	0	0
K	1, 2	Yes	No	1	0
L	1	Yes	No	0	0
M	1, 2	Yes	No	1	0
N	1, 2	Yes	Yes	0	0
O	1, 2	Yes	Yes	0	0
P	1, 2	Yes	No	0	1
Q	1, 2	Yes	No	0	0
R	3	No	Yes	0	0
S	3	No	Yes	0	0
T	3	no	Yes	0	0

No-Build Alternative

The No-Build Alternative would result in no additional transmission line development and, as such would not impact any water resources within the Study Area.

Route Alternative 1 and Associated Segment Alternatives

As shown in Table 3.4-6, the feasible 125–foot ROW evaluated for Route Alternative 1 crosses four water basins and six water courses.

Route Alternative 1 would introduce another plane of wires across the Mississippi River near Ball Club. Under this Alternative, the structures supporting Great River Energy's existing 69 kV crossing at this location would be replaced with larger structures to support both the new 230 kV crossing as well as the 69 kV transmission line that currently exists. These new transmission structures would be taller than the existing 69 kV structures.

With the following exceptions, the Segment Alternatives associated with Route Alternative 1 would not change the water crossings for this Route Alternative:

- Segment Alternative A would cross the Bungashing Creek and Necktie River, while avoiding a crossing an unnamed Necktie Tributary;
- Segment Alternative B would avoid crossing an unnamed tributary at Pike bay/Cass Lake; and
- Segment Alternative C would introduce a new crossing of the Leech Lake River; moving the existing 69 kV transmission line from its current Mississippi River Crossing near Ball Club. The existing crossing near Ball Club would be maintained, the existing 69 kV structures would be replaced with taller structures to support the new 230 kV transmission line.

The addition of new water crossings would represent a change in viewshed for users of the water bodies. Potential direct impacts to surface water from structure placement would not occur, as Project structures would span all surface water bodies. During construction, clearing of ROW adjacent to surface water and use of heavy equipment could result in soil erosion, which may increase the potential for run-off to surface water bodies. Increased run-off could result in changes in sedimentation and turbidity, which could affect water quality and aquatic habitat.

Route Alternative* 2 *and Associated Route Segment Alternatives

As shown in Table 3.4-6, the feasible 125-foot ROW evaluated for Route Alternative 2 would cross two PWI water basins and seven water courses.

As with Route Alternative 1, Route Alternative 2 would also introduce another plane of wires across the Mississippi River near Ball Club. Under this Route Alternative, the structures supporting Great River Energy's existing 69 kV crossing at this location would be replaced with larger structures to support both the new 230 kV crossing as well as the 69 kV transmission line that currently exists. These new transmission structures would be taller than the existing 69 kV structures.

With the following exception, the Segment Alternatives associated with Route Alternative 2 would not change the water crossings for this Route Alternative:

- Segment Alternative C would introduce a new crossing of the Leech Lake River; moving the existing 69 kV transmission line from its current Mississippi River Crossing near Ball Club. The existing crossing near Ball Club would be maintained, the existing 69 kV structures would be replaced with taller structures to support the new 230 kV transmission line.

The addition of new water crossings would represent a change in viewshed for users of the water bodies. Potential direct impacts to surface water from structure placement would not occur, as Project structures would span all surface water bodies. During construction, clearing of ROW adjacent to surface water and use of heavy equipment could result in soil erosion, which may increase the potential for run-off to surface water bodies. Increased run-off could result in changes in sedimentation and turbidity, which could affect water quality and aquatic habitat.

Route Alternative 3 and Associated Segment Alternatives

As shown in Table 3.4-6, the feasible 125-foot ROW evaluated for Route Alternative 3 would have a greater number of water crossings than Route Alternatives 1 or 2. Route Alternative 3 would result in nine water basin crossings and 27 water course crossings, which is three to four times the number of crossings required for Route Alternatives 1 and 2.

Segment Alternative E would cross Grouse Creek at several locations, while avoiding a crossing of the Deer River.

The addition of new water crossings would represent a change in viewshed for users of the water bodies. Potential direct impacts to surface water from structure placement would not occur, as Project structures would span all surface water bodies. During construction, clearing of ROW adjacent to surface water and use of heavy equipment could result in soil erosion, which may increase the potential for run-off to surface water bodies. Increased run-off could result in changes in sedimentation and turbidity, which could affect water quality and aquatic habitat.

Leech Lake Reservation

PWI water crossings within the Leech Lake Reservation are shown in Table 3.4-7.

Table 3.4-7: PWI Water Resources Crossed by Feasible 125-Foot Right-of-Way within the LLR

Route and Segment Alternatives	Associated Route Alternatives	Water Basin Crossings	Water Course Crossings
Route Alternatives			
1		3	5
2		1	3
3		0	0
Segment Alternatives			
B	1	0	0
C	1, 2	0	1
D	1	0	0
E	3	0	2
F	2	0	0
K	1, 2	1	0
L	1	0	0
M	1, 2	1	0
N	1, 2	0	0
O	1, 2	0	0
P	1, 2	0	0
Q	1, 2	0	0

Route Alternative 1 would cross the following rivers, streams, and water basins within the LLR: Moss Lake, Twin Lake, an unnamed wetland south of Portage Water Basin, an unnamed stream north of Moss Water Basin, Sucker Creek, Portage Creek, Mississippi River, and Deer River.

Route Alternative 2 would cross the following rivers, streams, and water basins within the LLR: Pike Bay, an unnamed connector stream near Pike Bay, Mississippi River, and Ball Club River.

Both Route Alternatives 1 and 2 would introduce another plane of wires across the Mississippi River near Ball Club. Under these Route Alternatives, the structures supporting Great River Energy's existing 69 kV crossing at this location would be replaced with larger structures to support both the new 230 kV crossing as well as the 69 kV transmission line that currently exists. These new transmission structures would be taller than the existing 69 kV structures.

Route Alternative 3 was designed to largely avoid the LLR and would not cross any rivers, streams, and water basins within the boundaries of the LLR.

Potential effects from the Segment Alternatives located on the LLR include:

- Segment Alternative C would introduce a new crossing of the Leech Lake River; moving the existing 69 kV transmission line from its current Mississippi River Crossing near Ball Club. The existing crossing near Ball Club would be maintained, the existing 69 kV structures would be replaced with taller structures to support the new 230 kV transmission line;
- Segment Alternative E would cross Grouse Creek at several locations within the Leech Lake Reservation; and
- Segment Alternative K would introduce a new crossing of the Necktie River.

The addition of new water crossings would represent a change in viewshed for users of the water bodies. Potential direct impacts to surface water from structure placement would not occur, as Project structures would span all surface water bodies. During construction, clearing of ROW adjacent to surface water and use of heavy equipment could result in soil erosion, which may increase the potential for run-off to surface water bodies. Increased run-off could result in changes in sedimentation and turbidity, which could affect water quality and aquatic habitat.

Chippewa National Forest

PWI water crossings within the Chippewa National Forest (CNF) are shown in Table 3.4-8.

Table 3.4-8: PWI Water Resources Crossed by Feasible 125-Foot Right-of-Way within the CNF

Route and Segment Alternatives	Associated Route Alternatives	Water Basin Crossings	Water Course Crossings
Route Alternatives			
1		4	5
2		2	2
3		8	15
Segment Alternatives			
B	1	0	0
C	1, 2	0	1
D	1	0	0
E	3	0	2
F	2	0	0
N	1, 2	0	0
O	1, 2	0	0
P	1,2	0	0
R	3	0	0
S	3	0	0
T	3	0	0

Route Alternative 1 would cross the following rivers, streams, and water basins within the CNF: Moss Lake, Twin Lake, White Oak Lake, an unnamed wetland directly south or Portage Water Basin, an unnamed stream north of Moss Lake, Sucker Creek, Portage Creek, Mississippi River, and Deer River.

Route Alternative 2 would cross the following rivers, streams, and water basins within the CNF: Pike Bay, White Oak Lake, an unnamed connector stream near Pike Bay, and the Mississippi River.

Route Alternatives 1 and 2 would introduce another plane of wires across the Mississippi River near Ball Club. Under these Route Alternatives, the structures supporting Great River Energy's existing 69 kV crossing at this location would be replaced with larger structures to support both the new 230 kV crossing as well as the 69 kV transmission line that currently exists. These new transmission structures would be taller than the existing 69 kV structures.

Route Alternative 3 would cross the following rivers, streams, and water basins within the CNF: Carter Lake, Jessie Lake, Whitefish Lake, Natures Lake (multiple crossings), an unnamed wetland east of Long Water Basin, an unnamed wetland north of Crooked Water Basin, an unnamed connector stream to the west of Gull Water Basin (multiple crossings), an unnamed stream east of Erickson Water Basin, Popple River (multiple crossings), Wagner Creek, Big Fork River (multiple crossings), an unnamed stream of Big Fork River Branch, Hinken Creek (west and east branches), Fletcher Creek, Little Turtle Creek, and an unnamed stream out of Jessie Lake (multiple crossings).

Potential effects from the Segment Alternatives located on the CNF include:

- Segment Alternative C would introduce a new crossing of the Leech Lake River; moving the existing 69 kV transmission line from its current Mississippi River Crossing near Ball Club. The existing crossing near Ball Club would be maintained, the existing 69 kV structures would be replaced with taller structures to support the new 230 kV transmission line; and
- Segment Alternative E would cross Grouse Creek at several locations within the CNF.

The addition of new water crossings would represent a change in viewshed for users of the water bodies. Potential direct impacts to surface water from structure placement would not occur, as Project structures would span all surface water bodies. During construction, clearing of ROW adjacent to surface water and use of heavy equipment could result in soil erosion, which may increase the potential for run-off to surface water bodies. Increased run-off could result in changes in sedimentation and turbidity, which could affect water quality and aquatic habitat.

3.4.2.2. Groundwater

Adverse impacts on groundwater resources are not anticipated from any of the Project Alternatives evaluated.

No-Build Alternative

The No-Build Alternative would result in no additional transmission line development and, as such would not impact any water resources within the Study Area.

Route Alternatives 1, 2, and 3 and Associated Segment Alternatives

Due to the depth of groundwater in the Study Area (between 5 and 50 feet below ground surface), groundwater resources may be encountered during excavations for transmission line structures or surface grade changes in low-lying and/or wet areas. In areas where shallow groundwater is encountered, dewatering prior to structure installation may be required. Depending on the scale of dewatering activities, it would be possible that shallow groundwater levels could be directly affected from dewatering. However, because installation of structure foundations would be installed at depths of 10 to 15 feet below ground surface, changes in groundwater levels would be confined to shallow groundwater with no resulting effect on deep water aquifers.

No water storage, reprocessing, or cooling is required for the construction or operation of the transmission line or substations and no associated discharges to surface water or groundwater are anticipated. The Project would not be expected to result in violations of groundwater quality standards, unless a significant fuel or chemical spill associated with construction equipment or substation operations were to occur.

3.4.3. Mitigation

A variety of mitigation measures could be implemented to reduce the potential impacts to water resources from construction and operation of the Project. Mitigation measures that are typically included in permits are noted. Cases where additional mitigation measures may be incorporated as a permit condition are also noted.

To mitigate the potential for erosion, under the HVTL permit, the Applicants could be required to implement reasonable measures to minimize runoff during construction. Planting or seeding non-agricultural areas that were disturbed by transmission line structures could be required to prevent runoff and impacts to water resources. The Applicants could work with applicable agencies to develop seed mixes from plants indigenous to the immediate area of disturbance.

To minimize long-term impacts to water resources, the HVTL permit could require the Applicants to span water resource when possible and avoid water resource crossings by movement of the ROW within the selected route. The HVTL permit may also require co-location with existing transmission facilities along certain segments of a permitted route. Co-location could minimize introduction new water course and water basin crossings. However, it should be noted that co-location through double circuiting would still require new structure construction that would create temporary impacts to water resources.

The Project would require a number of water resource permits, including coverage under the General Permit for Storm Water Discharges Associated with Construction Activities and associated Storm Water Pollution Prevention Plan (SWPPP), National Pollution Discharge Elimination System Permit (NPDES), License to Cross Public Waters, Public Waters Work Permit, and Section 10 Permit. The placement of transmission line pole structures, land clearing that involves soil disturbance, or placement of construction mats may be considered a discharge of fill material that would require a permit from the Department of the Army pursuant to Section 404 of the Clean Water Act. These permits would require the Applicants to develop and implement Best Management Practices (BMPs) for sediment and erosion control during construction and operation of the Project to protect topsoil and adjacent surface and groundwater resources, and to minimize soil erosion. Typical BMPs may include:

- Locate structures and disturbed areas away from rivers and lakes, where practicable;
- Contain stockpiled material, including fuel and chemicals, away from stream banks and lake shorelines;
- Install sediment and erosion control measures prior to construction, in accordance with sediment and erosion control plans and permits;
- Use turbidity control methods prior to discharging wastewater from concrete batching or other construction operations to streams or other surface waters;
- Spread topsoil and seed in a timely manner;
- Avoid use of fertilizers, pesticides, or herbicides in or near water bodies, including wetlands;
- Fuel construction vehicles outside of water bodies, including wetlands, and use appropriate spill prevention and containment procedures; and
- Implement procedures to minimize and control inadvertent fluid returns during horizontal directional drilling (HDD) operations, if they are used.

The Applicants could work with the jurisdictional agencies (i.e., the MPCA, MnDNR, and the USACE) to determine the best ways to minimize impacts and create appropriate BMPs.

If the Project structures cannot be sited such that impacts to water resources are avoided, compensatory mitigation under a USACE Section 404 permit would be required to replace the loss of aquatic resource functions in the watershed. Compensatory mitigation could include the restoration, establishment, enhancement, or preservation of wetlands or other aquatic resources to off-set Project impacts.

As described above in Section 3.4.2.2, temporary impacts during construction may occur if dewatering is necessary to install the transmission structures. Any dewatering effects on water tables would be localized and short-term. If dewatering is necessary, a dewatering permit would be obtained from the MnDNR. If the dewatered groundwater contains substantial quantities of suspended sediments, then the water would be filtered through silt fences or bio-rolls prior to discharge.

Construction activities carried out on CNF lands that take place within or in close proximity to lakes, streams, wetlands, or other water bodies would be conducted and monitored in accordance with objectives, standards, and guidelines of the Forest-Wide Management Directions provided in the 2004 *Forest Plan* (USDA, 2004). Construction plans would also be modified in accordance with any guidelines specific to each CNF Management Area.

3.5. Floodplains

This section describes floodplains in the Study Area, defined as the 1,000-foot-wide route identified for each Route Alternative and Segment Alternative. Where available, flood data derived from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) have been used to identify portions of the Study Area that fall within a 100-year floodplain. Non-FEMA-designated floodplains, riparian areas, and other flood-prone areas have been identified from USGS topographic maps and the 2004 *Forest Plan*. Additional related information is presented in Section 3.4, Water Resources.

3.5.1. Affected Environment

Floodplains are low-lying areas that are subject to periodic inundation due to heavy rains or snow melt. Floodplain areas are generally adjacent to lakes, rivers, and streams. In their natural state, floodplains provide necessary temporary water storage during flooding events. The periodic flooding and drying in these areas creates a unique habitat that supports a wide variety of plant and animal species.

Federal Emergency Management Agency (FEMA) Floodplain data have not been fully developed for the Route and Segment Alternatives. Identified FEMA floodplains include (FEMA, 2003a, 2003b, 2003c, and 2003d):

- The Mississippi River at the eastern end of the Study Area (Jay Gould Lake area); and
- White Oak Lake near the town of Deer River.

Other floodplain or floodway areas are likely present within the Study Area, but have not been included in the FEMA GIS dataset. These areas include, but may not be limited to, upper reaches of the Mississippi River near the western terminus of the Project alternatives (Wilton Substation) and other Mississippi River tributaries, Big Fork River, Ball Club Lake, Lake Winnibigoshish, Cass Lake, and Sucker Lake.

In addition, the 2004 *CNF Forest Plan* (USDA, 2004) identifies Riparian Emphasis (RE) Management Areas that are often associated with rivers, streams, lakes, and wetlands that are prone to periodic flooding. These areas include the Turtle River, Turtle River Lake, and Big Lake catchment; the Third River and Lake Winnibigoshish catchment; the Squaw Lake and Round Lake catchment; and the Sand Lake and Bowstring Lake catchment. Additional rivers, streams, and lakes are located in the Study Area, as described in Section 3.4, Water Resources.

3.5.2. Direct/Indirect Effects

This section discusses potential effects from the Project on floodplains and related resources if Project structures were placed directly in floodplains and avoidance of floodplains were not possible. Potential direct effects include:

- Loss of floodplains and floodplain storage
- Impairment of floodplains and floodplain storage

Due to the footprint of the Project transmission line structures and that the Route Alternatives have been sited to cross surface waters, wetlands, and floodplains perpendicularly rather than in parallel, the Project is not expected to result in adverse affects to floodplains. Thus, there are no potential indirect effects identified.

The Project would locate structures outside of floodplains to the extent practicable, such that potential impacts are expected to be minimal. If Project structures were placed directly in floodplains, construction of the transmission line is not expected to alter existing drainage patterns or floodplain elevations due to the small footprint of the poles and their relatively wide spacing. The transmission structures placed in floodplains have a small cross section, resulting in negligible fill. No change in floodplain functions would occur from construction of the Project.

3.5.2.1. No-Build Alternative

The No-Build Alternative would not construct any transmission facilities in the Study Area; as such there would be no impact on floodplains within the Study Area.

3.5.2.2. Route Alternative 1

A review of digital floodplain data shows that eight transmission structures may be placed in floodplains adjacent to the Mississippi River (two structures) and White Oak Lake (six structures). The estimated long-term impact would be approximately 14 square feet per tower location. Assuming an average spacing of 800 feet between structures (FEMA, 2003a, 2003b, 2003c, and 2003d), the estimated long-term impact would be 113 square feet (0.002 acre). Because floodplain impacts are, generally, regulated based on changes to floodplain storage (volume), the overall storage impact would correspond to approximately 0.5 cubic yard of displaced water for every foot of inundation for each structure. The estimated long-term change in acreage and storage volume represents a negligible change.

Additional impacts to unmapped floodplains are possible. The feasible right-of-way (ROW) evaluated for Route Alternative 1 would cross six water courses and four water basins (Table 3.4-5). Some of these water course crossings may have associated floodplains. As discussed in Section 3.4.2, it is anticipated that all surface water features would be avoided by spanning the transmission line over the water bodies or redirecting the route to avoid these areas entirely; as a result, additional floodplain impacts are expected to be negligible.

None of the Segment Alternatives associated with Route Alternative 1 cross floodplains adjacent to either the Mississippi River or White Oak Lake. Segment Alternatives A, C, and K do cross water courses (Table 3.4-5). As with Route Alternative 1, some of these water course crossings may have associated floodplains. It is anticipated that all surface water features would be avoided by spanning the transmission line over the water bodies or redirecting the route to avoid these areas entirely. As a result, additional floodplain impacts are expected to be negligible.

Route Alternative 1 would require construction of a new substation located in the Cass Lake area and a Nary Breaker Station at the existing Nary Junction (under Segment Alternative A). The proposed location for the new Cass Lake substation and Nary Breaker Station at Nary Junction are not located within FEMA-identified floodplains.

3.5.2.3. Route Alternative 2

The effects of Route Alternative 2 would be similar to those described for Route Alternative 1, above. Route Alternative 2 would have four transmission structures placed in the floodplains adjacent to the Mississippi River (two structures) and White Oak Lake (two structures) (FEMA, 2003a, 2003b, 2003c, and 2003d). Under this configuration, approximately 57 square feet (0.001 acre) of impact is anticipated. Because floodplain impacts are, generally, regulated based on changes to floodplain storage (volume), the overall storage impact would correspond to approximately 0.5 cubic yard of displaced water for every foot of inundation for each structure. The estimated long-term change in acreage and storage volume represents a negligible change.

Additional impacts to unmapped floodplains are possible. The feasible ROW evaluated for Route Alternative 2 would cross seven water courses and two water basins. As with Route Alternative 1, additional floodplain impacts from these water course crossings are expected to be negligible.

None of the Segment Alternatives associated with Route Alternative 2 cross floodplains adjacent to either the Mississippi River or White Oak Lake. Segment Alternatives C and K do cross water courses (Table 3.4-5). As with Route Alternative 2, some of these water course crossings may have associated floodplains. It is anticipated that all surface water features would be avoided by spanning the transmission line over the water bodies or redirecting the route to avoid these areas entirely. As a result, additional floodplain impacts are expected to be negligible.

Route Alternative 2 would require the expansion of an existing Cass Lake Substation. The existing substation is not located within a FEMA-identified floodplain.

3.5.2.4. Route Alternative 3

Route Alternative 3 would cross the Mississippi River east of Bemidji. This reach of the Mississippi is designated as a FEMA floodway (FEMA, 2009). The proposed H-frame transmission towers would allow spans of up to 1,000 feet, and no transmission structures would be placed within the floodway at this location.

Route Alternative 3 would also cross a major wetland complex associated with the Bowstring Lake and Bowstring River floodways. This wetland complex is located on both CNF and Bowstring Lake State Forest lands and is designated as a CNF Riparian Emphasis (RE) Management Area. Approximately 46 transmission structures may be placed within this wetland complex. Under this configuration, the estimated long-term impact would be approximately 650 square feet (0.015 acre). Because floodplain impacts are, generally, regulated based on changes to floodplain storage (volume), the overall storage impact would correspond to approximately 0.5 cubic yard of displaced water for every foot of inundation for each structure. The estimated long-term change in acreage and storage volume represents a negligible change.

Additional impacts to unmapped floodplains are possible. The feasible ROW evaluated for Route Alternative 3 would cross 27 water courses, or roughly triple the number as the other alternatives (Table 3.4-5). Additional floodplain impacts from these water course crossings are expected to be negligible.

Segment Alternative E crosses Grouse Creek, adding an additional three river and stream crossings. As with Route Alternative 3, some of these water course crossings may have associated floodplains. It is anticipated that all surface water features would be avoided by spanning the transmission line over the water bodies or redirecting the route to avoid these areas entirely. As a result, additional floodplain impacts are expected to be negligible.

3.5.2.5. Leech Lake Reservation

Within the Leech Lake Reservation the only FEMA-identified floodplains are those along the Mississippi River and some areas of the floodplain along White Oak Lake. The majority of the LLR is not included in the coverage of FEMA maps. Supplemental floodplain maps are maintained by the LLDRM. Due to the availability of floodplain maps, this section identifies only those potential impacts specific to FEMA-identified floodplains located within the boundaries of the LLR.

Under Route Alternative 1, up to eight transmission structures may be placed in floodplains adjacent to the Mississippi River (two structures) and White Oak Lake (six structures). The estimated long-term impact would be approximately 14 square feet per tower location. Assuming an average spacing of 800 feet between structures (FEMA, 2003a, 2003b, 2003c, and 2003d), the estimated long-term impact would be 113 square feet (0.002 acre), which represents a negligible change in acreage and storage volume.

The effects of Route Alternative 2 would be similar to those described for Route Alternative 1 above. Route Alternative 2 would have four transmission structures placed in the floodplains adjacent to the Mississippi River (two structures) and White Oak Lake (two structures) (FEMA, 2003a, 2003b, 2003c, and 2003d). Under this configuration, approximately 57 square feet (0.001 acre) of impact is anticipated, which represents a negligible change in acreage and storage volume.

Floodplains that are located outside the boundaries of the LLR but flow into adjacent waters of the LLR could affect such waters within the boundaries of the LLR. However, as discussed for Route Alternatives 1, 2, and 3, adverse impacts to all floodplains along the three Route Alternatives are expected to be negligible and there are no resulting impacts anticipated to water bodies on the LLR.

None of the Route or Segment Alternatives would adversely affect FEMA-identified floodplains in the LLR. Impacts to unmapped floodplains within the Leech Lake Reservation, to the extent they are present, are expected to be similar to those identified for FEMA-identified floodplains within all of the Route Alternatives, which are expected to be negligible.

3.5.2.6. Chippewa National Forest

Route Alternatives 1 and 2 would not adversely affect FEMA-identified floodplains within the CNF. No poles would be placed in known floodplains, resulting in no impacts to known floodplains in the CNF.

The 1,000-foot route for Route Alternative 3 would cross several riparian areas and floodplains identified in the 2004 *CNF Forest Plan*. As discussed above in Section 3.5.1, four catchments or sub-watersheds are designated as Riparian Emphasis (RE) Management Areas. None of these crossings would be within designated FEMA floodplains. Route Alternative 3 would also cross a major wetland complex associated with the Bowstring Lake and Bowstring River floodways, a portion of which is located on the CNF. Approximately 13 of the anticipated 46 transmission structures may be placed within the CNF. Under this configuration, the estimated long-term impact would be approximately 186 square feet (0.004 acre), which represents a negligible change in acreage and storage volume. Other potential impacts to unmapped floodplains, if any, are expected to be negligible.

3.5.3. Mitigation

The Project would locate structures outside of floodplains to the extent practicable, such that potential impacts are expected to be minimal.

Under the HVTL permit, the Applicants could be required to implement the following measures to prevent or reduce potential impacts to floodplains:

- Span floodplains and water resources to the extent possible to avoid potential impacts.
- Use construction techniques to minimize run-off into floodplains during construction.
- Plant or seed non-agricultural areas that were disturbed during construction. Use native seed mixes from the indigenous plants and plant indigenous plants located in the immediate disturbed soil area; ensure seeding and/or plantings are done in a time congruent with seeding and growth of the area, not during a time that would preclude germination or rooting.
- Restore floodplain contours to their pre-construction profile if contours are disrupted during construction.

Mitigation measures that are included in permits and would reduce the potential impacts to water resources and wetlands, which can result in impacts to surrounding floodplains, are discussed in Sections 3.4, Water Resources, and 3.6, Wetlands.

3.6. Wetlands

This section describes wetlands and wetland-related water resources and ecosystems in the Study Area. For the purposes of this analysis, the Study Area is defined as the Route Alternatives and Segment Alternatives. Information from the National Wetlands Inventory, available from the U.S. Fish and Wildlife Service (USFWS, 2009), was used to determine the location and condition of wetlands within the Study Area and potential effects of the Project on those conditions. NWI information was augmented by the State of Minnesota Public Water Inventory database, as well as information obtained from CNF biologists, LLDRM, Minnesota Department of Natural Resources (MnDNR), and local government units during the public scoping meetings.

3.6.1. Affected Environment

The following sections provide a summary of the existing wetlands present in the Study Area, as identified on the National Wetlands Inventory (NWI) and Public Water Inventory (PWI).

Wetlands can serve many functions, including ground water recharge and discharge; flood storage and alteration or attenuation; nutrient and sediment removal or transformation; toxicant retention; and shoreline stabilization. In addition, wetlands provide habitat for fish and wildlife, and support wildlife breeding, migration, and wintering. Wetlands also support recreational activities.

The USFWS (1979) defines the types of wetlands that occur in the Study Area using the following system and class/subclass classifications. The classification system was designed specifically for NWI wetlands and intended to be ecologically based.

- Lacustrine System - includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30 percent areal coverage ; and (3) total area exceeds 8 hectares (20 acres). Similar wetland and deepwater habitats totaling less than 8 hectares are also included in the Lacustrine System if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 2 meters (6.6 feet) at low water. Lacustrine waters may be tidal or nontidal, but ocean-derived salinity is always less than 0.5 percent.
- Riverine System - includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean derived salts in excess of 0.5 percent. A channel is "an open conduit either naturally or artificially created which periodically or continuously

contains moving water, or which forms a connecting link between two bodies of standing water."

- Emergent Wetland Class – characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. All water regimes are included except subtidal and irregularly exposed.
- Scrub-Shrub Wetland Class – includes areas dominated by woody vegetation less than 6 meters (20 feet) tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. All water regimes except subtidal are included.
- Forested Wetland Class – characterized by woody vegetation that is 6 meters (20 feet) tall or taller. All water regimes are included except subtidal.

The U.S. Army Corps of Engineers (USACE) has regulatory jurisdiction over waters of the United States including wetlands pursuant to Section 404 of the Clean Water Act, and jurisdiction over Navigable Waters of the United States pursuant to Section 10 of the 1899 Rivers and Harbors Act.. The placement of transmission line pole structures, land clearing that involves soil disturbance, or placement of construction mats may be considered a discharge of fill material that would require a permit from the Department of the Army pursuant to Section 404 of the Clean Water Act. In addition, the placement of a transmission line in, on, or over a navigable water body (i.e. Mississippi River) would require a permit pursuant to Section 10.A description of this permit and other federal, state, and local permits and regulatory approvals that may be required for construction and operation of the Project is provided in Section 6.0.

3.6.1.1. National Wetlands Inventory Wetlands

The USFWS has developed NWI maps showing the locations, size, and types of wetlands throughout the United States. These maps were developed using aerial photography interpretation techniques. The purpose of these maps was to provide better geospatial information about wetlands than had been previously available from other sources and to provide a consistent classification system across the United States. Because of the inherit limits of photo interpretation, the intent was not to map all wetlands and deepwater habitats, but rather the larger types that could be identified by such techniques. Forested wetlands are especially underrepresented in NWI maps due to limitations in identifying this wetland type from aerial photography. Thus, although these maps serve as an excellent screening or preliminary evaluation tool, on-the-ground field surveys are required to identify all wetlands, their boundaries, and their quality. To identify the presence and potential impact to wetlands in the Study Area, NWI data was supplemented with PWI wetlands data maintained by the MnDNR, as discussed in Section 3.6.1.2. Prior to Section 404 and Section 10 permitting, detailed field delineations of the Study Area would be required.

USFWS NWI maps were initially used to identify mapped wetlands existing within each of the Route Alternatives, which comprise the Study Area. Tables 3.6-1 and 3.6-2 show NWI wetlands located within each Route Alternative and Segment Alternative. Figure 3.6-1 displays the NWI wetlands in the Study Area.

Table 3.6-1: NWI Wetlands Identified within the Route Alternatives

	Type	Route Alternative 1		Route Alternative 2		Route Alternative 3	
		Acres	% of Route	Acres	% of Route	Acres	% of Route
Entire Route	**Fresh Water Emergent**	644	7.7	454	5.5	501	3.1
	Freshwater Forested/Scrub Shrub	1,665	19.9	1,522	18.5	3,113	22.0
	Freshwater Pond	20	0.2	18	0.2	36	0.3
	Lacustrine	14	0.2	13	0.2	65	0.5
	Riverine	13	0.2	9	0.1	20	0.1
	All NWI Wetlands	**2,356**	**28.1**	**2,014**	**24.5**	**3,735**	**26.3**
Chippewa National Forest	**Fresh Water Emergent**	174	2.1	137	1.7	276	2.0
	Freshwater Forested/Scrub Shrub	342	4.1	245	3.0	2,206	15.6
	Freshwater Pond	7	0.1	3	0.0	23	0.2
	Lacustrine	-	-	-	-	26	0.2
	Riverine	3	0.0	4.8	0.1	14	0.1
	All NWI Wetlands	**529**	**6.3**	**401**	**4.9**	**2,545**	**18.0**
Leech Lake Reservation	**Fresh Water Emergent**	469	5.6	322	3.7	1	0.0
	Freshwater Forested/Scrub Shrub	1,236	14.7	1,081	12.4	33	0.2
	Freshwater Pond	16	0.2	16	0.2	0.0	0.0
	Lacustrine	11	0.1	13	0.2	0.0	0.0
	Riverine	8	0.1	6	0.1	0.0	0.0
	All NWI Wetlands	**1,740**	**20.8**	**1,438**	**16.4**	**34**	**0.23**

Note: This evaluation was prepared using National Wetland Inventory (NWI) data only, the results have not been field verified. Field surveys would be conducted after the final route location has been selected, prior to Project construction.

Source: USFWS, 2009

Table 3.6-2: NWI Wetlands Identified within the Segment Alternatives

	Type	Segment Alternatives (acres)																			
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Entire Route	Fresh Water Emergent	117	71	31	54	43	14	5	10	5	0	11	29	5	2	5	<1	3	7	2	12
	Freshwater Forested/Scrub Shrub	161	136	112	49	226	21	<1	3	1	0	132	7	2	33	5	0	9	36	18	49
	Freshwater Pond	5	3	2	3	<1	0	0	0	0	0	0	0	1	0	7	0	0	<1	0	0
	Lacustrine	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
	Riverine	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	All NWI Wetlands	**283**	**210**	**149**	**105**	**270**	**35**	**5**	**13**	**6**	**0**	**147**	**36**	**8**	**35**	**17**	**<1**	**12**	**43**	**20**	**60**
	NWI Wetlands as a % of Route Segment	15	17	28	18	22	22	3	11	11	N/A	20	13	3	8	5	<1	35	19	15	23
Chippewa National Forest	Fresh Water Emergent	N/A	14	19	N/A	41	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	5	<1	N/A	2	0	1
	Freshwater Forested/Scrub Shrub	N/A	44	48	N/A	224	11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	33	5	0	N/A	19	0	9
	Freshwater Pond	N/A	3	0.00	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	7	0	N/A	<1	0	0
	Lacustrine	N/A	0	0.00	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	N/A	0	0	0
	Riverine	N/A	0	0.04	N/A	1	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	N/A	0	0	0
	All NWI Wetlands	**N/A**	**61**	**67**	**N/A**	**266**	**17**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**35**	**17**	**<1**	**N/A**	**22**	**0**	**10**
	NWI Wetlands as a % of Route Segment	N/A	10	21	N/A	23	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	5	<1	N/A	N/A	0	14
Leech Lake Reservation	Fresh Water Emergent	N/A	71	22	50	42	14	N/A	N/A	N/A	N/A	9	27	32	2	5	<1	3	N/A	N/A	N/A
	Freshwater Forested/Scrub Shrub	N/A	136	102	49	220	21	N/A	N/A	N/A	N/A	60	7	13	33	5	0	9	N/A	N/A	N/A
	Freshwater Pond	N/A	3.03	0	3	0	0	N/A	N/A	N/A	N/A	0	0	5	0	7	0	0	N/A	N/A	N/A

	Lacustrine	N/A	0	0	0	0	0	N/A	N/A	N/A	N/A	4	0	0	0	0	0	0	N/A	N/A	N/A
	Riverine	N/A	0	2	0	0	0	N/A	N/A	N/A	N/A	0	0	0	0	0	0	0	N/A	N/A	N/A
	All NWI Wetlands	**N/A**	**210**	**126**	**102**	**262**	**35**	**N/A**	**N/A**	**N/A**	**N/A**	**73**	**34**	**79**	**35**	**17**	**<1**	**1**	**N/A**	**N/A**	**N/A**
	NWI Wetlands as a % of Route Segment	N/A	17	26	19	23	20	N/A	N/A	N/A	N/A	10	11	27	8	5	<1	35	N/A	N/A	N/A

Note: This evaluation was prepared using National Wetland Inventory (NWI) data only, the results have not been field verified. Field surveys would be conducted after the final route location has been selected, prior to Project construction.
N/A = not applicable.

Source: USFWS, 2009

Route Alternatives and Segment Alternatives

Wetlands are common within the Study Area, comprising from approximately 25 percent of Route Alternative 2 to 28 percent of the total acreage of Route Alternative 1. The total acreage of wetlands located within the Study Area ranges from 2,014 acres for Route Alternative 2 to 3,735 acres for Route Alternative 3. The amount of NWI wetlands within the Segment Alternatives varies from none in several Segment Alternatives to 283 acres in Segment Alternative A. Segment Alternative P shows a much greater percentage of wetland coverage at 35 percent of the Segment Alternative.

Forested and scrub-shrub wetlands are the most common wetland types found in the Study Area, comprising the most wetland acreage, followed by freshwater emergent wetlands. As shown in Table 3.6-1, forested and scrub-shrub wetlands account for between 19.9 percent (Route Alternative 1) and 22.0 percent (Route Alternative 3) of the total acreage in the Route Alternatives. These wetland types also comprise the most common wetland types within the Segment Alternatives.

Route Alternative 1 would require construction of a new substation located in the Cass Lake area and a Nary Breaker Station at Nary Junction (under Segment Alternative A). Route Alternative 2 would require the expansion of an existing Cass Lake Substation. The location proposed for the new Cass Lake substation associated with Route Alternative 1 consists of approximately four acres of forested land. The Nary Breaker Station would be located at the intersection of three existing transmission lines referred to as the Nary Junction (the Nary to Cass Lake 115 kV line, the Bemidji to Nary 115 kV line, and the Nary to LaPorte 115 kV line); ROWs associated with these lines at the Nary Junction are managed to prevent the establishment of woody vegetation. The area surrounding the Nary Breaker Station is primarily upland deciduous forest. The proposed location for the Nary Breaker Station would require the removal of approximately 2.5 acres of woody vegetation. The nearest NWI wetland is a freshwater emergent wetland located approximately 450 feet north of the Nary Junction. The Cass Lake Substation expansion would be constructed on previously disturbed land owned by Otter Tail Power. There are no NWI or PWI wetlands identified at the substation locations that would be affected by the Project.

Leech Lake Reservation

As shown in Table 3.6-1, Route Alternative 1 contains the largest area of NWI wetlands in the Leech Lake Reservation (LLR) with approximately 1,740 acres. Route Alternative 2 contains a slightly lower number of NWI wetland areas in the LLR, approximately 1,438 acres, than Route Alternative 1. Route Alternative 3 has the fewest wetlands on the LLR, approximately 34 acres. As with the Route Alternatives generally, forested and scrub-shrub wetlands comprise the majority of NWI wetlands in the LLR for each alternative, ranging from 33 to 1,236 acres. Freshwater emergent wetlands were the only other type of wetland representing over 1 percent of the total acreage within Route

Alternatives on the LLR, varying from 469 acres on Route Alternative 1, 322 acres on Route Alternative 2, and 1 acre on Route Alternative 3.

Chippewa National Forest

As shown in Table 3.6-1, Route Alternative 3 has the largest area of NWI wetlands within the CNF, approximately 2,545 acres. The other two main alternatives cross fewer wetlands in the CNF, with Route Alternative 1 containing approximately 529 acres and Route Alternative 2 crossing approximately 401 acres of NWI wetlands.

3.6.1.2. Public Water Inventory Wetlands

MnDNR public waters include all water basins (i.e., lakes and ponds) and watercourses (i.e., rivers and streams) that meet the criteria set forth in Minnesota statutes (Section 103G.005, subd. 15), and that are identified on PWI maps and lists authorized by Minnesota statutes (Section 103G.201). Public water inventory wetlands are defined by the MnDNR (2009m) to include:

> *all type 3, type 4, and type 5 wetlands (as defined in U.S. Fish and Wildlife Service Circular No. 39, 1971 edition) that are 10 acres or more in size in unincorporated areas, or 2.5 acres or more in size in incorporated areas* (see: Minnesota Statutes Section 103G.005, subd. 17b, Wetland Type).

The regulatory boundary of these waters and wetlands is the ordinary high water level (OHWL) (MnDNR, 2009m). Table 3.6-3 shows the number of wetland basins located within each Route and Segment Alternative. Tables 3.4-2 and 3.4-3 in Section 3.4, Water Resources, show the number of MnDNR PWI watercourses and PWI basins that would be crossed by each 1,000-foot route. Section 3.4, Water Resources, provides a more detailed discussion about PWI streams and basins. Field verification of wetlands has not been completed for the Project, but would be conducted when a final route is selected, prior to Project construction.

Route Alternatives 1, 2, and 3

Tables 3.4-2 through 3.4-4 show the number of PWI-defined watercourses and basins within the routes and ROWs evaluated for each of the various Route Alternatives and Segment Alternatives. Table 3.6-3 shows the number of PWI wetlands that would be crossed by the Route and Segment Alternatives. The actual number of wetlands crossed during Project development and the amount of wetland area adversely affected would be dependent upon the location and width of the final ROWs. Wherever practicable, wetland crossings would be avoided entirely or located such that the wetlands could be spanned by poles placed between 800 and 1,000 feet apart. Mitigation measures for wetlands affected by Project construction and operation are discussed below in Section 3.6.3.

As shown in Table 3.6-3, the number of PWI wetland basins potentially affected within the ROWs evaluated range from six for Route Alternative 1, three for Route Alternative 2, to 10 for Route Alternative 3.

Table 3.6-3: Number of PWI Wetland Basin Crossings in the Study Area

Route and Segment Alternatives	Entire Route		Leech Lake Reservation (1,000-ft route)	Chippewa National Forest (1,000-ft route)
	1,000-foot route	125-foot ROW		
Route Alternatives				
1	10	6	8	8
2	7	3	4	4
3	24	10	0	24
Segment Alternatives				
A	2	1	N/A	N/A
B	0	0	0	0
C	0	0	0	0
D	0	0	0	N/A
E	2	0	2	2
F	0	0	0	0
G	0	0	N/A	N/A
H	0	0	N/A	N/A
I	0	0	N/A	N/A
J	0	0	N/A	N/A
K	2	1	1	0
L	0	0	0	N/A
M	1	1	1	N/A
N	0	0	0	0
O	0	0	0	0
P	0	0	0	0
Q	0	0	0	0
R	0	0	N/A	0
S	0	0	N/A	0
T	0	0	N/A	0

Source: MnDNR, 2009m

Leech Lake Reservation

As shown in Table 3.6-3, the number of PWI wetlands that would be crossed on the LLR range from zero for Route Alternative 3 to eight for Route Alternative 1. Route Alternative 3 largely avoids the LLR. The Segment Alternative with the most PWI wetlands crossings within the LLR is Segment Alternative E with two crossings.

Chippewa National Forest

As shown in Table 3.6-3, the number of PWI wetlands located on the CNF that are crossed by the Route Alternatives ranges from four for Route Alternative 2 to 24 for Route Alternative 3.

3.6.2. Direct/Indirect Effects

Potential effects to wetland areas are described for a feasible 125-foot ROW for each Route Alternative and Segment Alternative, because this is the maximum potential area that would be disturbed during construction within the wider route widths.

Potential direct impacts resulting from construction and maintenance of the Project could include:

- Long-term and temporary loss of wetlands and/or wetland functions
- Conversion of wetland types

Potential indirect impacts from the Project could include:

- Change in water quality and water recharge
- Loss of habitat
- Impacts from construction and maintenance access

Three types of direct impacts to wetland areas would result from the Project: long-term loss of wetlands and/or wetland functions in areas of Project structure placement, temporary loss of wetlands and/or wetland functions during construction, and conversion of wetland types, as shown in Table 3.6-4. Long-term loss of wetlands and/or wetland functions would only occur if a wetland could not be spanned, and if dredging or filling was required for structure installation. Each H-frame structure is anticipated to occupy 40 square feet. Removal of woody vegetation may incorporate a discharge of fill material that requires a Department of the Army Permit if mechanized land clearing involves soil disturbance in waters of the United States.

Long-term conversion of wetland type would occur where the clearing of forested wetland areas would be required within the ROW. Approximately 15 acres of wetland would be affected for each mile of ROW crossing through a wetland or wetland complex. Removal of woody vegetation within a wetland area would convert the forested wetland area to a different vegetative class and thus a different wetland type, for example, a forested wetland may be converted to a scrub-shrub or emergent wetland. The converted wetland would be maintained during operation with the periodic removal of forest vegetation. Wetland conversion could result in changes in wetland functions, including water retention and recharge. Conversion from one wetland type to another would also result in a change in wildlife species composition and diversity.

Temporary wetland losses or losses of wetland function due to construction activities may occur to wetland areas that are not within the footprint of an H-frame structure or converted to another wetland type. For example, soil compaction or vegetation removal may occur where a wetland area is traversed by construction equipment.

Some wetlands temporarily affected by the Project would return to their original function. However, certain wetland types, including bogs and white cedar swamps, would be difficult to restore and replace. Both white cedar swamps and bogs consist of a highly organic and moist soil composition that develops over time from decomposition. Bogs require a buffer to remove excess nutrients before they reach the bog, which could extend up to 250 feet from the bog itself. Excess water and nutrients in the buffer can adversely affect the function of the bog. Due to the unique soil conditions within bogs and white cedar swamps, the wetland types are difficult to restore and replace (State of Washington, 2005).

Each of the Route Alternatives would result in adverse impacts to wetlands. As shown in Table 3.6-4, for each ROW evaluated the long-term loss of wetlands and/or wetland functions from pole placement would be negligible, representing less than 1 acre. Conversion of wetland type, which could result from the removal of woody vegetation in the ROW and may be long-term, are specifically noted in Table 3.6-4 and not included in the definition of "long-term impacts" from pole placement. Route Alternative 2 generally shows the least potential impact to wetlands, with approximately 59 acres of temporary impacts and 166 acres of wetland conversion. Route Alternative 3 shows the greatest potential impact to wetlands, consisting of 101 acres of temporary impacts and 269 acres of wetland conversion. Route Alternative 1 falls between the other two, with 83 acres of temporary impacts and 209 acres of wetland conversion. These potential impacts are described in greater detail in the following subsections.

The estimated impacts to NWI wetlands identified in Table 3.6-4 were calculated for the feasible 125-foot ROW identified by the Applicants. The table accounts for locations along the Route and Segment Alternatives where the Applicants specified the Project ROW could overlap or parallel existing ROWs. In these areas, former wetlands may have already been impacted or converted, resulting in a lower potential impact from the Project. If the 125-foot ROW were located elsewhere within the 1,000-foot routes and no longer co-located with existing ROWs, the potential wetland conversion areas could be greater than those identified in the table.

Table 3.6-4 also provides a preliminary estimate of the number of wetlands that would have long-term impacts from the placement of structures for each Route Alternative and Segment Alternative. The estimated number of structures that would be placed in an NWI wetland ranges from 93 for Route Alternative 2 to 120 for Route Alternative 3.

Table 3.6-4: Estimated NWI Impacts within a Feasible 125-foot Right-of-Way

Route and Segment Alternatives	Associated Route Alternatives	Temporary Impacts (acres)	Wetland Type Conversion (acres)	Long-Term Impacts	Total NWI Wetland Impacts	Number of NWI Wetland Crossings That Cannot be Spanned	Estimated # of Structures placed in NWI Wetlands
Route Alternatives							
1		83	209	<1	292	29	113
2		59	166	<1	225	30	93
3		101	269	<1	370	35	120
Segment Alternatives							
A	1	23	10	<1	33	2	3
B	1	9	17	<1	26	2	2
C	1, 2	3	14	<1	17	1	1
D	1	6	4	<1	11	0	0
E	3	4	13	<1	17	2	6
F	2	1	2	<1	3	1	1
G	2	<1	N/A	<1	<1	0	0
H	2	<1	0	<1	<1	0	0
I	2	<1	<1	<1	<1	N/A	N/A
J	1, 2	0	0	0	0	0	0
K	1, 2	2	18	<1	20	2	10
L	1	3	<1	<1	4	1	1
M	1, 2	6	1	<1	7	1	1
N	1, 2	<1	4	<1	4	0	0
O	1, 2	2	<1	<1	2	0	0
P	1, 2	3	N/A	<1	3	0	0
Q	1, 2	<1	1	<1	1	0	0
R	3	<1	3	<1	6	0	0
S	3	<1	1	<1	4	N/A	N/A
T	3	2	4	<1	6	1	1

Forested wetlands are typically underrepresented in NWI maps due to limitations in identifying this wetland type from aerial photography. Thus, although NWI maps serve as an excellent screening or preliminary evaluation tool, on-the-ground field surveys are required to identify wetlands, their boundaries, and their quality. The forested wetland class is characterized by woody vegetation that is 6 meters (20 feet) or taller, and can be difficult to restore and replace. Within the ROW, forested wetlands would likely be converted to another wetland type. To identify potential impacts to forested wetlands, NWI maps were compared with land cover type maps to approximate the types of forested wetlands present in the 125-foot ROW for the Route and Segment Alternatives.

Tables 3.6-5 and 3.6-6 approximate the potential impacts to forested wetland types within the 125-foot feasible ROW identified for the Route and Segment Alternatives.

Table 3.6-5: Potential Impacts to Forested Wetland Types within the 125-foot Feasible Right-of-Way for the Route Alternatives

Forested Wetland Types	Route Alternatives		
	1	2	3
Deciduous Forest – Wetland Types (Acres)			
Aspen/White Birch	4.78	5.05	13.91
Black Ash	0.28	-	0.53
Lowland Deciduous	33.81	22.28	16.15
Maple/Basswood	0.29	0.08	0.48
Red Oak	-	-	-
Upland Deciduous	1.60	0.91	2.44
Total	**40.76**	**28.32**	**33.5**
Conifer Forest – Wetland Types (Acres)			
Balsam Fir mix	0.29	0.15	0.02
Jack Pine	0.13	0.12	0.79
Lowland Black Spruce	19.10	8.34	68.31
Lowland Northern White-Cedar	8.51	1.87	1.17
Red Pine	-	-	-
Red/White Pine	0.10	1.13	0.88
Tamarack	4.90	5.24	2.03
Upland Conifer	0.12	2.26	-
Upland Northern White-Cedar	0.09	-	0.25
Total	**33.24**	**19.1**	**73.45**
Conifer-Deciduous Mix – Wetland Types (Acres)			
Jack Pine-Deciduous mix	0.09	-	-
Lowland Conifer-Deciduous mix	6.03	4.50	11.26
Total	**6.12**	**4.50**	**11.26**

Table 3.6-6: Forested Wetland Types within the 125-foot Feasible Right-of-Way for the Segment Alternatives

Forested Wetland Types	Segment Alternatives																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Deciduous Forest – Wetland Types (Acres)																				
Aspen/White Birch	0.30	2.37	1.56	0.61	0.78	-	-	-	-	-	0.50	-	0.79	1.06	0.09	-	-	0.03	0.38	0.02
Black Ash	-	0.07	-	-	1.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lowland Deciduous	0.04	0.93	4.21	0.32	1.71	1.19	-	-	-	-	1.39	-	-	0.12	-	-	0.81	-	0.01	1.41
Maple/Basswood	-	0.03	-	0.12	-	-	-	-	-	-	-	-	-	0.05	-	-	-	-	0.03	-
Red Oak	-	-	-	0.02	-	-	-	-	-	-	-	-	0.02	-	-	-	-	-	-	-
Upland Deciduous	-	0.48	0.28	0.41	0.30	-	-	-	-	-	-	-	-	1.53	0.04	-	0.01	-	-	0.25
Total	**0.34**	**3.89**	**6.05**	**1.47**	**4.02**	**1.19**	**0.00**	**0.00**	**0.00**	**0.00**	**1.89**	**0.00**	**0.81**	**2.76**	**0.13**	**0.00**	**0.82**	**0.03**	**0.42**	**1.68**
Conifer Forest – Wetland Types (Acres)																				
Balsam Fir mix	-	-	0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jack Pine	0.30	0.11	-	-	-	-	-	-	-	-	0.21	-	-	-	-	-	-	0.90	-	-
Lowland Black Spruce	0.21	1.97	1.30	-	-	0.24	-	-	-	-	1.52	-	-	-	-	-	-	1.16	-	-
Lowland Northern White-Cedar	-	-	2.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Red Pine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Red/White Pine	-	-	0.01	0.23	0.18	-	-	-	-	-	0.12	-	-	-	-	-	-	-	-	-
Tamarack	-	0.72	1.60	-	0.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upland Conifer	-	-	0.10	-	0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upland Northern White-Cedar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04	-	-	-	-	-
Total	**0.51**	**2.80**	**5.50**	**0.23**	**0.89**	**0.24**	**0.00**	**0.00**	**0.00**	**0.00**	**1.85**	**0.00**	**0.00**	**0.00**	**0.04**	**0.00**	**0.00**	**2.06**	**0.00**	**0.00**

Conifer-Deciduous Mix – Wetland Types (Acres)																				
Jack Pine-Deciduous mix	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lowland Conifer-Deciduous mix	-	2.61	-	-	0.19	-	-	-	-	-	1.24	-	-	-	-	-	-	0.03	-	-
Total	**0.00**	**2.61**	**0.00**	**0.00**	**0.19**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.24**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.00**	**0.00**

3.6.2.1. No-Build Alternative

The No-Build Alternative would not construct transmission facilities in the Study Area; as such there would be no impact to wetlands within the Study Area.

3.6.2.2. Route Alternative 1

Route Alternative 1 would cross 29 wetland complexes that cannot be spanned as well as riparian areas along the Mississippi River, impacting an estimated 292 acres (Table 3.6-4). These impacts are greater than Route Alternative 2 but less than Route Alternative 3. As with all Route Alternatives, long-term impacts related to the permanent structures would be less than 1 acre. Approximately 209 acres of wetlands would be converted and approximately 83 acres would be temporarily affected during construction.

The Segment Alternatives associated with this route alternative would have the following impacts:

- Segment Alternative A would increase the total wetland impacts to 300 acres as compared to Route Alternative 1, increasing the temporary impacts to 102 acres, but reducing the wetland conversion to 198 acres. The number of wetland complexes that cannot be spanned would increase to 35, and this Segment Alternative would increase the number of structures potentially placed in an NWI wetland by two.
- Segment Alternative B would increase the total wetland impacts to approximately 312 acres, increasing the temporary impacts to 89 acres and the wetland conversion to 223 acres. Segment Alternative B would increase the number of wetland complexes that cannot be spanned to 33 and increase the number of structures to 115.
- Segment Alternative C would increase the total wetland impacts to approximately 312 acres, increasing the temporary impacts to 89 acres and the wetland conversion to 223 acres. Segment Alternative C would increase the number of wetland complexes that cannot be spanned to 31 and increase the number of structures to 119.

As discussed above, long-term impacts would result from the loss of wetlands and/or wetland functions from structure placement within a wetland (less than 1 acre). Wetland conversion through clearing and maintenance of the ROW could result in changes in wetland functions, including water retention and recharge. Conversion from one wetland type to another would also result in a change in wildlife species composition, diversity, and abundance. Temporary impacts to wetlands during construction include soil compaction or vegetation removal that could result in temporary loss of wetlands and/or wetland functions.

3.6.2.3. Route Alternative 2

Route Alternative 2 would cross 30 wetland complexes that cannot be spanned, as well as riparian areas along the Mississippi River. Although Route Alternative 2 contains a similar number of wetland complexes that cannot be spanned as Route Alternative 1, the estimated number of structures placed within NWI wetlands is less, 93 as opposed to 113.

As with the other Route Alternatives evaluated, long-term impacts to wetlands would be less than 1 acre. Wetland type conversion within the feasible 125-foot ROW that was evaluated are estimated to be 166 acres. Temporary impacts resulting from this Route Alternative are estimated to be approximately 59 acres.

As discussed above, long-term impacts would result from the loss of wetlands and/or wetland functions from structure placement within a wetland (less than 1 acre). Wetland conversion through clearing and maintenance of the ROW could result in changes in wetland functions, including water retention and recharge. Conversion from one wetland type to another would also result in a change in wildlife species composition and diversity. Temporary impacts to wetlands during construction include soil compaction or vegetation removal that could result in temporary loss of wetlands and/or wetland functions.

3.6.2.4. Route Alternative 3

Largely because of its longer length, Route Alternative 3 would have the greatest effect on wetlands of the Route Alternatives evaluated. Within the feasible ROW evaluated, Route Alternative 3 would cross 35 wetland complexes that cannot be spanned and require approximately 120 pole structures within wetland complexes.

Long-term impacts to wetlands that cannot be spanned would again be less than 1 acre. Wetland type conversion within the 125-foot ROW evaluated would be approximately 269 acres. Temporary impacts would affect approximately 101 acres.

As discussed above, long-term impacts would result from the loss of wetlands and/or wetland functions from structure placement within a wetland (less than 1 acre). Wetland conversion through clearing and maintenance of the ROW could result in changes in wetland functions, including water retention and recharge. Conversion from one wetland type to another would also result in a change in wildlife species composition and diversity. Temporary impacts to wetlands during construction include soil compaction or vegetation removal that could result in temporary loss of wetlands and/or wetland functions.

3.6.2.5. Leech Lake Reservation

Table 3.6-7 shows the estimated temporary impacts, long-term wetland type conversion, and long-term impacts to NWI wetlands located within feasible ROWs evaluated for the portions of all Route Alternatives and Segment Alternatives located within the LLR. Table 3.6-7 also provides a preliminary estimate of the number of wetlands within the LLR that would have long-term impacts from the placement of structures.

Table 3.6-7: Estimated NWI Impacts within a Feasible 125-foot Right-of-Way within the LLR

Route and Segment Alternatives	Temporary Impacts (acres)	Wetland Type Conversion (acres)	Long-Term Impacts (acres)	Total NWI Wetland Impacts (acres)	Number of Wetland Crossings That Cannot be Spanned	Estimated # of Structures placed in NWI Wetlands
Route Alternatives						
1	63	161	<1	224	23	92
2	43	117	<1	160	21	67
3	0	4	<1	4	1	0
Segment Alternatives						
A	N/A					
B	9	17	<1	26	2	2
C	3	14	<1	17	1	1
D	6	4	<1	11	0	0
E	3	13	<1	16	2	6
F	1	2	<1	3	1	1
G	N/A					
H	N/A					
I	N/A					
J	N/A					
K	1	9	<1	10	2	3
L	3	<1	<1	3	1	1
M	6	1	<1	7	1	1
N	<1	4	<1	4	0	0
O	2	<1	<1	2	0	0
P	3	0	<1	3	0	0
Q	<1	1	<1	1	0	0
R	N/A					
S	N/A					
T	N/A					

Route Alternative 1 has the greatest potential for wetland impacts; potentially affecting 224 acres of wetlands, of which 161 acres would be converted long-term. Route Alternative 2 could potentially affect 160 acres of wetlands, including conversion of approximately 117 acres of forested wetland. Route Alternative 3 largely avoids the

LLR, potentially affecting only 4 acres, all of them involving conversion of forested wetlands.

As discussed above, long-term impacts would result from the loss of wetlands and/or wetland functions from structure placement within a wetland (less than 1 acre). Wetland conversion through clearing and maintenance of the ROW could result in changes in wetland functions, including water retention and recharge. Conversion from one wetland type to another would also result in a change in wildlife species composition and diversity. Temporary impacts to wetlands during construction include soil compaction or vegetation removal that could result in temporary loss of wetlands and/or wetland functions.

3.6.2.6. Chippewa National Forest

Table 3.6-8 shows the estimated temporary impacts, long-term wetland type conversion, and long-term impacts to NWI wetlands located within ROW areas within the CNF. Overall, impact proportions would be similar to those described above for the entire route lengths. The table also provides a preliminary estimate of the number of wetlands within the CNF that would have long-term impacts from the placement of structures.

Table 3.6-8: Estimated NWI Impacts within a Feasible 125-foot Right-of-Way within the CNF

Route and Segment Alternatives	Temporary Impacts (acres)	Wetland Type Conversion (acres)	Long-Term Impacts	Total NWI Wetland Impacts	Number of Wetland Crossings That Cannot be Spanned	Estimated # of Structures placed in NWI Wetlands
Route Alternatives						
1	63	161	<1	224	23	92
2	30	101	<1	131	18	72
3	66	199	<1	265	24	126
Segment Alternatives						
A	N/A					
B	9	17	<1	26	2	2
C	3	14	<1	17	1	1
D	6	4	<1	11	0	0
E	3	13	<1	17	2	6
F	1	2	<1	3	1	1
G	N/A					
H	N/A					
I	N/A					
J	N/A					
K	N/A					
L	N/A					
M	N/A					
N	<1	4	<1	4	0	0
O	2	<1	<1	2	0	0
P	3	0	<1	3	0	0
Q	N/A					
R	0	1	0	1	0	0
S	0	0	0	0	0	0
T	0	1	<1	4	0	0

Route Alternative 1 could potentially affect 224 acres of wetlands on the CNF, requiring conversion of approximately 161 acres of forested wetland. Route Alternative 2 could potentially affect 131 acres of wetlands, 101 acres of which would be converted. Route Alternative 3 has the potential for the greatest wetland impacts, approximately 265 acres, including nearly 200 acres of forested-wetland conversion.

As discussed above, long-term impacts would result from the loss of wetlands and/or wetland functions from structure placement within a wetland (less than 1 acre). Wetland conversion through clearing and maintenance of the ROW could result in changes in wetland functions, including water retention and recharge. Conversion from one wetland type to another would also result in a change in wildlife species composition and diversity. Temporary impacts to wetlands during construction include soil compaction or vegetation removal that could result in temporary loss of wetlands and/or wetland functions.

3.6.3. Mitigation

A variety of mitigation measures could be implemented to reduce the potential impacts to wetlands from construction and operation of the Project. Mitigation measures that are typically included in permits are noted; cases where additional mitigation measures may be incorporated as a permit condition are also noted.

To mitigate the potential for erosion, under the HVTL permit the Applicants could be required to implement reasonable measures to manage storm water runoff during construction. Planting or seeding non-agricultural areas that were disturbed by transmission line structures would be required to prevent soil erosion due to runoff and the subsequent impacts to wetlands and water resources.

To minimize long-term impacts to wetlands, the HVTL permit could require the Applicants to span wetlands, when possible, by adjustment of the location of the final ROW within the selected 1,000-foot-wide route.

For long-term wetland impacts that were not avoidable, including wetland filling and wetland type conversion, the Project would be subject to wetland replacement siting rules (*Minnesota Rules* part 8420.0522), state compensatory mitigation requirements under state water quality standards (*Minnesota Rules* part 7050.0186), and the USACE *St. Paul District Policy for Wetland Compensatory Mitigation in Minnesota* (2009). Supplemental St. Paul District Army Corps of Engineers policy and guidance may also apply to compensatory mitigation for this Project. The primary goal of wetland mitigation is to restore high quality wetland communities of the same type, quality, function, and value as those to be impacted to the extent practicable. The five main categories of mitigation methods considered appropriate in northern Minnesota by state and federal agencies are: 1) restoration of impacted wetlands; 2) enhancement of existing wetlands; 3) wetland preservation; 4) wetland creation; and 5) upland buffers.

The USACE St. Paul District requires a basic compensation ratio of 1.5:1 (1.5 acres of compensatory mitigation for every 1 acre of wetland loss) in the northeastern portion of Minnesota where the Project would be located. *Minnesota Rules*, part 7050.0186 requires compensatory mitigation to be sufficient to ensure replacement of the diminished or lost designated uses of the wetland that was physically altered. Both state and federal mitigation rules can require greater mitigation ratios depending upon the location, timing, and type of mitigation provided.

The Project would require a number of wetland-related permits, including coverage under the General Permit for Storm Water Discharges Associated with Construction Activities and associated Storm Water Pollution Prevention Plan (SWPPP), National Pollution Discharge Elimination System Permit (NPDES), License to Cross Public

Waters, Public Waters Work Permit, and Section 10 Permit. The placement of transmission line pole structures, land clearing that involves soil disturbance, or placement of construction mats may be considered a discharge of fill material that would require a permit from the Department of the Army pursuant to Section 404 of the Clean Water Act. These permits would require the Applicants to develop and implement Best Management Practices (BMPs) for sediment and erosion control during construction and operation of the Project to protect topsoil and adjacent wetlands and surface water resources. Typical BMPs may include:

- Contain stockpiled material, including fuel and chemicals, away from wetlands;
- Install sediment and erosion control prior to construction in accordance with sediment and erosion control plans and permits;
- Use turbidity control methods prior to discharging wastewater from concrete batching or other construction operations to streams or other surface waters;
- Spread topsoil and seed in a timely manner;
- Avoid use of fertilizers, pesticides, or herbicides in or near water bodies, including wetlands;
- Fuel construction vehicles outside of water bodies, including wetlands, and use appropriate spill prevention and containment procedures; and
- Implement procedures to minimize and control inadvertent fluid returns during horizontal directional drilling (HDD) operations, if they are used.

The Applicants have proposed several additional BMPs for Project construction. These BMPs are designed to protect topsoil and adjacent water resources by trapping sediments. This would avoid contributing sediment to wetlands. The Applicants propose to avoid or minimize major disturbance of individual wetlands and drainage systems during construction by spanning wetlands and drainage systems, where possible. When it is not possible to span the wetland, the Applicants would draw upon several options during construction to minimize impacts:

- When possible, construction would be scheduled during frozen ground conditions;
- Crews would attempt to access a wetland with the least amount of physical impact to the wetland (i.e., shortest route);
- The structures would be assembled on upland areas before they were brought to the site for installation, when practical; and
- When construction during winter was not possible, construction mats would be used where wetlands would be affected. Additionally, the Applicants have access to an all-terrain construction vehicle that may be used, which is designed to minimize soil impact in damp areas.

As a standard practice, similar mitigation measures would be followed on lands within the Leech Lake Reservation as for state lands and private property.

Construction activities carried out on CNF lands that take place within or in close proximity of lakes, streams, wetlands, or other water bodies would be conducted and monitored in accordance with objectives, standards, and guidelines of the Forest-Wide Management Directions provided in the 2004 *Forest Plan* (USDA, 2004). Construction plans would also be modified in accordance with any guidelines specific to each CNF Management Area.

3.7. Biological Resources

This section describes the biological conditions (i.e., vegetation, noxious weeds, and fauna) in the Study Area, which is defined as the 1,000-foot-wide route developed for each Route Alternative and Segment Alternative. The major biological resource areas within the Study Area include the Chippewa National Forest; the Leech Lake Reservation; and, to a lesser extent, state-owned lands including five State forests (Big Fork, Blackduck, Bowstring, Buena Vista, and Welsh Lake) and the Bemidji Slough Wildlife Management Area (WMA). The primary focus of this section is the potential impacts to vegetative cover, the potential spread of noxious weeds, and impacts from changes in vegetation cover and habitat fragmentation on common wildlife species. A discussion of Federal, State, and Tribal threatened, endangered, and species of special concern is provided in Section 3.8.

Minnesota Department of Natural Resources (MnDNR) Geographical Analysis Program (GAP) Level 4 land cover data were used to identify the vegetation communities within the 1,000-foot Project alternatives. Vegetation community information was further supplemented with the *USFS Chippewa National Forest Land and Resource Management Plan* (CNF, 2004), *MnDNR Comprehensive Wildlife Conservation Strategy* (MnDNR 2006), and MnDNR general habitat descriptions (MnDNR, 2009). The noxious weeds inventory was based upon the Minnesota Noxious Weed Law (*Minnesota Rules*, parts 1505.0730 through 1505.0750), Chippewa National Forest (CNF) invasive species list (USDS, 2009), the Leech Lake Band of Ojibwe Division of Resource Management (LLDRM, 2009e) invasive species list, and previous field surveys completed for previous projects in the region (USDS, 2009). Fauna information was primarily derived from field surveys completed for previous projects in the region (USDS, 2009) in the area and a *Biological Assessment and Evaluation* completed for this project (Appendix G).

3.7.1. Affected Environment

This section describes vegetation cover, noxious weeds, and fauna in the Study Area that may be affected by Project construction and operation.

3.7.1.1. Vegetation Cover

The Project lies within the Chippewa Plains Subsection of the Northern Minnesota Drift and Lakes Plains Ecoregion, which was historically characterized by a diverse mix of wetland communities and upland deciduous/coniferous forests comprised of pine species (e.g., red, white, and jack) and hardwoods (e.g., oak, maple, basswood, aspen, and birch) (Marschner, 1974; Otter Tail Power et al., 2008a). Since the early to mid-1900s, forestry has been a dominant land use practice in the region, which has changed the vegetative landscape to a mosaic of aspen-dominated deciduous forests, mixed hardwood forests and shrublands, croplands, pine forests, and wetlands interspersed with various levels of rural and urban development (MnDNR, 2009d).

Vegetation cover was analyzed using vegetation cover types as defined by Minnesota Geographic Analysis Program (GAP) Level 4 land cover data. Table 3.7-1 summarizes the vegetation cover types for the three Route Alternatives; the primary cover types are individually identified. More detailed data about the vegetation cover types are included in Appendix F.

Table 3.7-1: Vegetation Cover Types within the Route Alternatives

Cover Type	Route Alternative 1		Route Alternative 2		Route Alternative 3	
	Acres	Percent of Route	Acres	Percent of Route	Acres	Percent of Route
Aspen/White Birch	1,956	23.4	1,696	20.8	3,931	27.8
Broadleaf Sedge/Cattail	394	4.7	435	5.3	284	2.0
Cropland	1,474	17.6	1,072	13.2	3,344	23.7
Grassland	82	1.0	70	0.9	137	1.0
Jack Pine	239	2.9	376	4.6	166	1.2
Lowland Conifer	363	4.3	213	2.6	893	6.3
Lowland Conifer-Deciduous Mix	112	1.3	67	0.8	167	1.2
Lowland Deciduous	291	3.5	273	3.4	384	2.7
Lowland Shrub	1,016	12.1	980	12.0	1,392	9.9
Sedge Meadow	157	1.9	100	1.2	134	0.9
Upland Conifer	636	7.6	742	9.1	371	2.6
Upland Deciduous	1,282	15.3	477	5.9	1,688	12.0
Upland Shrub	267	3.2	853	10.5	758	5.4
Urban/Developed	73	0.9	760	9.3	395	2.8
Water	33	0.4	33	0.4	76	0.5
Total	**8,375**	**100**	**8,147**	**100**	**14,120**	**100**

In addition to the major Route Alternatives described above, multiple Segment Alternatives for each of the major routes are also under consideration. Table 3.7-2 identifies the Segment Alternatives for each Route Alternative and summarizes the vegetation cover types for the Segment Alternatives. More detailed information about the vegetation cover types is included in Appendix F.

Table 3.7-2: Vegetation Cover Type within the Segment Alternatives

	Segments and Associated Route Alternatives																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
	1	1	1,2	1	3	2	2	2	2	1, 2	1, 2	1	1, 2	1, 2	1, 2	1, 2	1, 2	3	3	3
Cover Type	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**
Aspen/White Birch	469 (24.4)	465 (35.8)	281 (51.7)	122 (19.6)	263 (20.2)	23 (12.8)	18 (8.8)	8 (4.2)	8 (10.4)	0 (0.0)	99 (13.5)	135 (42.6)	104 (33.4)	111 (23.6)	156 (44.3)	24 (37.5)	9 (19.6)	10 (4.3)	15 (11.3)	32 12.2
Broadleaf Sedge/Cattail	49 (2.5)	67 (5.2)	18 (3.3)	13 (2.1)	19 (1.5)	4 (2.2)	5 (2.5)	7 (3.6)	3 (3.9)	0 (0.0)	47 (6.4)	15 (4.7)	28 (9.0)	0 (0.00)	4 (1.1)	0 (0.0)	0 (0.0)	1 (0.4)	0 (0.0)	0 (0.0)
Cropland	597 (31.1)	47 (3.6)	2 (0.4)	273 (43.8)	444 (34.1)	23 (12.8)	100 (49.0)	82 (42.7)	38 (49.4)	52 (76.5)	194 (26.5)	116 (36.6)	36 (11.6)	0 (0.0)	0 (0.0)	9 (14.1)	14 (30.4)	142 (60.7)	92 (69.2)	123 46.9
Grassland	7 (0.4)	4 (0.3)	0 (0.0)	3 (0.5)	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (0.7)	2 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.4)	0 (0.0)	0 (0.0)
Jack Pine	39 (2.0)	96 (7.4)	13 (2.4)	4 (0.6)	6 (0.5)	15 (8.3)	32 (15.7)	12 (6.3)	0 (0.0)	0 (0.0)	131 (17.9)	0 (0.0)	51 (16.4)	27 (5.7)	0 (0.0)	12 (18.8)	0 (0.0)	6 (2.6)	0 (0.0)	0 (0.0)
Lowland Conifer	19 (1.0)	21 (1.6)	45 (8.3)	1 (0.2)	56 (4.3)	3 (1.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	21 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	9 (3.8)	0 (0.0)	0 (0.0)
Lowland Conifer-Deciduous mix	2 (0.1)	19 (1.5)	8 (1.5)	0 (0.0)	16 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (0.7)	0 (0.0)	0 (0.0)	6 (1.3)	0 (0.0)	0 (0.0)	1 (2.2)	3 (1.3)	0 (0.0)	0 (0.0)
Lowland Deciduous	31 (1.6)	22 (1.7)	25 (4.6)	11 (1.8)	41 (3.2)	15 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (1.0)	0 (0.0)	2 (0.6)	7 (1.5)	3 (0.9)	0 (0.0)	0 (0.0)	9 (3.8)	5 (3.8)	31 (11.8)
Lowland Shrub	135 (7.0)	60 (4.6)	48 (8.8)	44 (7.1)	111 (8.5)	9 (5.0)	0 (0.0)	4 (2.1)	2 (2.6)	0 (0.0)	56 (7.7)	14 (4.4)	9 (2.9)	8 (1.7)	4 (1.1)	0 (0.0)	0 (0.0)	11 (4.7)	6 (4.5)	15 (5.7)
Sedge Meadow	12 (0.6)	1 (0.1)	4 (0.7)	9 (1.4)	15 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (0.5)	0 (0.0)	2 (0.6)	0 (0.0)	1 (0.3)	0 (0.0)	2 (4.3)	2 (0.9)	0 (0.0)	8 (3.1)
Upland Conifer	39 (2.0)	75 (5.8)	59 (10.9)	14 (2.2)	128 (9.8)	33 (18.3)	17 (8.3)	21 (10.9)	0 (0.0)	0 (0.0)	26 (3.6)	0 (0.0)	7 (2.3)	67 (14.2)	56 (15.9)	3 (4.7)	2 (4.3)	0 (0.0)	0 (0.0)	11 (4.2)
Upland Deciduous	444 (23.1)	380 (29.2)	31 (5.7)	92 (14.8)	126 (9.7)	4 (2.2)	3 (1.5)	0 (0.0)	0 (0.0)	0 (0.0)	13 (1.8)	29 (9.1)	50 (16.1)	222 (47.1)	112 (31.8)	1 (1.6)	18 (39.1)	25 (10.7)	12 (9.0)	38 (14.5)
Upland Shrub	67 (3.5)	39 (3.0)	9 (1.7)	33 (5.3)	71 (5.5)	4 (2.2)	10 (4.9)	9 (4.7)	5 (6.5)	1 (1.5)	119 (16.3)	4 (1.3)	22 (7.1)	21 (4.5)	13 (3.7)	3 (4.7)	0 (0.0)	6 (2.6)	1 (0.8)	2 (0.8)
Urban/Developed	12 (0.6)	1 (0.1)	0 (0.0)	4 (0.6)	4 (0.3)	47 (26.1)	19 (9.3)	49 (25.5)	21 (27.3)	15 (22.1)	5 (0.7)	2 (0.6)	0 (0.0)	2 (0.4)	3 (0.9)	12 (18.8)	0 (0.0)	8 (3.4)	3 (2.3)	1 (0.4)
Water	0 (0.0)	3 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	**1,922 (100)**	**1,300 (100)**	**543 (100)**	**623 (100)**	**1,301 (100)**	**180 (100)**	**204 (100)**	**192 (100)**	**77 (100)**	**68 (100)**	**732 (100)**	**317 (100)**	**311 (100)**	**471 (100)**	**352 (100)**	**64 (100)**	**46 (100)**	**234 (100)**	**133 (100)**	**262 (100)**

Route Alternative 1

The dominant cover types in Route Alternative 1 are aspen/white birch forest (approximately 2,000 acres or 23 percent) and cropland (approximately 1,500 acres or 18 percent). Other prominent cover types include upland deciduous forest and lowland deciduous shrub (each comprising approximately 1,000 acres or 11 percent of the route). Many other cover types comprise less than 5 percent of the alternatives, including broadleaf sedge/cattail, lowland deciduous and conifer forests, and Jack Pine.

Cover types for the Segment Alternatives associated with Route Alternative 1 (A, B, C, D, J, K, L, M, N, O, P, and Q) are also dominated by aspen/birch forests, croplands, and other upland deciduous species, including maple/basswood stand. They generally have a similar vegetative structure to Route Alternative 1, with the following exceptions:

- Segment Alternatives C, N, and O contain very little cropland (0 to 4 percent) but contain relatively greater upland conifer stands (10 to 16 percent).
- Segment Alternatives K and P contain relatively greater upland shrub communities at the expense of upland deciduous forests.
- Segment Alternative K also contains approximately 131 acres (18 percent) of Jack Pine forest, and is the only Segment Alternative associated with Route Alternative 1 that contains more than 100 acres of that cover.
- Segment Alternative J is the only segment that does not contain an aspen/birch community. It is dominated by cropland (52 acres or 77 percent) and urban/developed areas (15 acres or 22 percent).

Route Alternative 1 and Segment Alternatives B, C, D, N, and O cross the Welsh Lake and Bowstring State Forests, and the Hole-in-the-Bog Scientific and Natural Area (SNA) is approximately 0.5 mile south of this Route Alternative. However, there are no State-designated SNAs or wildlife management areas (WMAs) within the Study Area for this Route Alternative or any of the associated Segment Alternatives.

Route Alternative 1 also crosses the Ten Section management area east of the city of Cass Lake. The Ten Section Area is considered a unique biological area by the CNF for old growth red and white pine stands. Activities within this area are managed to maintain existing old growth forest conditions (USDA, 2004). The Ten Section area is also an important spiritual and traditional gathering area to the members of the LLBO (LLBO, 2008b). While the boundary of the Ten Section management area is defined by the CNF, the LLBO has indicated that use of this area for spiritual and traditional gathering activities extends beyond the Ten Section management area boundary. For further discussion about use of the Study Area by the LLBO, refer to Section 3.9, Cultural Resources, and 3.12, Environmental Justice.

None of the Segment Alternatives would cross the Ten Section Area and Segment Alternative B would relocate Route Alternative 2 around the Ten Section Area.

Route Alternative 2

Similar to Route Alternative 1, aspen/white birch forest is the dominant vegetation cover type along Route Alternative 2, (approximately 1,700 acres or 21 percent of the route), followed by cropland (approximately 1,100 acres or 13 percent of the route), lowland shrub (approximately 1,000 acres or 12 percent of the route), and upland shrub (approximately 850 acres or 11 percent of the route). Many other cover types comprise less than 5 percent of the routes, including upland and lowland conifers, broadleaf sedge/cattail, and lowland deciduous forest.

The dominant cover types for the Segment Alternatives associated with Route Alternative 2 (C, F, G, H, I, J, K, M, N, O, P, and Q) are similar to the dominant cover types along Route Alternative 2 (aspen/birch and cropland). However, lowland shrub does not occur on any of the associated Segment Alternatives, and upland shrub communities are limited to Segment Alternatives K and P. Segment Alternatives C, M, N, and O contain large tracts of upland conifer and deciduous forests. Segment Alternatives G, H, and J contain relatively little aspen/birch (less than 10 percent each). Segment Alternatives H and J are dominated by cropland and urban development, while Segment Alternative G is primarily cropland and Jack Pine forest.

Route Alternative 2 and Segment Alternatives B, C, N, and O cross the Bowstring State Forest, and the Hole-in-the-Bog SNA is approximately 0.5 mile south of this Route Alternative. However, there are no State-designated SNAs or WMAs within the Study Area for this Route Alternative or any of the associated Segment Alternatives.

Route Alternative 3

As with Route Alternatives 1 and 2, aspen/white birch forest (approximately 4,000 acres or 28 percent of the route) and cropland (approximately 3,300 acres or 24 percent of the route) are the dominant vegetation cover types along Route Alternative 3. Other prominent cover types include upland deciduous forest and lowland shrub, which comprise approximately 1,700 acres (12 percent of the route) and 1,400 acres (10 percent of the route), respectively. Many other cover types comprise less than 5 percent of the route, including upland conifer, broadleaf sedge/cattail, and lowland deciduous and conifer forests. Cover types along Segment Alternatives E, R, S, and T are similar, although cropland is a major cover type along Segment Alternatives R, S, and T.

Route Alternative 3 crosses the Buena Vista, Blackduck, Big Fork, and Bowstring State Forests and Segment Alternative E crosses Bowstring State Forest. However, there are no State-designated SNAs or WMAs along this Route Alternative or any of the associated Segment Alternatives.

Leech Lake Reservation

Sections of each of the Route Alternatives lie within the LLR, although the portion of Route Alternative 3 within the LLR is small (36 acres or less than 1 percent of the route). Within the LLR, the dominant vegetation cover type for all Route Alternatives is aspen/white birch (Table 3.7-3).

Table 3.7-3: Vegetative Cover Types within the Route Alternatives within the LLR

Cover Type	Route Alternative 1		Route Alternative 2		Route Alternative 3	
	Acres	Percent of Route	Acres	Percent of Route	Acres	Percent of Route
Aspen/White Birch	1,351	25.54	1,358	25.95	0	0
Broadleaf Sedge/Cattail	229	4.34	285	5.45	0	0
Cropland	376	7.1	344	6.58	0.3	0.76
Grassland	26	0.49	40	0.77	0	0
Jack Pine	145	2.75	184	3.53	0	0
Lowland Conifer	303	5.73	191	3.64	0.2	0.54
Lowland Conifer-Deciduous mix	98	1.85	51	0.98	8	21.66
Lowland Deciduous	219	4.15	157	3.01	12	32.97
Lowland Shrub	781	14.75	753	14.41	8	22.06
Sedge Meadow	99	1.88	44	0.85	0	0
Upland Conifer	576	10.87	618	11.8	0	0
Upland Deciduous	921	17.41	326	6.22	8	21.97
Upland Shrub	130	2.45	575	10.99	<0.1	0.02
Urban/Developed	6	0.11	273	5.19	<0.1	0.02
Water	31	0.59	33	0.62	0	0
Total	**5,291**	**100**	**5,232**	**100**	**36**	**100**

The sections of Route Alternative 1 that are within the LLR also contain high amounts of lowland shrub (781 acres or 15 percent) and upland conifer and deciduous forest (576 acres or 11 percent, and 921 acres or 17 percent, respectively), with smaller quantities of many other cover types. Route Alternative 2 is similar in that the dominant vegetation cover types are aspen/white birch and lowland shrub; although upland shrub replaces the upland conifer and deciduous forests as the other dominant cover type. The 35-acre portion of Route Alternative 3 within the LLR does not contain aspen/white birch, but is dominated by a series of lowland communities including lowland conifer-deciduous mix (8 acres or 22 percent), lowland deciduous forest (12 acres or 33 percent), and lowland shrub (8 acres or 22 percent). Small quantities of upland deciduous forest, shrub, and urban land are interspersed throughout for a total of approximately 8 acres.

Route Alternatives 1 and 2 cross the Ten Section management area and Guthrie Till Plain east of the City of Cass Lake, which are considered important spiritual and traditional gathering areas within the LLR (LLBO, 2008b). The Ten Section Area is managed by the CNF to maintain old growth red and white pine stands (USFS, 2004) which contain plant and animal species significant to the LLBO; however, spiritual and traditional gathering practices extend beyond the CNF management area boundary. The northern hardwood forests of the Guthrie Till Plain are also provides plant and animal species of tribal significance (LLBO, 2008b). The Guthrie Till Plain is located along the north shore of Leech Lake (south of Highway 2) in the southwest corner of the LLR. For further discussion of use of the Study Area by the LLBO, refer to Section 3.9, Cultural Resources, and 3.12, Environmental Justice.

Twelve (B, C, D, E, F, K, L, M, N, O, P, and Q) of the 20 Segment Alternatives cross the Leech Lake Reservation and, with the exception of Segment Alternative D, the dominant cover type is aspen/white birch (Table 3.7-4). Upland deciduous and conifer forests and croplands are also common to the majority of the Segment Alternatives. Other prominent vegetative communities are Jack Pine (Segment Alternatives K and M), lowland deciduous or shrub (Segment Alternatives E, P, and Q), upland shrub (Segment Alternatives K and Q), urban (Segment Alternative F), and broadleaf sedge/cattail (Segment Alternative P).

Table 3.7-4: Vegetation Cover Type within the Segment Alternatives within the LLR

Cover Type	Segments and Associated Route Alternatives											
	B	**C**	**D**	**E**	**F**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**
	1	**1, 2**	**1**	**3**	**2**	**1, 2**	**1**	**1, 2**	**1, 2**	**1, 2**	**1, 2**	**1, 2**
	Acres (%)	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**	**Acres (%)**
Aspen/White Birch	464 (36.1)	265 (54.0)	0 (0.0)	221 (19.0)	23 (12.8)	44 (15.4)	92 (42.8)	104 (33.3)	111 (23.6)	156 (43.9)	52 (21.8)	9 (17.3)
Broadleaf Sedge/Cattail	57 (4.4)	7 (1.4)	13 (2.4)	19 (1.6)	4 (2.2)	0 (0.0)	0 (0.0)	29 (9.3)	0 (0.0)	4 (1.1)	27 (11.3	0 (0.0)
Cropland	47 (3.7)	2 (0.4)	236 (42.7)	384 (33.0)	23 (12.8)	60 (21.0)	65 (30.2)	36 (11.5)	0 (0.0)	0 (0.0)	17 (17.1)	14 (26.9)
Grassland	4 (0.3)	0 (0.0)	3 (0.5)	0 (0.0)	0 (0.0)	1 (0.3)	1 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	0 (0.0)
Jack Pine	96 (7.5)	13 (2.6)	4 (0.7)	6 (0.5)	15 (8.4)	41 (14.3)	0 (0.0)	51 (16.3)	27 (5.7)	0 (0.0)	15 (6.3)	0 (0.0)
Lowland Conifer	21 (1.6)	43 (8.8)	0 (0.0)	56 (4.8)	3 (1.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (2.1)	0 (0.0)
Lowland Conifer-Deciduous mix	19 (1.5)	8 (1.6)	0 (0.0)	16 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (1.3)	0 (0.0)	0 (0.0)	1 (1.9)
Lowland Deciduous	22 (1.7)	25 (5.1)	11 (2.0)	39 (15.0)	15 (8.4)	0 (0.0)	0 (0.0)	2 (0.6)	7 (1.5)	3 (0.8)	3 (1.3)	6 (11.5)
Lowland Shrub	60 (4.7)	41 (8.4)	44 (8.0)	110 (9.5)	9 (5.0)	21 (7.3)	14 (6.5)	9 (2.9)	8 (1.7)	4 (1.1)	32 (13.4)	0 (0.0)
Sedge Meadow	1 (0.1)	1 (0.2)	6 (1.1)	15 (1.3)	0 (0.0)	4 (1.4)	0 (0.0)	2 (0.6)	0 (0.0)	1 (0.3)	19 (8.0)	2 (3.8)
Upland Conifer	75 (5.8)	54 (11.0)	112 (20.3)	123 (10.6)	33 (18.4)	48 (16.8)	15 (7.0)	7 (2.2)	67 (14.3)	59 (16.6)	9 (3.8)	2 (3.8)
Upland Deciduous	376 (29.3)	31 (6.3)	90 (16.3)	110 (9.5)	4 (2.2)	3 (1.0)	26 (12.1)	50 (16.0)	222 (47.2)	112 (31.5)	11 (4.6)	18 (34.6)
Upland Shrub	39 (3.0)	1 (0.2)	30 (5.4)	61 (5.2)	4 (2.2)	57 (19.9)	1 (0.5)	22 (7.1)	21 (4.5)	13 (3.7)	27 (11.3)	0 (0.0)
Urban/Developed	1 (0.1)	0 (0.0)	4 (0.7)	2 (0.2)	46 (25.7)	4 (1.4)	1 (0.5)	0 (0.0)	1 (0.2)	3 (0.8)	19 (8.0)	0 (0.0)
Water	3 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	**1,285 (100)**	**491 (100)**	**553 (100)**	**1,162 (100)**	**179 (100)**	**286 (100)**	**215 (100)**	**312 (100)**	**470 (100)**	**355 (100)**	**238 (100)**	**52 (100)**

Chippewa National Forest

Sections of each of the major Route Alternatives lie within the CNF. Within the CNF, the dominant vegetation cover type for all Route Alternatives is aspen/white birch (Table 3.7-5).

Table 3.7-5: Vegetative Cover Types within the Route Alternatives within the CNF

Cover Type	Route Alternative 1		Route Alternative 2		Route Alternative 3	
	Acres	Percent of Route	Acres	Percent of Route	Acres	Percent of Route
Aspen/White Birch	1,202	27.7	1,143	28.6	2,657	36.1
Broadleaf Sedge/Cattail	182	4.2	240	6.0	168	2.3
Cropland	95	2.2	113	2.8	672	9.1
Grassland	35	0.8	29	0.7	59	0.8
Jack Pine	144	3.3	100	2.5	41	0.6
Lowland Conifer	238	5.5	155	3.9	807	11.0
Lowland Conifer-Deciduous mix	84	1.9	42	1.1	108	1.5
Lowland Deciduous	176	4.1	110	2.8	222	3.0
Lowland Shrub	669	15.4	659	16.5	909	12.4
Sedge Meadow	54	1.2	35	0.9	52	0.7
Upland Conifer	544	12.5	544	13.6	229	3.1
Upland Deciduous	764	17.6	271	6.8	1,031	14.0
Upland Shrub	120	2.8	429	10.7	268	3.6
Urban/Developed	1	0.0	97	2.4	79	1.1
Water	31	0.7	32	0.8	49	0.7
Total	**4,339**	**100**	**3,999**	**100**	**7,351**	**100**

The sections of Route Alternative 1 within the CNF also contain moderate amounts of lowland shrub (669 acres or 15 percent) and upland conifer and deciduous forest (544 acres or 13 percent, and 764 acres or 18 percent, respectively), with smaller quantities of many other cover types. Route Alternative 2 is similar in that the dominant vegetation cover types are aspen/white birch (1,143 acres or 29 percent), lowland shrub (659 acres or 17 percent), and upland conifer (544 acres or 14 percent); although upland shrub (429 acres or 11 percent) replaces the upland deciduous forest as the other dominant cover type. Route Alternative 3 is also dominated by aspen/white birch (2,657 acres or 36 percent), but includes lowland conifer (807 acres or 11 percent), lowland shrub (909 acres or 12 percent), and upland deciduous forest (1,031 acres or 14 percent).

Route Alternative 1 also crosses the Ten Section management area east of the City of Cass Lake. The Ten Section Area is considered a unique biological area by the CNF for old growth red and white pine stands. Activities within this area are managed to maintain existing old growth forest conditions (USDA, 2004).

Ten (B, C, D, E, N, O, P, R, S, and T) of the 20 Segment Alternatives cross the CNF and the dominant cover type is aspen/white birch, with the exception of Segment Alternatives D, E, R, S, and T where cropland is the co-dominant or dominant vegetative cover, respectively (Table 3.7-6). Upland deciduous and conifer forests are also common to the majority of the Segment Alternatives. Other prominent vegetative communities are lowland shrub (Segment Alternatives E and P), upland shrub (Segment Alternative P), and broadleaf sedge/cattail (Segment Alternative P).

Table 3.7-6: Vegetation Cover Type within the Segment Alternatives within the CNF

Cover Type	Segments and Associated Route Alternatives									
	B	C	D	E	N	O	P	R	S	T
	1	1, 2	1	3	1, 2	1, 2	1, 2	3	3	3
	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)
Aspen/White Birch	210 (27.9)	281 (51.7)	37 (33.3)	236 (20.3)	111 (23.6)	156 (43.9)	24 (37.5)	3 (2.7)	0 (0.0)	18 (24.7)
Broadleaf Sedge/Cattail	11 (1.5)	18 (3.3)	0 (0.0)	19 (1.6)	0 (0.0)	4 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Cropland	13 (1.7)	2 (0.4)	33 (29.7)	398 (34.2)	0 (0.0)	0 (0.0)	9 (14.1)	60 (54.5)	8 (100)	30 (41.1)
Grassland	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Jack Pine	15 (2.0)	13 (2.4)	2 (1.8)	6 (0.5)	27 (5.7)	0 (0.0)	12 (18.8)	5 (4.5)	0 (0.0)	0 (0.0)
Lowland Conifer	21 (2.8)	45 (8.3)	0 (0.0)	56 (4.8)	0 (0.0)	0 (0.0)	0 (0.0)	6 (5.5)	0 (0.0)	0 (0.0)
Lowland Conifer-Deciduous mix	11 (1.5)	8 (1.5)	0 (0.0)	16 (1.4)	6 (1.3)	0 (0.0)	0 (0.0)	2 (1.8)	0 (0.0)	0 (0.0)
Lowland Deciduous	18 (2.4)	25 (4.6)	0 (0.0)	41 (3.5)	7 (1.5)	3 (0.8)	0 (0.0)	2 (1.8)	0 (0.0)	8 (11.0)
Lowland Shrub	32 (4.2)	48 (8.8)	11 (9.9)	109 (9.4)	8 (1.7)	4 (1.1)	0 (0.0)	8 (7.3)	0 (0.0)	0 (0.0)
Sedge Meadow	0 (0.0)	4 (0.7)	0 (0.0)	15 (1.3)	0 (0.0)	1 (0.3)	0 (0.0)	2 (1.8)	0 (0.0)	0 (0.0)
Upland Conifer	38 (5.0)	60 (11.0)	7 (6.3)	105 (9.0)	67 (14.3)	59 (16.6)	3 (4.7)	0 (0.0)	0 (0.0)	5 (6.8)
Upland Deciduous	357 (47.4)	31 (5.7)	11 (9.9)	103 (8.9)	222 (47.2)	112 (31.5)	1 (1.6)	18 (16.4)	0 (0.0)	12 (16.4)
Upland Shrub	25 (3.3)	9 (1.7)	10 (9.0)	57 (4.9)	21 (4.5)	13 (3.7)	3 (4.7)	1 (0.9)	0 (0.0)	0 (0.0)
Urban/Developed	1 (0.1)	0 (0.0)	0 (0.0)	2 (0.2)	1 (0.2)	3 (0.8)	12 (18.8)	3 (2.7)	0 (0.0)	0 (0.0)
Water	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	**753 (100)**	**544 (100)**	**111 (100)**	**1,163 (100)**	**470 (100)**	**355 (100)**	**64 (100)**	**110 (100)**	**73 (100)**	**64 (100)**

3.7.1.2. Noxious Weeds

Noxious weeds are plants that are injurious to public health, the environment, public roads, crops, livestock, and other property (*Minnesota Statues*, section 18.77, subd. 8). Noxious weeds and other invasive plants are undesirable as are introduced species that could exclude and out-compete desirable native species, thereby decreasing overall species diversity. They primarily occur and spread through disturbed areas such as roadsides and rights-of-way where the removal of native plant communities has opened space for recolonization. Noxious weeds pose a threat to native plant communities and wildlife habitat, because they have few natural predators and can be aggressive competitors, allowing them to spread quickly and often outcompete the native plants upon which native wildlife depend. The Minnesota Noxious Weed Law (*Minnesota Statutes*, section 18.78) requires that noxious weeds be controlled or eradicated. The Law recognizes 11 primary noxious weeds (*Minnesota Rules*, part 1505.0730) that must be controlled or eradicated on all lands within the State; two restricted noxious weeds (*Minnesota Rules*, part 1505.0732) which cannot be imported, sold, or transported within the State; and 52 secondary noxious weeds (*Minnesota Rules*, part 1505.0740), which are not regulated by the State but are included in some County control programs. Overall, most of the noxious weeds in the areas traversed by the alternatives are widespread and common, but occur in scattered infestations in variable densities.

Infestations of a primary noxious weed, leafy spurge, are known to occur near all the Route Alternatives, as it has been documented near Cohasset and Bena. Spotted knapweed, a secondary noxious weed, is also known to occur near all the Route Alternatives because it has been documented in clusters near the cities of Cass Lake and Bemidji (Otter Tail Power et al., 2008a). Table 3.7-7 lists the regulated primary, restricted, and secondary noxious weeds within the Study Area.

Table 3.7-7: Minnesota Primary and County-Selected Secondary Noxious Weeds

Scientific	Common	Regulatory List	Habitat
Primary Noxious Weeds			
Alliaria petiolata	Mustard, Garlic	Minnesota	Moist soil in forests, forest edges, and roadsides
Cannabis sativa	Hemp	Minnesota	Open fields, croplands
Carduus acanthoides	Thistle, plumeless	Minnesota	Roadsides, croplands, disturbed areas
Carduus nutans	Thistle, musk	Minnesota	Roadsides, croplands, disturbed areas
Cirsium arvense	Thistle, Canada	Minnesota	Roadsides, croplands, disturbed areas
Cirsium vulgare	Thistle, bull	Minnesota	Roadsides, croplands, disturbed areas
Convolvulus arvensis	Field bindweed	Minnesota	Croplands, hedgerows
Euphorbia esula	Spurge, leafy	Minnesota	Croplands, pastures, roadsides
Lythrum salicaria	Loosestrife, purple	Minnesota	Wetlands
Sonchus arvensis	Sowthistle, perennial	Minnesota	Croplands, disturbed areas
Toxicodendron radicans	Poison ivy	Minnesota	Disturbed areas, wetlands, shrublands, forests
Restricted Noxious Weeds			
Rhamnus cathartica	Common buckthorn	Minnesota	Young forest, forest clearings/edges, disturbed areas, hedgerows
County-Selected Secondary Noxious Weeds			
Abutilon theophrasti	Velvetleaf	None, LLBO-identified	Croplands, waste areas, pastures, roadsides, and fence rows
Ambrosia artemisifolia	Ragweed, common	Cass	Croplands, roadsides, grasslands
Arctium minus	Burdock	Cass	Roadsides, croplands, grasslands
Artemisia absinthium	Wormwood	Cass	Croplands, roadsides, waste areas
Berteroa incana	Hoary alyssum	Beltrami, Cass, Hubbard	Roadsides, croplands, grasslands
Centaurea maculosa	Spotted knapweed	Beltrami, Cass, Hubbard	Roadsides, croplands, grasslands
Chrysanthemum leucanthemum	Oxeye daisy	Cass, Hubbard, Itasca	Grasslands, roadsides, waste areas
Hieracium aurantiacum	Orange hawkweed	Cass, Itasca	Roadsides, grasslands
Lychnis alba	Cockle, white	None, LLBO-identified	Fields, waste areas, disturbed sites, roadsides, railroads
Ranunculus acris	Buttercup, tall	Cass, Hubbard, Itasca	Grasslands, croplands
Tanacetum vulgare	Tansey	Beltrami, Cass, Itasca	Croplands, moist pasture
Xanthium pennsylvanicum	Cocklebur, commen	None, LLBO-identified	Open fields, gardens, pastures, and waste areas

Source: Otter Tail Power et al., 2008a; Minnesota Department of Agriculture, 2010.

Leech Lake Reservation

Seven primary noxious weed species, nine secondary noxious weeds, and two LLBO invasive plant species of concern have been identified within the LLR and are listed in Table 3.7-8 (USDS, 2009). Bio-control methods of noxious weeds have been used on the LLR since 1995 (USDA, 2003) and recent bio-control projects have focused on control of purple loosestrife, spotted knapweed, and leafy spurge. Manual removal by timed ecological mowing or hand-pulling is also used to control seed production. Herbicides are primarily avoided as a management tool because of the traditional gathering of plant materials that occurs on the LLR. Herbicide use must be approved through a LLR permit from the LLDRM-Environmental Department.

Plumeless thistle, garlic mustard, and common buckthorn are Early Detection Rapid Response (EDRR) species on the LLR, meaning that they are the targets of intensive management and eradication programs. Staff members from both the LLR and the CNF have worked cooperatively to address infestations of these weeds on adjacent lands.

Table 3.7-8: Noxious Weeds Known to Occur within the LLR

Type of Weed	Common Name	Scientific Name
Primary Noxious Weeds	Garlic mustard	*Alliaria petiolata*
	Plumeless thistle	*Carduus acanthoides*
	Spotted knapweed	*Centaurea biebersteinii*; formerly *C. maculosa*
	Canada thistle	*Cirsium arvense*
	Leafy spurge	*Euphorbia podperae*; formerly *E. esula*
	Purple loosestrife	*Lythrum salicaria*
	Common buckthorn	*Rhamnus cathartica*
Secondary Noxious Weeds	Velvetleaf	*Abutilon theophrastic*
	Hoary alyssum	*Berteroa incana*
	Oxeye daisy	*Chrysanthemum leucanthemum*
	Orange hawkweed	*Hieracium aurantiacum*
	Cockle, white	*Lychnis alba*
	Common reed grass	*Phragmites australis*–unclear if native or exotic
	Common tansy	*Tanacetum vulgare*
	Hybrid cattail	*Typha* x *glauca*—hybrid of two native cattails that outcompetes its parents.
	Cocklebur, common	*Xanthium pennsylvanicum*
LLBO Invasive Species[1]	St. Johnswort	*Hypericum perforatum*
	Wild Parsnip	*Pastinaca sativa*

Note: 1. These species do not occur on the Minnesota Noxious Weed list, but were identified as invasive species of concern by the LLBO. Wild parsnip is also a state-wide invasive species in Minnesota.
Sources: USDS, 2009; LLDRM, 2009e

Chippewa National Forest

The U.S. Forest Service (USFS) has a list of noxious weeds that are being tracked within the CNF (Table 3.7-9). Purple loosestrife, a highly invasive aquatic plant, is a primary noxious weed that occurs in wetlands on the CNF. Other noxious weeds that are found on disturbed sites within the CNF are spotted knapweed, leafy spurge, hoary alyssum, Canada thistle, bull thistle, field bindweed, perennial sowthistle, and field sowthistle (CNF, 2008c).

Plumeless thistle, garlic mustard, and common buckthorn are EDRR species in the CNF, meaning that they are the targets of intensive management and eradication programs. A total of 331 sites encompassing 515 total acres within the CNF contain infestations of non-native invasive plants, including noxious weeds, and have been proposed for treatment by a combination of manual, biological and chemical controls (CNF, 2008b). Proposed CNF treatment locations near the alternatives are as follows:

- Proposed CNF treatment locations for spotted knapweed: an area along U.S. Highway 2 that separates Pike Bay and Cass Lake (Route Alternative 2); an area along U.S. Highway 2 northeast of Lower Sucker Lake (Route Alternative 2); two areas along U.S. Highway 2 east of Bena (Route Alternative 2); and an area along U.S. Highway 2 near the junction of the Mississippi River (Route Alternatives 1 and 2).
- Proposed CNF treatment locations for leafy spurge: two areas along U.S. Highway 2 east and west of Bena (Route Alternative 2) and an area along U.S. Highway 2 near the junction of the Mississippi River (Route Alternatives 1 and 2).
- Proposed CNF treatment location for buckthorn along MN Highway 6, north of Deer River (Route Alternative 3).

Table 3.7-9: Noxious Weeds Tracked within the CNF

CNF Identified Noxious Weeds		
Scientific	**Common**	**Status**
Centaurea maculosa	Spotted knapweed	Primary weed
Euphorbia esula	Leafy spurge	Primary weed
Lythrum salicaria	Purple loosestrife	Primary weed
Rhamnus cathartica/frangula	Buckthorn	Primary weed
Alliaria petiolata	Garlic mustard	Primary weed
Berteroa incana	Hoary alyssum	Secondary weed
Carduus acanthoides	Plumeless thistle	Secondary weed
Tanacetum vulgare	Common tansy	Secondary weed
Potamogeton crispus	Curlyleaf pondweed	Secondary weed
Cirsium arvense	Canada thistle	Secondary weed
Cirsium vulgare	Bull thistle	Secondary weed
Convolvulus arvensis	Field bindweed	Secondary weed
Sonchus arvensis, S. uliginosus	Sowthistle	Secondary weed
Cenchrus longispinus	Field sandspur	Native noxious weed
Toxicodendron radicans	Poison ivy	Native noxious weed
Phragmites australis	Common reed	Monitored noxious weed
Typha angustifolia	Narrow-leaved cattail	Monitored noxious weed
Melilotus alba/officinalis	White/yellow sweet clover	Monitored (not official)

Source: CNF, 2008c

3.7.1.3. Fauna

This discussion summarizes the habitat conditions and common wildlife species present within the 1,000-foot Route and Segment Alternatives. For a discussion about federal, state, and tribal species of special concern, refer to Section 3.8, Species of Special Concern. Many wildlife species known to occur within the Study Area are considered important for traditional gathering practices by LLBO members, and are discussed in Section 3.9, Cultural Resources and Section 3.12, Environmental Justice.

Route Alternatives 1, 2, and 3

Wildlife habitat along each of the 1,000-foot Route and Segment Alternatives is similar in the general habitat conditions and common wildlife species that occur. The 1,000-foot Route Alternatives are dominated (approximately 50 to 70 percent) by upland deciduous forests, lowland deciduous shrublands, and grasslands/croplands. Specifically, aspen/white birch forests are the dominant habitat along Route Alternatives 1 and 2 and the Segment Alternatives associated with them, with cropland, upland deciduous forests, and lowland deciduous shrublands (including scrub/shrub wetlands) also providing major habitat (approximately 10 to 20 percent) within each alternative. Habitat within Route Alternative 3 is also predominantly aspen/white birch communities (approximately 54 percent); however, croplands habitat is greater (approximately 25 percent) relative to Route Alternatives 1 and 2. Less common habitats within all of the alternatives include upland and lowland conifer forests, lowland deciduous forests, and sedge/cattail communities. Refer to Section 3.7.1 for a detailed discussion about each habitat type within the Route and Segment Alternatives.

These habitats provide forage, nesting, and breeding habitat for resident wildlife, as well as stopover habitat for migratory species. Resident species common to north-central Minnesota forests and grasslands include mammals such as voles, mice, rabbits, beaver, bobcat, coyote, gray wolf, white tailed deer, and black bear as well as numerous songbird species. Common wetland and open water species include snakes, turtles, toads, and frogs.

Historic field surveys (USDS, 2009) have identified various warbler and raptor species as the most common wildlife within Route Alternatives 1 and 2. Connecticut and gold-winged warblers, red-tailed hawks, and bald eagles were all observed within the Route Alternatives 1 and 2 Study Area. Recent field surveys (Appendix G) along the Route Alternative 3 corridor identified 11 species, of which nine are birds (e.g., American bittern, bay-breasted warbler, black tern, black-backed woodpecker, Connecticut warbler, Le Conte's sparrow, Sandhill crane, trumpeter swan, and yellow rail), one is a mammal (gray wolf), and one is a reptile (snapping turtle). LeConte's sparrow and Connecticut warbler were the most commonly observed species during surveys along Route Alternative 3 and were commonly associated with lowland spruce forests and croplands, respectively. The gray wolves identified within the Route Alternative were transient individuals; there was no evidence of den sites within the Study Area.

Several avian nesting locations have also been documented within the three Route Alternatives. One great blue heron rookery was documented near Portage Lake in the vicinity of Route Alternatives 1 and 2 (NHIS, 2007). This rookery occurs within the CNF and LLR boundaries. In addition, NHIS and CNF records indicate multiple bald eagle nesting areas within or adjacent to each of the alternatives. Five bald eagle nesting areas are known to occur along Route Alternative 1. Two bald eagle nest sites have been identified along Route Alternative 2, while Route Alternative 3 is known to support one bald eagle nest site (NHIS, 2008). All nest sites for Route Alternatives 1 and 2 occur within the CNF and LLR boundaries. Refer to Section 3.8 for further detail about the species of special concern within the individual Route and Segment Alternatives.

The MnDNR designates WMAs throughout the State to provide protected habitat for game and nongame species, as well as to provide recreational opportunities for hunters and wildlife observers. The Bemidji Slough WMA, a 49-acre wetland complex created to protect local wetland resources, offers restricted hunting and is available for waterfowl and wildlife viewing (MnDNR, 2009a). This WMA is outside the borders of the CNF and LLR, but is located within Route Alternative 1. Segment Alternative J avoids the WMA, by allowing Route Alternative 1 to connect with Route Alternative 2.

Leech Lake Reservation

The LLR overlaps to a large extent within Route Alternatives 1 and 2 and Segment Alternatives A, B, C, D, F, L, M, N, O, P, and Q and, therefore, also provides primarily forested habitat with interspersed shrubland and wetland areas. The majority of Route Alternative 3 is outside of the LLR (greater than 90 percent). However, habitat conditions within the LLR are dominated by black ash and lowland deciduous and coniferous-deciduous mixed forests. Within Segment Alternative E, black ash and lowland forest habitat give way to croplands. There are no WMAs within, or adjacent to, the Route Alternatives or Segment Alternatives within the LLR.

Habitat conditions within the LLR are consistent with the general habitat conditions within the alternatives, as described above. Therefore, the common fauna within the LLR are expected to be similar to those species described above. Many of these species are important parts of the traditional gathering practices of the LLBO members, in particular, species occurring in and around the Ten Section management area as well as the northern hardwood forests within the LLR.

Chippewa National Forest

The CNF is crossed by all three Route Alternatives and is managed for multiple uses, including wildlife habitat. There are no WMAs within, or adjacent to, the Route Alternatives or Segment Alternatives within CNF. More than 239 common bird species are known to occur within the forest, including greater than 100 breeding species (CNF, 2008). Within the CNF, the alternatives are comprised of approximately 65 to 90 percent forested habitat with interspersed shrublands and wetlands. Route Alternative 3 and Segment Alternative E contain more cropland/grassland habitat than the other alternatives; however, forest cover remains the dominant habitat (approximately 63 percent). The CNF also provides habitat for one of the largest breeding populations of bald eagles in the lower 48 states. Approximately 150 breeding pairs of bald eagles occur annually within the CNF. Bald eagle nesting sites within the CNF include large red and white pines, and occasionally aspen (USFS, 2008). Three non-native, invasive species occur within the CNF, the earthworm, faucet snail, and the rusty crayfish. It is unknown if these species occur within the Route or Segment Alternatives (USDS, 2009; MnDNR, 2009n). However, two (faucet snail and rusty crayfish) are aquatic species that would be avoided because no structures or temporary construction activities would occur in waterways within the Route and Segment Alternatives.

The USFS designates Lynx Analysis Units (LAUs) within the CNF that comprise landscape-scale analysis areas for lynx management and were developed in consultation with the U.S. Fish and Wildlife Service. The Route Alternatives intersect nine LAUs within the CNF: three along Route Alternative 1 (LAU 8, 10, and 15); two along Route Alternative 2 (LAU 10 and 15); and six along Route Alternative 3 (LAU 3, 5, 6, 7, 9, and 14). No additional LAUs are intersected by the Segment Alternatives; however, several

LAUs along the main routes also intersect Segment Alternatives C (LAU 8) and E (LAU 14).

Habitat conditions within the CNF are consistent with the general habitat conditions within the alternatives, as described above. Therefore, the common fauna within the CNF are expected to be similar to those species described above.

3.7.2. Direct/Indirect Effects

The following sections describe the potential direct and indirect effects of each of the alternatives on vegetation cover, from noxious weeds, and fauna. For purposes of comparison, impacts are calculated using a feasible125-foot right-of-way (ROW). For purposes of this assessment, it is assumed that the Project would occupy the entire 125-foot ROW.

3.7.2.1. Vegetation Cover

The primary long-term impact of the alternatives on vegetation is the long-term conversion of existing vegetation communities to managed grassland or shrubland within the transmission line ROW. Maintenance of these areas would preclude recovery of natural vegetation for the lifetime of the Project. The magnitude of impacts relates to the type of vegetation that would be converted. In general, conversion of unmanaged upland shrub and grassland communities to maintained ROWs is much less significant than the same conversion of forest communities because of the magnitude of the structural change that occurs. While the relative quality (low versus high) of the existing habitat does play a large role in the magnitude of the potential impacts, the loss of forest cover would generally be considered more significant than the conversion of shrub and grasslands to a maintained ROW.

Based upon MnDNR Natural Heritage Information System and data available from the MnDNR Data Deli, no rare or sensitive vegetation communities occur within the Route or Segment Alternatives. Therefore, there would be no impacts to any rare or sensitive vegetation communities. Please refer to Section 3.15, Forestry, for impacts to specific forest resources. Route Alternatives 1 and 2 cross two areas (the Ten Section area and Guthrie Till Plain) identified by the LLBO as culturally significant natural resource areas. Impacts to these areas are further discussed below. Refer to Section 3.9, Cultural Resources, and 3.12, Environmental Justice for additional discussions of natural resources as cultural resources.

Tables 3.7-10 and 3.7-11 summarize the vegetation cover types within the feasible ROWs evaluated for each of the Route Alternative and Segment Alternative. More detailed data about the vegetation cover types are included in Appendix F.

Route Alternatives 1 and 2 would result in approximately 1,000 acres of impacts to native vegetation cover, while Route Alternative 3 would result in approximately 1,800 acres of impacts to existing vegetation communities.

Table 3.7-10: Vegetation Cover Types within the Feasible 125-foot Right-of-Way

Cover Type	Route Alternative 1		Route Alternative 2		Route Alternative 3	
	Acres	Percent of Route	Acres	Percent of Route	Acres	Percent of Route
Aspen/White Birch	249	23.8	199	19.5	430	24.5
Broadleaf Sedge/Cattail	43	4.1	56	5.6	43	2.4
Cropland	211	20.2	115	11.3	459	26.1
Grassland	8	0.8	11	1.1	26	1.5
Jack Pine	28	2.7	31	3.0	14	0.8
Lowland Conifer	34	3.3	17	1.7	78	4.4
Lowland Conifer-Deciduous mix	7	0.6	6	0.6	12	0.7
Lowland Deciduous	44	4.2	25	2.5	23	1.3
Lowland Shrub	151	14.4	116	11.4	171	9.7
Sedge Meadow	22	2.1	14	1.4	23	1.3
Upland Conifer	59	5.6	109	10.7	31	1.8
Upland Deciduous	159	15.2	45	4.4	224	12.8
Upland Shrub	24	2.3	162	15.9	153	8.7
Urban/Developed	8	0.8	111	10.8	70	4.0
Water	1	0.1	1	0.1	2	0.1
Total	**1,048**	**100**	**1,018**	**100**	**1,759**	**100**

Table 3.7-11: Vegetation Cover Type within the Feasible 125-foot Segment Alternatives

Cover Type	Segments and Associated Route Alternatives																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
	1	1	1, 2	1	3	2	2	2	2	1, 2	1, 2	1	1, 2	1, 2	1, 2	1, 2	1, 2	3	3	3
	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)
Aspen/ White Birch	36 (15.0)	63 (38.2)	37 (56.1)	9 (11.0)	25 (15.6)	3 (14.3)	0 (0.0)	2 (7.7)	2 (16.7)	0 (0.0)	13 (14.0)	17 (40.5)	14 (17.0)	15 (26.3)	22 (53.7)	1 (16.7)	0 (0.0)	0 (0.0)	2 13.3	5 (16.1)
Broadleaf Sedge/Cattail	9 (3.8)	6 (3.6)	2 (3.0)	1 (1.2)	1 (0.6)	0 (0.0)	1 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	8 (8.6)	3 (7.1)	5 (12.5)	0 (0.0)	1 (2.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Cropland	105 (43.8)	10 (6.1)	0 (0.0)	41 (50.0)	58 (36.3)	3 (14.3)	19 (73.1)	12 (46.2)	7 (58.3)	4 (57.1)	21 (22.6)	19 (45.2)	7 (17.5)	0 (0.0)	0 (0.0)	0 (0.0)	2 (40.0)	19 (70.4)	11 (73.3)	15 (48.4)
Grassland	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Jack Pine	2 (0.8)	9 (5.5)	2 (3.0)	0 (0.0)	1 (0.6)	3 (14.3)	2 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)	23 (24.7)	0 (0.0)	5 (12.5)	5 (8.8)	0 (0.0)	1 (16.7)	0 (0.0)	2 (7.4)	0 (0.0)	0 (0.0)
Lowland Conifer	2 (0.8)	3 (1.8)	6 (9.1)	0 (0.0)	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.7)	0 (0.0)	0 (0.0)
Lowland Conifer-Deciduous mix	0 (0.0)	3 (1.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Lowland Deciduous	0 (0.0)	2 (1.2)	5 (7.6)	1 (1.2)	2 (1.3)	2 (9.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (20.0)	0 (0.0)	0 (0.0)	2 (6.5)
Lowland Shrub	14 (5.8)	8 (4.8)	3 (4.5)	3 (3.7)	18 (11.3)	1 (4.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (7.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (6.5)
Sedge Meadow	3 (1.3)	0 (0.0)	0 (0.0)	1 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.1)	0 (0.0)	1 (2.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.2)
Upland Conifer	2 (0.8)	10 (6.1)	6 (9.1)	2 (2.4)	25 (15.6)	5 (23.8)	2 (7.7)	3 (11.5)	0 (0.0)	0 (0.0)	5 (5.4)	0 (0.0)	0 (0.0)	6 (10.5)	5 (12.2)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.2)
Upland Deciduous	53 (22.1)	41 (24.8)	4 (6.1)	12 (14.6)	15 (9.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (3.2)	3 (7.1)	3 (7.5)	25 (43.9)	12 (29.3)	0 (0.0)	2 (40.0)	2 (7.4)	0 (0.0)	1 (3.2)
Upland Shrub	12 (5.0)	8 (4.8)	1 (1.5)	10 (12.2)	13 (8.1)	0 (0.0)	1 (3.8)	2 (7.7)	1 (8.3)	0 (0.0)	7 (7.5)	0 (0.0)	5 (12.5)	6 (10.5)	1 (2.4)	1 (16.7)	0 (0.0)	2 (7.4)	0 (0.0)	0 (0.0)
Urban/Developed	2 (0.8)	1 (0.6)	0 (0.0)	1 (1.2)	1 (0.6)	4 (19.0)	1 (3.8)	7 (26.9)	2 (16.7)	3 (42.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (16.7)	0 (0.0)	1 (3.7)	1 (6.7)	0 (0.0)
Water	0 (0.0)	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	**240 (100)**	**165 (100)**	**66 (100)**	**82 (100)**	**160 (100)**	**21 (100)**	**26 (100)**	**26 (100)**	**12 (100)**	**7 (100)**	**93 (100)**	**42 (100)**	**40 (100)**	**57 (100)**	**41 (100)**	**5 (100)**	**5 (100)**	**27 (100)**	**15 (100)**	**31 (100)**

No-Build Alternative

The No-Build Alternative would result in no change to the existing environment and, as a result, no short- or long-term changes to vegetation cover would occur. The Project would not be constructed and no clearing of vegetation would be required.

Route Alternative 1

Route Alternative 1 would primarily result in impacts to aspen/white birch, cropland, lowland deciduous shrublands, and upland deciduous forests, together accounting for approximately 770 acres, or 73 percent of the vegetation cover within the feasible alignment evaluated. This alternative would also have minor impacts to other cover types. However, the impacts to these additional cover types are each less than 5 percent of the feasible alignment evaluated. Route Alternative 1 would generally impact the same cover types as the other Route Alternatives, with the following exceptions:

- Route Alternative 1 would have greater impacts to upland deciduous communities (including sugar maple/basswood stands) than Route Alternative 2. However, impacts to upland deciduous communities are expected to be limited to 159 acres or 15 percent of the ROW.
- Route Alternative 1 would have less impact on urban/developed areas (8 acres) than either Route Alternatives 2 or 3 (111 acres and 70 acres, respectively).
- Route Alternative 1 would have less impact on upland shrub (24 acres) than Route Alternatives 2 or 3 (162 acres and 153 acres, respectively).
- Route Alternative 1 would cross the Ten Section Area and Guthrie Till Plain potentially affecting the old growth stands within these areas. These areas and the surrounding habitat are of particular importance to the LLBO for spiritual and traditional gathering practices.
- Route Alternative 1 would have the longest length of new corridors (non-existing ROWs) among the three route alternatives (5.2 miles). This represents approximately 7.5 percent of the Route Alternative. Construction of these new corridors would fragment existing habitat patches rather than expanding existing ROWs as would occur along the remainder of the Route Alternative.

Impacts to vegetative communities from all Segment Alternatives associated with Route Alternative 1 would be similar (a difference of less than 20 acres) to Route Alternative 1, with the following exceptions:

- Segment Alternative B would avoid the Ten Section management area as defined by the CNF. However, the lands surrounding the Ten Section management area are also important to the traditional spiritual and traditional gathering practices of the LLBO. Segment Alternative B would not avoid impacts to the areas immediately south of the Ten Section management area boundary.

- Segment Alternative C would impact an additional 66 acres, the majority, 37 acres, being aspen/white birch communities.
- Segment Alternative K would impact approximately 23 acres of Jack Pine. This Segment Alternative includes more than two times the Jack Pine forest cover than any other Segment Alternative.

There are no Segment Alternatives that would completely avoid impacts to the Guthrie Till Plain relative to Route Alternative 1. Segment Alternatives A, B, D, K, L, M, N, and O all intersect a portion of the Guthrie Till Plain and are not likely to minimize impacts to this area relative to Route Alternative 1; however, Segment Alternatives N and O (in combination with a portion of Route Alternative 2) would reduce habitat fragmentation of along the eastern end of the Guthrie Till Plain.

Route Alternative 2

Similar to Route Alternative 1, Route Alternative 2 would primarily result in impacts to aspen/white birch, cropland, and lowland deciduous shrublands. This alternative would also have minor impacts on other cover types. However, the impacts to these additional cover types are each less than 5 percent of the feasible alignment evaluated. Route Alternative 2 would generally impact the same cover types as the other Route Alternatives, with the following exceptions:

- Route Alternative 2 would have greater impacts to upland shrub and conifer communities relative to Route Alternatives 1 and 3.
- Route Alternative 2 would have the greatest impact on urban/developed areas (111 acres) of any of the Route Alternatives (8 acres for Route Alternative 1 and 70 acres for Route Alternative 3).
- Route Alternative 2 would have the shortest length of new corridors (non-existing ROWs) among the three route alternatives (2.6 miles). This represents approximately 3.8 percent of the Route Alternative. Construction of these new corridors would fragment existing habitat patches rather than expanding existing ROWs as would occur along the remainder of the Route Alternative.
- Route Alternative 2 would reduce the project footprint within the Ten Section Area and Guthrie Till Plain relative to Route Alternative 1 due to its location along Highway 2, a pre-existing ROW. Route Alternative 2 passes along the northern boundary of the Ten Section Area and limits the impacts to the Guthrie Till Plain to an approximately 3 mile stretch immediately east of the Ten Section Area. In addition, representatives of the LLDRM have identified the eastern portions of the Ten Section Area and Guthrie Till Plain that would be crossed by Route Alternative 2 as an area of lesser tribal use for hunting/gathering and spiritual activities, compared to the areas of the Ten Section Area and Guthrie Till Plain that would be crossed by Route Alternative 1.

Because vegetative communities from all associated Segment Alternatives are either similar to Route Alternative 2, or represent relatively small acreages, impacts to vegetative communities from all Segment Alternatives associated with Route Alternative 2 would be similar (a difference of less than 20 acres) to Route Alternative 2, with the following exceptions:

- Segment Alternative C would impact an additional 66 acres, the majority, 37 acres, being aspen/white birch communities.
- Segment Alternative K would impact approximately 23 acres of Jack Pine. This Segment Alternative includes more than two times the Jack Pine forest cover than any other Segment Alternative.

The eastern sections of the Ten Section Area and Guthrie Till Plain that would be crossed by Route Alternative 2 are developed with an existing ROW and are not as heavily used by members of the LLBO for hunting/gathering and spiritual activities as those portions of the Ten Section Area and Guthrie Till Plain that would be crossed by Route Alternative 1. There are no Segment Alternatives associated with Route Alternative 2 that have been developed to avoid the Ten Section Area or Guthrie Till Plain.

Route Alternative 3

Route Alternative 3 is the longest route alternative and, due to its length, would result in the greatest total disturbance. However, because of the increased length, the relative potential impacts along the feasible alignment would be nearly double compared to Route Alternatives 1 and 2. Similar to Route Alternatives 1 and 2, approximately one-quarter of the impacts within the ROW would be aspen/white birch communities and an additional one-quarter would be cropland. In addition, upland deciduous forest impacts would also be greater relative to Route Alternatives 1 and 2. Impacts to vegetative communities from Segment Alternatives E, R, S, and T would be similar to Route Alternative 3. The new corridors (non-existing ROWs) within Route Alternative 3 would be similar to Route Alternative 1 (5.1 miles, or 4.4 percent of the entire route). Construction of these new corridors in forested areas would fragment existing forest patches rather than expanding existing ROWs as would occur along the remainder of the Route Alternative. Within forested areas, the new corridors would create edge habitat and migratory pathways through previously intact forest interiors. This alternative does not cross the Ten Section area or Guthrie Till Plain.

Leech Lake Reservation

Tables 3.7-12 and 3.7-13 summarize the potential impacts to the vegetation communities within the LLR ROW for the Route Alternatives and Segment Alternatives.

Table 3.7-12: Vegetation Cover Types within the Feasible 125-foot Right-of-Way in the LLR

Cover Type	Route Alternative 1		Route Alternative 2		Route Alternative 3	
	Acres	Percent of Route	Acres	Percent of Route	Acres	Percent of Route
Aspen/White Birch	176	26.5	158	24.1	0	0
Broadleaf Sedge/Cattail	24	3.6	32	4.9	0	0
Cropland	55	8.3	32	4.9	0	0
Grassland	1	0.2	4	0.6	0	0
Jack Pine	19	2.9	13	2	0	0
Lowland Conifer	28	4.3	17	2.6	0	0
Lowland Conifer-Deciduous mix	6	0.9	4	0.6	0	0
Lowland Deciduous	36	5.4	12	1.8	1	25
Lowland Shrub	120	18.1	89	13.6	3	75
Sedge Meadow	14	2.1	6	0.9	0	0
Upland Conifer	51	7.8	101	15.4	0	0
Upland Deciduous	118	17.9	31	4.8	0	0
Upland Shrub	14	2.1	109	16.6	0	0
Urban/Developed	1	0.2	47	7.1	0	0
Water	1	0.2	1	0.2	0	0
Total	**664**	**100**	**656**	**100**	**4**	**100**

Route Alternatives 1 and 2 would convert approximately 660 acres of native vegetation cover to a maintained ROW, while very little of Route Alternative 3 (4 acres of lowland communities) is within the LLR. Similar to the overall impacts, Route Alternative 1 would primarily impact aspen/white birch, lowland shrub, and upland deciduous forest while Route Alternative 2 would primarily impact aspen/white birch, upland and lowland shrub communities, and upland conifer forest. Route Alternative 1 would cross the Ten Section management area and potentially affect the old growth forest stands, which have a cultural importance to the LLBO members.

The main difference in Route Alternative impacts within the LLR is the relatively low acreage of cropland (55 and 32 acres within Route Alternatives 1 and 2, respectively, and none within Route Alternative 3).

The affected vegetation cover types within the feasible ROWs evaluated for Segment Alternatives within the LLR are generally similar to the cover within the Route Alternatives. Impacts to vegetative communities for all Segment Alternatives located within the LLR would be similar (a difference of less than 20 acres) to Route Alternatives 1, 2, and 3, with the following exceptions:

- Segment Alternative B would impact an additional 88 acres within the LLR compared to Route Alternative 1. The only cover type that would be impacted by more than 20 acres would be aspen/white birch. This Segment Alternative would avoid impacts to the Ten Section management area, but would still affect areas identified by the LLBO as important spiritual and traditional gathering areas adjacent to the CNF Ten Section management area boundary.

- Segment Alternative C would impact an additional 47 acres, the majority, 37 acres, being aspen/white birch communities.
- Segment Alternative E would impact an additional 91 acres within the LLR than Route Alternative 3 impacts to the LLR. Most of the impacts would be to aspen/white birch and croplands.
- Segment Alternatives R and T would impact an additional 3 to 7 acres within the LLR than Route Alternative 3. Most of the impacts would be to cropland and upland deciduous forest, although Segment Alternative R would also impact 1 acre of Jack Pine forest.
- Segment Alternatives N and O would reduce fragmentation impacts to portions of the Guthrie Till Plain by minimizing the potential habitat fragmentation relative to Route Alternative 1. There are no Segment Alternatives associated with Route Alternative 2 that would limit or avoid the intersection with the Ten Section area or Guthrie Till Plain.

Table 3.7-13: Vegetation Cover Types within the Feasible 125-foot Right-of-Way Segment Alternatives in the LLR

Cover Type	Segments and Associated Route Alternatives														
	B	C	D	E	F	K	L	M	N	O	P	Q	R	S	T
	1	1, 2	1	3	2	1, 2	1	1, 2	1, 2	1, 2	1, 2	1, 2	3	3	3
	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)
Aspen/White Birch	63 (41.7)	36 (76.6)	7 (10.4)	21 (23.1)	3 (18.8)	6 (15.8)	12 (44.4)	14 (35.0)	15 (26.8)	22 (78.6)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	3 (30.0)
Broadleaf Sedge/Cattail	6 (4.0)	0 (0.0)	1 (1.5)	0 (0.0)	0 (0.0)	8 (21.1)	3 (11.1)	5 (12.5)	0 (0.0)	1 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Cropland	10 (6.6)	0 (0.0)	33 (49.3)	51 (56.0)	0 (0.0)	9 (23.7)	9 (33.3)	7 (17.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (71.4)	1 (100)	3 (30.0)
Grassland	0 (0.0)	0 (0.0)	1 (1.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Jack Pine	9 (6.0)	1 (2.1)	0 (0.0)	1 (1.1)	3 (18.8)	6 (15.8)	0 (0.0)	5 (12.5)	5 (8.9)	0 (0.0)	1 (16.7)	0 (0.0)	1 (14.3)	0 (0.0)	0 (0.0)
Lowland Conifer	3 (2.0)	5 (10.6)	0 (0.0)	1 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Lowland Conifer-Deciduous mix	3 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Lowland Deciduous	2 (1.3)	0 (0.0)	1 (1.5)	0 (0.0)	2 (12.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (33.3)	0 (0.0)	0 (0.0)	1 (10.0)
Lowland Shrub	8 (5.3)	0 (0.0)	3 (4.5)	0 (0.0)	1 (6.3)	2 (5.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Sedge Meadow	0 (0.0)	0 (0.0)	1 (1.5)	0 (0.0)	0 (0.0)	1 (2.6)	0 (0.0)	1 (2.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Upland Conifer	9 (6.0)	5 (10.6)	1 (1.5)	5 (5.5)	5 (31.3)	0 (0.0)	0 (0.0)	0 (0.0)	6 (10.7)	2 (7.1)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Upland Deciduous	28 (18.5)	0 (0.0)	10 (14.9)	0 (0.0)	0 (0.0)	1 (2.6)	3 (11.1)	3 (7.5)	24 (42.9)	2 (7.1)	0 (0.0)	2 (66.7)	1 (14.3)	0 (0.0)	3 (30.0)
Upland Shrub	8 (5.3)	0 (0.0)	9 (13.4)	12 (13.2)	0 (0.0)	5 (13.2)	0 (0.0)	5 (12.5)	6 (10.7)	1 (3.6)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Urban/Developed	1 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	2 (12.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Water	1 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	**151 (100)**	**47 (100)**	**67 (100)**	**91 (100)**	**16 (100)**	**38 (100)**	**27 (100)**	**40 (100)**	**56 (100)**	**28 (100)**	**5 (100)**	**3 (100)**	**7 (100)**	**1 (100)**	**10 (100)**

Chippewa National Forest

Tables 3.7-14 and 3.7-15 summarize the potential impacts to the vegetation communities within the CNF ROW for the Project.

Table 3.7-14: Vegetation Cover Types within the Feasible 125-foot Route Alternatives in the CNF

Cover Type	Route Alternative 1		Route Alternative 2		Route Alternative 3	
	Acres	Percent of Route	Acres	Percent of Route	Acres	Percent of Route
Aspen/White Birch	158	29.1	137	27.6	304	33.0
Broadleaf Sedge/Cattail	18	3.3	27	5.4	30	3.3
Cropland	10	1.8	6	1.2	93	10.1
Grassland	4	0.7	4	0.8	11	1.2
Jack Pine	19	3.5	5	1.0	7	0.8
Lowland Conifer	22	4.1	12	2.4	72	7.8
Lowland Conifer-Deciduous mix	6	1.1	4	0.8	8	0.9
Lowland Deciduous	32	5.9	6	1.2	19	2.1
Lowland Shrub	99	18.2	79	15.9	110	12.0
Sedge Meadow	7	1.3	5	1.0	12	1.3
Upland Conifer	50	9.2	87	17.5	14	1.5
Upland Deciduous	102	18.8	24	4.8	157	17.1
Upland Shrub	15	2.8	81	16.3	59	6.4
Urban/Developed	0	0.0	17	3.4	21	2.3
Water	1	0.2	1	0.2	1	0.1
Total	**543**	**100**	**495**	**100**	**918**	**100**

Similar to the previous discussion, the aspen/white birch community would have the most potential impact from all alternatives, followed generally by lowland shrub and upland deciduous forests along Route Alternatives 1 and 3 and upland conifer forests and upland shrub communities for Route Alternative 2.

The Project would result in a long-term conversion of forested habitat to managed shrublands within the 125 ROW; however, with the exception of aspen forests the CNF vegetation compositions objectives in the 2008 Forest Plan identify the need to increase the long-term distribution of upland forest communities within the CNF (USDA, 2008). The potential impacts of the Route Alternatives would impact less than 1 percent of each upland forest type within the CNF and would jeopardize the long-term viability of any forest communities within the CNF or ability of the CNF to meet its vegetation management objectives.

Table 3.7-15: Affected Vegetation Cover Types within the Feasible 125-foot Segment Alternatives in the CNF

Cover Type	Segments and Associated Route Alternatives							
	B	C	D	E	F	N	O	P
	1	1, 2	1	3	2	1, 2	1, 2	1, 2
	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)	Acres (%)
Aspen/White Birch	33 (34.0)	37 (57.8)	1 (50.0)	24 (16.9)	3 (23.1)	15 (26.3)	22 (53.7)	3 (10.3)
Broadleaf Sedge/Cattail	2 (2.1)	2 (3.1)	0 (0.0)	1 (0.7)	0 (0.0)	0 (0.0)	1 (2.4)	1 (3.4)
Cropland	2 (2.1)	0 (0.0)	0 (0.0)	51 (35.9)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.4)
Grassland	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Jack Pine	2 (2.1)	1 (1.6)	0 (0.0)	1 (0.7)	3 (23.1)	5 (8.8)	0 (0.0)	2 (6.9)
Lowland Conifer	3 (3.1)	5 (7.8)	0 (0.0)	1 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Lowland Conifer-Deciduous mix	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Lowland Deciduous	1 (1.0)	5 (7.8)	0 (0.0)	2 (1.4)	1 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)
Lowland Shrub	6 (6.2)	3 (4.7)	0 (0.0)	18 (12.7)	0 (0.0)	0 (0.0)	0 (0.0)	4 (13.8)
Sedge Meadow	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.4)
Upland Conifer	3 (3.1)	6 (9.4)	1 (50.0)	19 (13.4)	5 (38.5)	6 (10.5)	5 (12.2)	1 (3.4)
Upland Deciduous	39 (40.2)	4 (6.3)	0 (0.0)	13 (9.2)	0 (0.0)	25 (43.9)	12 (29.3)	1 (3.4)
Upland Shrub	4 (4.1)	1 (1.6)	0 (0.0)	12 (8.5)	0 (0.0)	6 (10.5)	1 (2.4)	9 (31.0)
Urban/Developed	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (7.7)	0 (0.0)	0 (0.0)	6 (20.7)
Water	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	**97 (100)**	**64 (100)**	**2 (100)**	**142 (100)**	**13 (100)**	**57 (100)**	**41 (100)**	**29 (100)**

The affected vegetation cover types within the feasible ROWs evaluated for Segment Alternatives within the CNF are generally similar to the cover within the Route Alternatives. Impacts to vegetative communities for all Segment Alternatives located within the CNF would be similar (a difference of less than 20 acres) to Route Alternatives 1, 2, and 3, with the exception of Segment Alternative C which would impact an additional 64 acres, the majority (37 acres) being aspen/white birch communities. Similar to the Route Alternatives, each Segment Alternative would affect less than 1 percent of the upland forest community types within the CNF.

3.7.2.2. Noxious Weeds

Most non-native invasive plants in the Project Study Area occur in disturbed areas such as roadsides, utility corridors, and temporary roads. Introduction occurs through natural colonization of disturbed areas (quick-colonizing species), introducing topsoil, gravel, hay, and straw with an invasive species seedbank, or through transfer of the seeds via workers and construction equipment. The Project would result in the temporary disturbance of surface soils from site clearing, grading, and excavation activities at structure locations, pulling and tensioning sites, setup areas, and during the transport of crews, machinery, materials, and equipment over access routes (primarily along the transmission ROW). Construction of the Project is expected to disturb roughly 1,000 acres of soil, depending upon the Route Alternative and Segment Alternative eventually selected. Approximately 3 acres would undergo more long-term impacts because of the installation of pole structures. Areas with temporary and long-term soil disturbance would be the focal points for noxious weed control, as described in the alternatives section below.

No-Build Alternative

The No-Build Alternative would result in no change to the existing environment, because the Project would not be constructed. As a result, land disturbance and dispersal of seeds resulting in the potential establishment of noxious weeds would not occur.

Route Alternatives 1, 2, and 3

Construction of any of the alternatives could lead to the introduction or spread of noxious weeds in an area from ground disturbance, introduction of topsoil, gravel, hay, or straw that is contaminated with noxious weed seeds, and/or vehicles importing weed seed from a contaminated site to an uncontaminated site. The USFS has identified 515 acres of the CNF for its non-native, invasive species management program. These areas are known locations of noxious weeds within the CNF, and several areas are within the Route Alternatives. Following work in these areas, the potential exists to spread noxious weeds to other areas by the methods described above. However, implementation of a noxious weed management program (as identified in Section 3.7.3) would mitigate the potential spread of these species. The use of herbicides is currently restricted and requires a permit within the LLR; therefore, the preferred methods of weed control are manual removal via pulling or mowing.

Leech Lake Reservation

Noxious weeds are known to occur throughout the LLR and directly affect tribal residents who gather native plant materials for both traditional uses and to earn a living (for a further discussion of LLBO member's use of native vegetation and wildlife, refer to Section 3.9, Cultural Resources, and Section 3.12, Environmental Justice). Noxious weeds are often fast-growing and introduction to previously uncontaminated sites along the Route and Segment Alternatives would potentially lead to competitive exclusion of native species within the LLR. Control programs are ongoing throughout the reservation; however, the use of herbicides is regulated and requires a permit from the LLDRM. Therefore, the preferred methods of weed control are manual removal via pulling or mowing.

Chippewa National Forest

Noxious weeds are known to occur throughout the CNF and three CNF proposed noxious weeds treatment locations lie within the vicinity of the alternatives (see the affected environment section, above).

3.7.2.3. Fauna

Potential wildlife impacts from the Project include the direct or indirect loss or conversion of habitats, increased habitat fragmentation, and the potential risk of avian collisions with transmission conductors and equipment. The Project would expand the existing ROWs or create new ROWs that would convert woodlands to maintained grass/shrub. Species that rely upon forested habitat would generally be displaced in favor of grass, shrubland, and forest- adapted species. The creation of new ROW corridors within the forested portions of each route alternatives would replace contiguous forest habitat with edge habitat and potentially provide new foraging corridors for predatory species while impacts along the existing ROWs would expand the existing edge effects further from the existing ROW. Route Alternatives 1 and 3 would each result in approximately 5 miles of new corridors (5.2 and 5.1, respectively), while Route Alternative 2 would have the least (2.6 miles). Overall, the Route Alternatives would convert approximately 430 to 815 acres (Route Alternatives 2 and 3, respectively) of woodland to grasslands and shrublands. The specific impacts of the Project alternatives, including those areas within the CNF and LLR, are discussed below.

No-Build Alternative

The No-Build Alternative would result in no change to the existing environment, because the Project would not be constructed. As a result, changes in habitat composition, fragmentation, and a potential increase in the risks of avian strikes within the Project Study Area would not occur.

Route Alternative 1

The habitat and wildlife species occurring within the feasible alignments evaluated are common throughout north-central Minnesota. Aspen/birch communities, which categorically represent the dominant native habitat (excluding cropland) within the feasible alignments evaluated (refer to Table 3.7-1) continue to cover approximately 85 percent of their historic distribution within the region (MnDNR, 2006). The only habitat to show a major (i.e., greater than 50 percent) decline from historic levels is Jack pine woodland. However, this habitat is relatively uncommon (0 to 2 percent) within the feasible alignments evaluated and, therefore, does not provide a large amount wildlife habitat within the boundaries of the Project. The Project would result in the conversion of forested habitat to shrublands within the ROW. Population-level impacts would not be anticipated given the relative proportion of intact native wildlife habitat within the region; however, individuals could incur short-term impacts within the immediate area of construction.

Additionally, the Project would generally follow pre-existing pipeline or transmission ROWs or roadways (see Sections 3.18, Utility Systems, and 3.19, Traffic and Transportation) and result in the expansion of existing ROWs, as opposed to construction of new corridors through previously undisturbed lands. The expansion of the existing ROWs would increase the lateral extent of edge-related impacts (e.g., greater access for generalist predators) further from the existing ROW. However, the Project generally would not result in additional forest fragmentation or isolation of habitat patches. The creation of a new ROW through forested areas would fragment the existing habitat patch and provide a foraging corridor for general predators, and create habitat for edge species and other generalists that may displace interior forest species. A study of the edge effects on breeding birds in the CNF (Hanski et al., 1996) found no major effect on nesting success with respect to forest edges. However, it is possible that predatory species, such as cowbirds, and large mammals, such as wolves, would now have easier access to these habitat patches.

The Bemidji Slough WMA is within Route Alternative 1 and would require an alignment crossing the WMA. However, the Project infrastructure would be constructed on 800-foot longitudinal centers such that no structures would be placed within the WMA. Periodic maintenance activities in the ROW would have the potential to affect wildlife within the WMA. However, maintenance activities would be limited to the greatest extent possible while still complying with Federal and state regulations to minimize these impacts. In addition, the WMA could be avoided through the use of Segment Alternative A or a crossover to Route Alternative 2 via Segment Alternative J. Indirect effects to avian species from transmission lines are further discussed below.

Wildlife in the vicinity of the existing ROWs would not be adversely affected by an expansion of the existing ROW. During construction, some mortality could occur to less motile or burrowing species, and abandonment of a nest site and the loss of eggs and/or young in avian species. Less motile species (such as herpetile and invertebrates) may be more susceptible to micro-environmental changes resulting from the expanded ROWs. However, these species are generally common throughout the region and there are no low-mobility federal, state, or tribal terrestrial species of concern that would be affected by the Project. Aquatic species are not anticipated to be adversely affected because the Project could either span or site around the water features within the ROWs such that no permanent structures would be built within any water bodies.

Avian collisions with the transmission line, specifically waterfowl, may occur following construction of the Project, particularly in areas where the transmission line is between foraging or breeding areas (e.g., agricultural fields, wetlands, river corridors, or open water). There are numerous water bodies within the alternatives that may serve as habitat for waterfowl species, specifically the Mississippi River crossing, because this is considered to be a primary flyway. However, it is important to note that the headwaters of the Mississippi River intersect Route Alternatives 1 and 2 and their associated Segment Alternative ROWs only. Route Alternative 3, while still within the flyway, would not directly cross the Mississippi River.

Electrocution of large birds, specifically raptors, occurs when they come into contact with either two conductors or a conductor and a grounding device. However, the Applicants' would design their transmission lines to provide adequate spacing between the lines and grounding devices such that risk of raptor electrocution would be eliminated. Therefore, the electrocution risk to large birds would not be a major effect of the Project (APLIC, 2006). Additional avian impacts may occur if raptor species or other bird species build nests on the transmission line structures.

It is unknown whether the two non-native, invasive species occur within the alternative ROWs for the Project. However, there is a low potential for the Project to result in the spread of rusty crayfish because there would be minimal Project activity within LLR/CNF water bodies. The Project would not result in the transport of fill from one portion of the Project to another and limit the potential for the spread of earthworms. However, the potential exists for earthworms to be transported in the treads of vehicles and other mediums described for noxious weeds. Refer to Section 3.8.2 for a detailed discussion about the potential effects to species of special concern.

Route Alternative 2

The impacts for Route Alternative 2 would be the same relative to wildlife. Refer to the above discussion for the potential impacts of the Project to wildlife within, or adjacent to, Route Alternative 2. This Route Alternative would expand existing utility and transportation ROWs (see Section 3.18, Utilities, and 3.19, Transportation), thereby potentially expanding the potential edge effects further from the existing centerline. This has the potential to cause forest interior dwelling species (e.g., songbirds) to emigrate further from existing ROWs. However, there is sufficient forest habitat in the vicinity of the Project such that this would not affect the regional population levels of these species.

Route Alternative 3

The impacts for Route Alternative 3 would be the same relative to wildlife. Refer to the above discussion for the potential impacts of the Project to wildlife within, or adjacent to, Route Alternative 3.

Leech Lake Reservation

The habitat conditions and wildlife species that occur within the LLR are the same as the overall conditions and species occurrences within the ROWs discussed above. It is anticipated that the impacts to these habitats and species would be the same as those discussed above for the ROWs as a whole.

Chippewa National Forest

The habitat conditions and wildlife species that occur within the CNF are the same as the overall conditions and species occurrences within the ROWs discussed above. It is anticipated that the impacts to these habitats and species would be the same as those discussed above for the ROWs as a whole.

The Project would potentially cross through nine LAUs within the CNF and, therefore, have the potential to affect Canada lynx within the Study Area. However, the Route Alternatives would largely be constructed within existing corridors, limiting the potential impacts on the LAU, and Canada lynx are generally uncommon in the area. No Segment Alternatives would avoid impacts that would otherwise occur with the Route Alternatives. Refer to Section 3.8 for further discussion about the potential impacts to Canada lynx.

3.7.3. Mitigation

The following sections describe the mitigation measures for potential impacts to vegetation cover, from noxious weeds, and for potential impacts to fauna.

3.7.3.1. Vegetative Cover

The following mitigation strategies to minimize impacts could be included as conditions in the High Voltage Transmission Line (HVTL) permit:

- Route Location - The permitted route may be specific in the location and width of ROW to minimize impacts to biological resources and minimize fragmentation of natural habitats.
- Vegetation Removal - The permit can limit vegetation removal and require the Applicants to minimize the number of trees removed during construction of the Project in its selection of the specific ROW for the transmission line and, where feasible, through the use of co-location with existing ROW.
- Restoration – The permit would require restoration for ROWs, access roads, temporary work spaces, and other private lands affected by construction of the Project.
- Co-location - The Project could be double-circuited with existing transmission lines to the extent practicable and consistent with sound engineering principles or system reliability criteria. The permit could identify areas where the Project could be double-circuited with existing transmission lines.
- Structures would be located outside of wetlands and floodplains, to the extent practicable, to minimize wetland impacts.
- Re-vegetation of disturbed areas would be reseeded following construction using a native species seed mix that would restore native vegetation cover. This seed mix would be developed in consultation with the MnDNR, LLDRM, and CNF staff. Seed mix will be developed in conjunction with appropriate resource agencies taking into consideration culturally important species.

Construction and operation of the Project on the LLR and on CNF lands would have to comply with all applicable permitting requirements.

The following additional mitigation strategies would be implemented by the Applicants to further minimize impacts:

- The location of structures, ROWs, and other disturbed areas would be determined by considering input from landowners, LLBO, and the CNF.
- Implementation of best management practices during Project construction and operation.

3.7.3.2. Noxious Weeds

The Project would result in land disturbance that would create opportunities for the introduction or spread of noxious weeds within the Project ROWs.

The HVTL Permit could include the following permit conditions to mitigate these impacts:

- Development of a noxious weed management program, including a noxious weed and vegetation management plan, in coordination with LLDRM, CNF, and appropriate local officials.
- Re-vegetation using regionally native species (see Section 3.7.3.1). Seed mixes, mulches, and other ground cover would be certified as weed free and only clean straw mulch would be used.

The Applicants have agreed to the following additional mitigation measures:

- Coordination regarding noxious weeds management, prior to commencement of construction activities within the LLR and CNF, to ensure the implementation of appropriate noxious weeds control measures for the Project.
- A field review of the ROW and construction staging sites prior to construction to identify areas that currently contain noxious weeds, including consultation with appropriate LLDRM, CNF, MnDNR, and local officials to identify contaminated areas.
- Construction vehicles, including the under carriage, would be power-washed or manually cleaned to remove material prior to construction if equipment has been traveling from an area contaminated by noxious weeds to an uncontaminated area.

3.7.3.3. Fauna

The Project would result in conversion of forested habitat to grass/shrubland habitat, increase habitat fragmentation through widening of existing ROWs or new ROWs, and potentially affect avian migration and foraging through construction of overhead transmission lines. The Project would mitigate for these impacts by implementing the construction and operational measures described below.

The following mitigation strategies to minimize impacts could be included as conditions in the High Voltage Transmission Line (HVTL) permit:

- Route Location - The permitted route may be specific in the location and width of ROW to minimize impacts to biological resources and minimize fragmentation of natural habitats.
- Vegetation Removal - The permit can limit vegetation removal and require the Applicants to minimize the number of trees removed during construction of the Project in its selection of the specific ROW for the transmission.
- Restoration – The permit would require restoration for ROWs, access roads, temporary work spaces, and other private lands affected by construction of the Project.
- Co-location - The Project could be double-circuited with existing transmission lines to the extent practicable and consistent with sound engineering principles

or system reliability criteria. The permit could identify areas where the Project could be double-circuited with existing transmission lines.

- Require the installation of marked transmission line shield wires to the extent practicable within major flyways (i.e., the Mississippi River) and explore the use of alternative structures.
- Development of an Avian Protection Plan (APP) consistent with the *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC, 2006), including selection of substation components for insulation and isolation, wire separation distances that are greater than the wingspan of largest birds in the region to minimize the electrocution risk, and timing of activities to minimize disruption during the breeding season.

In addition, the Applicants have agreed to implement the following additional mitigation measures:

- Construction vehicles, including the under carriage, would be power-washed or manually cleaned to remove material prior to construction if they have been traveling from an area contaminated by earthworms to an uncontaminated area.

3.8. Species of Special Concern

This section describes the species of concern, as identified by the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), State of Minnesota, and the Division of Resource Management Leech Lake Band of the Ojibwe (LLDRM), that are known to occur in the Study Area. The Study Area is defined as being each of the Route Alternatives developed for the Project and generally within Beltrami, Cass, Hubbard, and Itasca counties, including the Leech Lake Reservation (LLR) and Chippewa National Forest (CNF), where the alternatives are located. The section identifies the potential direct and indirect impacts to special concern species as a result of the Project alternatives.

A *Biological Assessment and Evaluation* for the Project was prepared and is included in draft form as Appendix G of this document. The Biological Assessment and Evaluation includes species-specific field surveys along each of the major Route Alternatives. Data from the USFWS county occurrence lists; USFS Regional Foresters Sensitive Species (RFSS) list; Minnesota Department of Natural Resources (MnDNR) Natural Heritage Information System (NHIS); and LLDRM Sensitive Species list were used to identify the species that are rare, threatened, endangered, or of special concern within the 1,000-foot-wide Route Alternatives. Individual occurrence data for the LLDRM Sensitive Species was not available; however, the LLDRM provides their occurrence information to both the MnDNR and the USFS. Therefore, the occurrence information for LLDRM-listed species is included within the NHIS and USFS data sets discussed in this analysis. Habitat-specific field surveys were performed in 2008 and 2009 within a 250-foot wide area centered on the proposed centerline of each Route Alternative. If a target species was identified within the survey area and suitable habitat extended beyond the 250 feet from the proposed centerline, the survey area was expanded from a 250-foot to 1,000-foot route. The results of the agency records and field surveys are discussed below.

3.8.1. Affected Environment

Threatened and endangered species in Minnesota are protected from death, harm, and harassment under the Federal Endangered Species Act (ESA), as amended (16 U.S.C. §§ 1531 – 1544) and the Minnesota Endangered Species Statute (*Minnesota Statutes*, section 84.0895) and the Leech Lake Reservation Conservation Code. The Federal ESA defines the regulations pertaining to plant and animal species federally-designated as threatened or endangered to ensure that any project or action would not jeopardize the continued existence of any listed species or adversely modify designated critical habitats.

Two federally-listed species are known to occur within Aitkin, Beltrami, Cass, and Hubbard counties: Canada Lynx (*Lynx canadensis*) and Gray Wolf (*Canis lupis*). Canada lynx sightings have been reported in and around the Study Area; however, there have been no verified occurrences of this species (MnDNR, 2009g). Gray wolves are known to occur along all three Route Alternatives and preliminary field study results noted the gray wolf as potentially occurring within Route Alternative 3 (Appendix G). The Study Area for the Route Alternatives and the associated Segment Alternatives is not within the Federally-designated critical habitat for Canada lynx or gray wolf.

Minnesota's Endangered Species Statute requires the MnDNR to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern. The resulting list of Endangered, Threatened, and Special Concern Species is codified as *Minnesota Rules*, chapter 6134. The Endangered Species Statute also authorizes the MnDNR to adopt rules that regulate treatment of species designated as endangered and threatened. These regulations are codified as *Minnesota Rules*, parts 6212.1800 to 6212.2300 and impose a variety of restrictions, a permit program, and several exemptions pertaining to the taking of species designated as endangered or threatened. The results of field studies and detailed project plans determine whether a takings permit is required. Fourteen state-listed species (five birds, one mammal, one reptile, two invertebrates, and five plants) are known to occur within the Study Area (NHIS, 2008).

The USFS maintains the RFSS lists of sensitive species occurring in National Forests. The USFS sets out guidelines for preserving RFSS species and uses BEs to ensure that their actions: 1) do not contribute to the loss of viability of any native or desired non-native plant or animal species or contribute to a trend toward federal listing of any species; 2) comply with the requirements of the ESA; and 3) provide a process and standard to ensure that sensitive species (including RFSSs) receive full consideration in the decision-making process. There are 22 RFSSs that are known to occur with the Study Area, including 10 bird species, two invertebrates, and 10 plant species.

The LLDRM maintains its own list of sensitive species occurring within the LLR (LLBO, 2009b). There are approximately 93 species on the LLDRM Sensitive Species list; however, seven are considered either extinct or extirpated from the region. Of the remaining 86 species, 39 are known to occur within the Study Area, including 13 bird species, one mammal, one reptile, two invertebrates, and 22 plant species. The two federally-listed species, Canada lynx and gray wolf, are also considered sensitive species by the LLDRM.

The federally-listed species tracked by the USFWS (Canada lynx and gray wolf) were identified based upon general occurrence information for each county.

3.8.1.1. Birds

Fourteen bird species of special concern have been identified in the Project Study Area (within the Route and Segment Alternatives). Tables 3.8-1 and 3.8-2 identify the State, USFS, and LLDRM bird species of special concern known to occur within the Study Area; the State, USFS, and Tribal listing status for each species; and the number of known occurrences for the Study Area. The presence of their preferred habitats and actual observation of their occurrences in the Study Area are described individually in the following paragraphs.

Table 3.8-1: Known Occurrences of Bird Species of Special Concern within Route Alternatives

Name[1]		Listing Status[2]			Route Alternative 1			Route Alternative 2			Route Alternative 3		
Common	Scientific	State	USFS	LLDRM	NHIS/ LLDRM[3]	USFS/ LLDRM[3]	HDR[4]	NHIS/ LLDRM[3]	USFS/ LLDRM[3]	HDR[4]	NHIS/ LLDRM[3]	USFS/ LLDRM[3]	HDR[4]
Northern Goshawk	*Accipiter gentilis*	-	RFSS	E	0	11	0	0	6	0	0	12	0
Le Conte's Sparrow	*Ammodramus leconteii*	-	RFSS	S	0	0	0	0	0	0	0	0	15
Great Blue Heron	*Ardea herodias*	-	-	S	1	0	0	0	0	0	0	0	0
Red-shouldered Hawk	*Buteo lineatus*	SC	RFSS	T	1	1	2	0	0	0	0	0	0
Black Tern	*Chlidonias niger*	-	RFSS	-	0	0	0	0	0	0	0	0	5
Yellow Rail	*Conturicops navoboracensis*	SC	RFSS	T	0	0	0	0	0	0	0	0	2
Trumpeter Swan	*Cygnus buccinators*	T	RFSS	E	0	0	0	0	0	0	0	0	3
Bay-breasted Warbler	*Dendroica castanea*	-	RFSS	S	0	0	0	0	0	0	0	0	1
Sandhill Crane	*Grus canadensis*	-	-	S	0	0	0	0	0	0	0	0	1
Bald Eagle[5] Nesting Area	*Haliaeetus leucocephalus*	SC	-	T	1	6	1	4	6	5	1	0	0
Connecticut Warbler	*Oporornis agilis*	-	RFSS	S	0	0	0	0	0	5	0	0	21
Osprey	*Pandion haliaetus*	-	-	S	0	2	1	0	3	1	0	0	0
Black-backed Woodpecker	*Picoides arcticus*	-	RFSS	T	0	0	0	0	1	1	0	0	3
Total Number of Species Present		-	-	-	**3**	**9**	**6**	**5**	**10**	**27**	**8**	**0**	**58**

Notes:

1. The NHIS (Minnesota DNR Natural Heritage Information System) and USFS databases, in many cases, appear to be documenting the same occurrences. Thus, adding the number of occurrences would likely result in an overestimation species frequency.
2. State: E = Endangered; T = Threatened; SC = Special Concern
   USFS: RFSS = Regional Forester Sensitive Species; WL = Watch List
   LLBO: E = Endangered; T = Threatened; S = Sensitive
3. Individual data sets for the LLDRM-listed species were not available; however, the LLDRM provides their occurrence information to the NHIS and CNF. Therefore, the NHIS and USFS data sets include the LLDRM-developed occurrence information for those species identified in the table as LLDRM sensitive species.
4. Surveys as described in HDR, 2009.
5. Receives federal protection through the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Sources: MnDNR NHIS, 2009; USFS, 2009; HDR, 2009

Table 3.8-2: Known Occurrences of Bird Species of Special Concern within the Segment Alternatives

Name[1]		Listing Status[2]			Segment Alternative A			Segment Alternative B			Segment Alternative D			Segment Alternative E			Segment Alternative K			Segment Alternative L			Segment Alternative N			Segment Alternative R			Segment Alternative T		
Common	**Scientific**	**State**	**USFS**	**DRM**	**NHIS/DRM[3]**	**USFS/DRM[3]**	**HDR[4]**	**NHIS/DRM[3]**	**USFS/DRM[3]**	**HDR[4]**	**NHIS/DRM[3]**	**USFS/DRM[3]**	**HDR[4]**	**NHIS/DRM[3]**	**USFS/DRM[3]**	**HDR[4]**	**NHIS/DRM[3]**	**USFS/DRM[3]**	**HDR[4]**	**NHIS/DRM[3]**	**USFS/DRM[3]**	**HDR[4]**	**NHIS/DRM[3]**	**USFS/DRM[3]**	**HDR[4]**	**NHIS/DRM[3]**	**USFS/DRM[3]**	**HDR[4]**	**NHIS/DRM[3]**	**USFS/DRM[3]**	**HDR[4]**
Northern Goshawk	*Accipiter Gentilis*	-	RFSS	E	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0
Le Conte's Sparrow	*Ammodramus leconteii*	-	RFSS	S	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2
American Bittern	*Botarus lentigimosus*	-	-	S	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-shouldered Hawk	*Buteo Lineatus*	SC	RFSS	T	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Bay-breasted Warbler	*Dendroica castanea*	-	RFSS	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sandhill Crane	*Grus canadensis*	-	-	S	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Osprey	*Pandion haliaetus*	-	-	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Total					**0**	**1**	**0**	**2**	**3**	**0**	**0**	**1**	**0**	**0**	**0**	**4**	**0**	**1**	**0**	**0**	**1**	**0**	**2**	**1**	**0**	**0**	**0**	**3**	**0**	**0**	**3**

Notes:

1. The NHIS (Minnesota DNR Natural Heritage Information System) and USFS databases, in many cases, appear to be documenting the same occurrences. Thus, adding the number of occurrences would likely result in an overestimation species frequency.
2. State: SC = Special Concern
   USFS: RFSS = Regional Forester Sensitive Species
   LLBO: E = Endangered; T = Threatened; S = Sensitive
3. Individual data sets for the LLDRM-listed species were not available; however, the LLDRM provides their occurrence information to the NHIS and CNF. Therefore, the NHIS and USFS data sets include the LLDRM-developed occurrence information for those species identified in the table as LLDRM sensitive species.
4. Surveys as described in HDR, 2009.

Sources: MnDNR NHIS, 2009; USFS, 2009; HDR, 2009

Northern Goshawk *(Accipiter gentilis)*

Northern goshawk is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM endangered species (E). Its preferred habitat includes mature large trees with a stable nest platform, such as aspen, beech, maple, white pine, and white oak (Audubon, 2009). Northern goshawk densities within the CNF are generally low. CNF records indicate that approximately 105 documented observations of Northern goshawk within the forest, including 19 known foraging and post-fledging territories within the Study Area (USFS, 2009). Route Alternatives 1 and 3 provide the greatest amount of suitable habitat within the 1,000-foot Study Area for this species (approximately 31 percent each). Approximately 26 percent of Route Alternative 2 also provides suitable habitat for this species.

The northern goshawk is not federally-listed as a rare, threatened or endangered species by the USFWS. Field surveys and historic records from the USFS and NHIS did not identify any active Northern goshawk nest sites within the Route Alternatives. However, the USFS has identified 25 Northern goshawk territories within 1 mile of each of the Route Alternatives, mostly commonly in the vicinity of Route Alternative 1. The USFS has also documented one individual within Route Alternative 2, although no nest site was identified (HDR, 2009).

Le Conte's Sparrow *(Ammodramus leconteii)*

Le Conte's Sparrow is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM sensitive species (S). It is a secretive bird that favors tall, dense vegetation in wet meadows and wetland edges. However, in Minnesota this species is also known to occur in upland grassland habitats including pasture, hayland, and retired cropland (Igl, 1999). The breeding season typically begins in early May and continues until early September; the fledging period for this species is not known (Dechant et al., 1999). Route Alternative 3 and Segment Alternative E provide the greatest amount of suitable habitat for this species (approximately 27 percent of the 1,000 foot-wide route) among the alternatives. Approximately 23 percent of Route Alternative 1 and its associated Segment Alternatives and 19 percent of Route Alternative 2 and its associated Segment Alternatives also provide suitable habitat for this species.

This species is not federal or state-listed and, therefore, is not tracked by the State or USFWS. However, suitable habitat for this species does occur outside of the CNF. Field surveys did not identify any occurrences of this species within Route Alternatives 1 and 2 but did identify 15 occurrences (Table 3.8-1) within Route Alternative 3 and an additional two, three, and two occurrences within Segment Alternatives E, R, and T, respectively (HDR, 2009).

Great Blue Heron *(Ardea herodias)*

The Great Blue Heron is a LLDRM sensitive (S) species. It can be found in a variety of aquatic habitats such as sheltered, shallow bays and inlets, sloughs, marshes, wet meadows, shores of lakes, and rivers. Nesting colonies are typically found in mature forests, on islands, or near mudflats (Audubon, 2008). Approximately 5 percent of Route Alternatives 1 and 2 and their associated Segment Alternatives provide suitable habitat for Great Blue Herons, although this habitat is concentrated along the Mississippi River. Habitat for this species is scarce within Route Alternative 3 and Segment Alternative E, and is associated with scattered wetlands.

The Great Blue Heron is not federally-listed as a rare, threatened, or endangered species by the USFWS. The NHIS documented one occurrence of Great Blue Heron within the LLR and CNF portion of Route Alternative 1 (Table 3.8-1); however, this species was not included in the 2009 field surveys (HDR, 2009).

American Bittern *(Botaurus lentiginosus)*

American Bittern is a LLDRM sensitive (S) species. It prefers large cattail, bulrush, or sedge marshes for breeding and feeding but it also utilizes bogs, wet meadows, and hayfields (NatureServe, 2009). Approximately 5 percent of Route Alternatives 1 and 2 and their associated Segment Alternatives provide suitable habitat for American Bittern, with the habitat concentrated along the Mississippi River. Habitat for this species is scarce within Route Alternative 3 and Segment Alternative E, and is associated with scattered wetlands.

This species is not a federal, state, or RFSS species and, therefore, is not tracked in their databases. However, field surveys identified one occurrence of American Bittern within Segment Alternative E (HDR, 2009).

Red-shoulder Hawk *(Buteo lineatus)*

Red-shoulder Hawk is a state listed special concern species (SC), a federal Regional Forester Sensitive Species (RFSS), and a LLDRM threatened species (T) but is not federally-listed by the USFWS. The Red-shouldered Hawk is associated with mature deciduous-coniferous and hardwood forests, often nesting in sugar maple and American beech (NatureServe, 2009b). It is also found in swamps, river bottomlands, and wooded marsh openings, with the borders of lakes and streams or other wetlands providing especially favored habitat (Johnsgard, 1990). Red-shouldered Hawk densities within the CNF are generally low. Approximately 19 percent of Route Alternative 1 provides suitable forest habitat for the Red-shouldered Hawk, Route Alternative 2 contains approximately 11 percent, and Route Alternative 3 contains approximately 16 percent.

Four documented occurrences of Red-shouldered Hawk occur within Route Alternative 1. The species has not been documented within Route Alternatives 2 and 3 and field surveys did not identify this species along any of the three Route Alternatives (HDR, 2009). The NHIS and USFS records also identified several occurrences of this species along Segment Alternatives B and N.

Black Tern (*Chlidonias niger*)

Colonies of Black Terns are a federal Regional Forester Sensitive Species (RFSS). They are found in freshwater marshes and wetlands containing emergent vegetation, generally present along lake margins and rivers (MSU, 2009). Similar to Great Blue Herons, approximately 5 percent of Route Alternatives 1 and 2 and associated Segment Alternatives provide suitable habitat for this species, primarily concentrated along the Mississippi River. Habitat within Route Alternative 3 is scarce (less than 2 percent).

Black Terns are not federally-listed as a rare, threatened, or endangered species by the USFWS and there are no NHIS or USFS records of Black Tern occurring within the Study Area. However, recent field surveys identified five black terns within Route Alternative 3 (HDR, 2009).

Yellow Rail *(Conturicops navoboracensis)*

Yellow Rail is a state listed special concern species (SC), a federal Regional Forester Sensitive Species (RFSS), and a LLDRM threatened species (T). It is a secretive marsh-dwelling species, preferring expansive sedge or grass dominated wet meadows with standing water levels ranging from 2 to 12 inches. Cattail, forb, woody, and shrubby habitats are not preferred (MnDNR, 2009). Habitat for this species is scarce within the Study Area (approximately 1 to 2 percent of each Route Alternative).

Yellow Rail is not federally-listed as a rare, threatened, or endangered species by the USFWS and there are no occurrences of Yellow Rail documented by NHIS or USFS. However, field surveys identified two occurrences of this species along Route Alternative 3. No occurrences were documented during field surveys for Route Alternatives 1 and 2 (HDR, 2009).

Trumpeter Swan *(Cygnus buccinator)*

Trumpeter Swan is a state listed threatened species (T), a federal Regional Forester Sensitive Species (RFSS), and a LLDRM endangered species (E). Trumpeter Swan prefers small ponds and lakes with extensive beds of cattails, bulrush, sedges, and horsetail for breeding territory (MnDNR, 2009c). Nesting territories range from 6 to 150 acres in size and include large, shallow wetlands 1 to 3 feet deep with a diverse mix of emergent vegetation (WiDNR, 2009). Habitat for Trumpeter Swan is relatively uncommon within the Study Area, with approximately 5 percent of Route Alternatives 1 and 2 providing suitable habitat. Habitat within Route Alternative 3 is scarce (less than 2 percent).

Trumpeter Swan is not federally-listed as a rare, threatened, or endangered species by the USFWS. This species is not known to occur along Route Alternatives 1 and 2. Field surveys identified three occurrences of Trumpeter Swan along Route Alternative 3 (HDR, 2009).

Bay-breasted Warbler *(Dendroica castanea)*

Bay-breasted warbler is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM sensitive species (S). It breeds in mid-age to mature spruce-fir forests where cool, dense coniferous growth is interrupted by small openings such as bogs or clearings. Preferred nesting trees include balsam fir and spruces, mixed with tamaracks, white pines, birches, or aspens (Morse, 1989). The habitat for this species is generally uncommon within the Study Area (approximately 1 to 6 percent). Route Alternative 3 and Segment Alternative E provide the greatest amount of habitat.

Bay-breasted warbler is not federally-listed as a rare, threatened, or endangered species by the USFWS. This species is not known to occur along Route Alternatives 1 and 2. Field surveys identified one occurrence of this species along Route Alternative 3 and Segment Alternative T (HDR, 2009). This species is not federal or state-listed and, therefore, is not tracked by the USFWS or State. However, suitable habitat for this species does occur outside of the CNF.

Sandhill Crane *(Grus canadensis)*

Sandhill Crane is a LLDRM sensitive species (S). Sandhill cranes primarily utilize open freshwater wetlands, but the different subspecies can be found in habitats that range from bogs, sedge meadows, and fens to open grasslands, pine savannas, and cultivated lands. During breeding season, Sandhill Cranes occur at their greatest density in habitats that contain open sedge meadows and in wetlands that are adjacent to short vegetation in uplands (ICF, 2009). Wetland habitat for this species is relatively uncommon within the Study Area, with approximately 5 percent of Route Alternatives 1 and 2 providing suitable habitat. Habitat within Route Alternative 3 is scarce (less than 2 percent).

This species is not a federal, state, or RFSS species and therefore is not tracked by the USFWS, NHIS, or USFS. Field surveys identified one occurrence of this species along Route Alternative 3 and one along Segment Alternative E (HDR, 2009).

Bald Eagle *(Haliaeetus leucocephalus)*

Bald Eagles are state listed species of concern (SC) and a LLDRM threatened species (T). Bald Eagles commonly inhabit forested areas near lakes and rivers, often nesting in the largest tree in the area (Cornell, 2009a). Approximately 26 to 28 percent of the Study Area provides suitable habitat for Bald Eagles, primarily as aspen/birch forests (21 to 27 percent) and some red/white pine stands (1 to 5 percent). The CNF provides habitat for one of the largest breeding populations of Bald Eagles in the lower 48 states. Known

Bald Eagle nesting sites within the CNF include large red and white pines, and occasionally aspen (USFS, 2008).

The bald eagle is not federally-listed as a rare, threatened, or endangered species by the USFWS. The NHIS documented one bald eagle nesting site within Route Alternative 1, four Bald Eagle nesting sites within Route Alternative 2, and one within Route Alternatives 3. The USFS documented six Bald Eagle nest sites within the CNF portions of Route Alternative 1. Of these documented occurrences of this species within the Study Area, six occur within the LLR. Field surveys identified an additional nest site within Route Alternative 1 and five nest sites were observed within Route Alternative 2. Field surveys did not identify this species within Route Alternative 3 (HDR, 2009). No additional nest sites occur within any of the Segment Alternatives.

Connecticut Warbler (*Oporornis agilis*)

The Connecticut warbler is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM sensitive species (S). Within the CNF, the Connecticut Warbler most frequently inhabits open, mature lowland conifer forests, including spruce-tamarack, sphagnum, and jack pine areas (Kudell-Ekstrum, 2002). The breeding season in Minnesota occurs from late May through late August (BSI, 2009). The habitat for this species is generally uncommon within the Study Area (approximately 1 to 5 percent). Route Alternative 3 and Segment Alternative E provide the greatest amount of habitat.

The Connecticut warbler is not federally-listed as a rare, threatened, or endangered species by the USFWS. The USFS and NHIS have no records of Connecticut warbler within any of the Route or Segment Alternatives (Tables 3.8-1 and 3.8-2). Field surveys identified occurrences of these species within each of the Route Alternatives, including five occurrences within Route Alternative 2 and 21 occurrences within Route Alternative 3 (HDR, 2009).

Osprey *(Pandion haliaetus)*

Ospreys are a LLDRM sensitive species (S). They typically inhabit a variety of forested areas near lakes and rivers that provide adequate supplies of fish, Osprey's main food source. Breeding generally occurs during the summer months, approximately late May through August (UMN, 2009). Habitat for this species primarily occurs within Route Alternatives 1 and 2 and their associated Segment Alternatives within the CNF and LLR, where the alternatives pass large open water bodies such as Lake Winnibigoshish and the upper Mississippi River.

The osprey is not federally-listed as a rare, threatened, or endangered species by the USFWS. The USFS documented two occurrences of Osprey within the CNF and LLR portions of Route Alternative 1 and three individuals within Route Alternative 2. There are no known occurrences of this species within the CNF for Route Alternative 3 (Table 3.8-1). Field surveys identified one transient individual within Route Alternatives 1 and

2 (HDR, 2009). The USFS has also identified one individual within Segment Alternative N (Table 3.8-2).

Black-backed Woodpecker (*Picoides arcticus*)

The black-backed woodpecker is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM threatened species (T). It is a secretive bird inhabiting mature, fire regulated, boreal, and coniferous forests where snags, fallen logs, and dying trees with larvae of wood boring beetles are available (Corace, 2001). The breeding period begins in mid-May and continues through the summer, when the fledging period concludes in early fall (Birdnature, 2009). Habitat availability is limited within the Study Area from approximately 6 percent (Route Alternatives 2 and 3) to 7 percent (Route Alternative 1).

The black-backed woodpecker is not federally-listed as a rare, threatened, or endangered species by the USFWS. The USFS documented one occurrence of black-backed woodpecker within the CNF and LLR portions of Route Alternative 2 (Table 3.8-1). Recent field surveys identified one black-backed woodpecker within Route Alternative 2 and three within Route Alternative 3 (HDR, 2009).

3.8.1.2. Mammals

Four mammals (including 2 federally-listed species), one reptile, and two invertebrate species of special concern have been identified in the Project Study Area (within the Route and Segment Alternatives). Tables 3.8-3 and 3.8-4 identify the Federal, State, USFS, and LLDRM species of special concern known to occur within the Study Area; the Federal, State, USFS, and LLDRM listing status for each species; and the number of known occurrences for the Study Area. The presence of their preferred habitats and actual observation of their occurrences in the Study Area are described individually in the following paragraphs.

Table 3.8-3: Known Occurrences of Mammal, Reptile, and Invertebrate Species of Special Concern within the Route Alternatives

Name[1]		Listing Status[2]				Route Alternative 1			Route Alternative 2			Route Alternative 3		
Common	Scientific	USFWS	State	USFS	LLDRM	NHIS/ LLDRM[3]	USFS/ LLDRM[3]	HDR[4]	NHIS/ LLDRM[3]	USFS/ LLDRM[3]	HDR[4]	NHIS/ LLDRM[3]	USFS/ LLDRM[3]	HDR[4]
Mammals														
Moose	*Alces alces*	-	-	-	X	0	0	0	0	0	0	0	0	0
Gray Wolf	*Canis lupus*	T	SC	-	S	0	0	0	0	0	0	0	0	4
Puma	*Felis concolor*	-	SC	-	E	0	0	0	0	0	0	0	0	0
Canada Lynx	*Lynx canadensis*	T	-	-	E	0	0	0	0	0	0	0	0	0
Reptiles														
Snapping Turtle	*Chelydra serpentine*	-	SC	-	S	0	0	0	0	0	0	0	0	4
Invertebrates														
Creek Heelsplitter	*Lasmigona compressa*	-	SC	RFSS	SC	0	0	0	0	0	0	4	0	0
Black Sandshell	*Ligumia recta*	-	SC	RFSS	SC	0	0	0	0	0	0	3	0	0
Total		**-**	**-**	**-**	**-**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**8**

Notes:

1. The NHIS (Minnesota DNR Natural Heritage Information System) and USFS databases, in many cases, appear to be documenting the same occurrences. Thus, adding the number of occurrences would likely result in an overestimation species frequency.
2. USFWS: T = Threatened
   State: SC = Special Concern
   USFS: RFSS = Regional Forester Sensitive Species
   LLBO: E = Endangered; T = Threatened; S = Sensitive; X = Extirpated
3. Individual data sets for the LLDRM-listed species were not available; however, the LLDRM provides their occurrence information to the NHIS and CNF. Therefore, the NHIS and USFS data sets include the LLDRM-developed occurrence information for those species identified in the table as LLDRM sensitive species.
4. Surveys as described in HDR, 2009.

Sources: MnDNR NHIS, 2009; USFS, 2009; HDR, 2009

Table 3.8-4: Known Occurrences of Mammal, Reptile, and Invertebrate Species of Special Concern within the Segment Alternatives

Name[1]		Listing Status[2]				Segment Alternative E		
Common	Scientific	USFWS6	State	USFS	LLDRM	NHIS/ LLDRM[3]	USFS/ LLDRM[3]	HDR[4]
Mammals								
Moose	*Alces alces*	-	-	-	X	0	0	1
Gray Wolf	*Canis lupus*	T	SC	-	S	0	0	0
Puma	*Felis concolor*	-	SC	-	E	0	1	0
Canada Lynx	*Lynx canadensis*	T	-	-	E	0	0	0
Reptiles								
Snapping Turtle	*Chelydra serpentine*	-	SC	-	S	0	0	0
Invertebrates								
Creek Heelsplitter	*Lasmigona compressa*	-	SC	SC	SC	1	0	0
Black Sandshell	*Ligumia recta*	-	SC	SC	SC	0	0	0
Total		**-**	**-**	**-**	**-**	**1**	**1**	**1**

Notes:

1. The NHIS and USFS databases in many cases appear to be documenting the same occurrences. Adding the number of occurrences would likely overestimate frequency.
2. State: E = Endangered; T = Threatened; SC = Special Concern
   USFS: RFSS = Regional Forester Sensitive Species
   LLBO: E = Endangered; T = Threatened; S = Sensitive
3. Individual data sets for the LLDRM-listed species were not available; however, the LLDRM provides their occurrence information to the NHIS and CNF. Therefore, the NHIS and USFS data sets include the LLDRM-developed occurrence information for those species identified in the table as LLDRM sensitive species.
4. Surveys as described in HDR, 2009

Sources: MnDNR NHIS, 2008; USFS, 2009; HDR, 2009

Moose (*Alces alces*)

Although extirpated in the region, a transient moose (*Alces alces*) was observed within Segment Alternative E (HDR, 2009). Moose are a LLDRM extirpated (X) species and are not common to the Study Area.

Gray Wolf (*Canis lupus*)

A July 1, 2009 federal judge's ruling rescinded an April 2009 USFWS decision to delist the western Great Lakes population of Gray Wolves (*Canis lupus*). As a result, the gray wolf is again a federally-listed threatened species. The gray wolf is listed as a Minnesota species of special concern (SC) and a LLDRM sensitive (S) species. The Route Alternatives are not located within designated critical habitat for the gray wolf (43 FR 9607, March 9, 1978).

Gray wolf populations in the western Great Lakes Region (i.e., Minnesota, Wisconsin, and Michigan) are expanding and a 2007 to 2008 winter survey by the MnDNR (Erb, 2008) estimated that 2,921 gray wolves live in Minnesota. The MnDNR considers the gray wolf population fully recovered because it surpassed the federal delisting goal of 1,251 to 1,400 wolves (MnDNR, 2009f).

There are no NHIS or USFS-recorded occurrences of the gray wolf within the Route Alternatives. However, gray wolves are generally known to occur within the Study Area (HDR, 2009). Field studies (HDR, 2009) identified four occurrences within Alternative 3. Most gray wolves live in 2 to 12 member family packs and defend territories of 20 to 214 square miles (Erb and Benson, 2004). Therefore, the field study and other observations likely represent a single pack.

Puma (*Felis concolor*)

The Puma (*Felis concolor*) is the only mammal identified as a species of special concern. Pumas are a state species of special concern (SC) and a LLDRM endangered species (E) but are not federally-listed as a rare, threatened, or endangered species by the USFWS. They are solitary animals, adapted to a variety of habitats, but in Minnesota they are mostly found in remote, heavily forested areas. They require large areas of habitat with a sufficient prey base to survive. There have only been a few confirmed reports of this species in Minnesota, and there is no evidence that there are breeding populations present in the state (MnDNR, 2009d). The USFS documented one occurrence of this species within Segment Alternative E.

Canada Lynx (***Lynx canadensis***)

Canada lynx (*Lynx canadensis*) are a federally-listed threatened species and a LLDRM endangered (E) species, although it is not considered an RFSS or species of special concern in Minnesota. Lynx population cycles are related to snowshoe hare populations, and therefore are predominantly found in boreal (specifically upland conifer) forests (USFWS, 2009), which are not common (approximately 2 to 10 percent) within each of the Route Alternatives.

Of the 426 sightings reported to the Minnesota Natural Heritage and Nongame Research Program since 2000, only approximately 10 percent (42 sightings) were in Beltrami, Cass, Hubbard, and Itasca counties. Of these 42 sightings, only two are considered "Verified," meaning that DNA or radio telemetry data was available for the occurrence or that the data came from a MnDNR-identified reliable source (MnDNR, 2009a). The Route Alternatives are not located within the critical habitat for Canada lynx and no occurrences (verified, probable, or unverified) have been reported within the Study Area (MnDNR, 2009a). Field surveys did not identify any lynx within the Route and Segment Alternatives (HDR, 2009).

The USFS designates Lynx Analysis Units (LAUs) within the LLR/CNF. These LAUs are landscape-scale analysis areas for lynx management and were developed in consultation with the U.S. Fish and Wildlife Service. The Route Alternatives intersect nine LAUs within the LLR/CNF: three along Route Alternative 1 (LAU 8, 10, and 15); two along Route Alternative 2 (LAU 10 and 15); and six along Route Alternative 3 (LAU 3, 5, 6, 7, 9, and 14). No additional LAUs are intersected by the Segment Alternatives; however, Segment Alternatives C (LAU 8) and E (LAU 14) also intersect LAUs. The management goals for the LAUs include promoting habitat for lynx prey species (e.g., snowshoe hare) and preventing the loss of suitable lynx habitat within the LLR/CNF borders.

3.8.1.3. Reptiles

The snapping turtle (*Chelydra serpentine*) is the only reptile species of special concern in the Study Area. Snapping turtles are a state species of special concern (SC) and a LLDRM sensitive(S) species but are not federally-listed as a rare, threatened, or endangered species by the USFWS. The species utilizes a variety of aquatic habitats including rivers, lakes, and marshes. It prefers slow moving and quiet waters with a dense vegetative cover and muddy bottoms. Common nesting areas include sandy banks and fields, but the snapping turtle occasionally nests on gravel roads and lawns (MnDNR, 2009n).

There are no NHIS or USFS records of this species occurring within the Route Alternatives. However, field surveys documented four individuals within Route Alternative 3 (HDR, 2009).

3.8.1.4. Invertebrates

Only two invertebrates have been identified as species of concern in the Study Area, the Creek Heelsplitter and the Black Sandshell. Both species are identified by the State, USFS, and LLDRM as invertebrate species of special concern. These species are not federally-listed as rare, threatened, or endangered by the USFWS. Both of their habitats and observed occurrences in the Study Area are described below.

Creek Heelsplitter (*Lasmigona compressa*)

The Creek Heelsplitter is a state species of special concern (SC), federal Regional Forester Sensitive Species (RFSS), and a LLDRM sensitive species (S) but is not federally-listed as a rare, threatened, or endangered species by the USFWS. It is most commonly found in creeks and headwaters of small and medium rivers. Its preferred substrate is small gravel or sand (Sietnam, 2003).

The NHIS documented four occurrences of the Creek Heelsplitter (including two within CNF and one within the LLR) within the Study Area for Route Alternative 3 and one occurrence within Segment Alternative E. However, the NHIS has no record of this species within the Study Area for the other Route Alternatives or Segment Alternatives.

Black Sandshell (*Ligumia recta*)

The Black Sandshell is a state species of special concern (SC), federal Regional Forester Sensitive Species (RFSS), and a LLDRM sensitive species (S) but is not federally-listed by the USFWS. It is found in rivers, lakes, and large streams, usually in riffles or raceways with good current. It inhabits sandy mud, firm sand, or gravel (INHS, 2009).

The NHIS documented three occurrences of the Black Sandshell (including one within the CNF) within Route Alternative 3. However, there are no records indicating that this species occurs within the other Route or Segment Alternatives.

3.8.1.5. Plants

Twenty-five plant species of concern have been identified as occurring within the Route and Segment Alternatives. There are no federal rare, threatened, or endangered species identified by the USFWS as known to occur within the Route and Segment Alternatives. Table 3.8-5 identifies the State, USFS, and LLDRM plant species of special concern known to occur within the Route Alternatives; the State, USFS, and LLDRM listing status for each species; and the number of known occurrence in the Route Alternatives. Table 3.8-5 identifies the same information for the State, USFS, and LLDRM plant species of special concern known to occur within the Segment Alternatives. Their habitats and observed occurrences within each alternative are described below. Field surveys (HDR, 2009) found that three LLDRM plant species (white pine, American elm, and slippery elm) were commonly found throughout forest stands within the Route and Segment Alternatives and, therefore, were not included in the tables but are part of the detailed, species-specific discussions below.

Table 3.8-5: Known Occurrences of Plant Species of Special Concern within Route Alternatives

Name[1]		Listing Status[2]			Route Alternative 1			Route Alternative 2			Route Alternative 3		
Common	Scientific	State	USFS	LLDRM	NHIS/ LLDRM[3]	USFS/ LLDRM[3]	HDR[4]	NHIS/ LLDRM[3]	USFS/ LLDRM[3]	HDR[4]	NHIS/ LLDRM[3]	USFS/ LLDRM[3]	HDR[4]
Dissected Grapefern	*Botrychium dissectum*	-	-	T	0	0	1	0	1	2	0	0	0
Triangle Moonwort	*Botrychium lanceolatum*	-	RFSS	T	1	0	2	0	0	0	0	0	0
Mingan Moonwort	*Botrychium minganense*	SC	-	T	2	2	5	2	0	4	0	0	0
Goblin Fern	*Botrychium mormo*	-	RFSS	E	3	3	3	1	1	0	1	2	13
Pale Moonwort	*Botrychium pallidum*	-	RFSS	T	0	0	6	5	9	1	0	0	4
St. Lawrence Grapefern	*Botrychium rugulosum*	-	RFSS	T	0	0	0	6	6	1	0	0	0
Least Grapefern	*Botrychium simplex*	-	RFSS	T	0	0	6	4	7	5	0	0	6
Blue Beech	*Carpinus caroliniana*	-	-	S	0	0	3	0	0	0	0	0	0
Ram's Head Lady's Slipper	*Cypripedium arietinum*	-	-	T	0	0	0	0	0	0	1	0	0
Spatulate-leaved Sundew	*Drosera intermedia*	-	-	S	0	0	0	0	0	3	0	0	0
Few-flowered Spike Rush	*Eleocharis quinqueflora*	SC	RFSS	S	1	0	0	1	0	0	0	0	0
Sweet grass	*Hierchloe ordata*	-	-	S	0	0	0	0	0	2	0	0	0

Name[1]		Listing Status[2]			Route Alternative 1			Route Alternative 2			Route Alternative 3		
Common	**Scientific**	**State**	**USFS**	**LLDRM**	**NHIS/ LLDRM[3]**	**USFS/ LLDRM[3]**	**HDR[4]**	**NHIS/ LLDRM[3]**	**USFS/ LLDRM[3]**	**HDR[4]**	**NHIS/ LLDRM[3]**	**USFS/ LLDRM[3]**	**HDR[4]**
White Adder's-mouth	*Malaxis monophyllos var brachypoda*	-	RFSS	T	1	1	0	0	0	0	0	0	0
One-flowered broomrape	*Orobanche uniflora*	SC	RFSS	T	1	0	0	0	0	0	0	0	0
Clubspur Orchid	*Platanthera clavellata*	SC	RFSS	T	0	0	0	0	0	0	0	0	1
Tubercled rein-orchid	*Platanthera flava var. herbiola*	E	-	-	0	0	0	0	0	0		0	1
Clustered Bur-reed	*Sparganium glomeratum*	-	RFSS	T	2	2	0	0	0	0	0	0	2
Canada Yew	*Taxus canadensis*	-	RFSS	S	0	2	5	0	1	1	0	0	0
Torrey's manna-grass	*Torreychloa pallida*	SC	-	S	0	0	1	0	0	0	0	0	0
New England Violet	*Viola novaeangliae*	-	-	S	0	0	0	0	0	1	0	0	0
Humped bladderwort	*Utricularia gibba*	-	-	S	3	0	0	0	0	0	0	0	0
Total Number of Species Present		**-**	**-**	**-**	**-**	**10**	**32**	**20**	**25**	**22**	**4**	**2**	**25**

Notes:

1. The NHIS and USFS databases in many cases appear to be documenting the same occurrences. Adding the number of occurrences would likely overestimate frequency.
2. State: E = Endangered; T = Threatened; SC = Special Concern
   USFS: RFSS = Regional Forester Sensitive Species
   LLBO: E = Endangered; T = Threatened; S = Sensitive
3. Individual data sets for the LLDRM-listed species were not available; however, the LLDRM provides their occurrence information to the NHIS and CNF. Therefore, the NHIS and USFS data sets include the LLDRM-developed occurrence information for those species identified in the table as LLDRM sensitive species.
4. Surveys as described in HDR, 2009

Sources: MnDNR NHIS, 2008; USFS, 2009; HDR, 2009

Table 3.8-6: Known Occurrences of Plant Species of Special Concern within Segment Alternatives

Name[1]		Listing Status[2]			Segment Alternative B			Segment Alternative C			Segment Alternative E			Segment Alternative F			Segment Alternative N		
Common	**Scientific**	**State**	**USFS**	**LLDRM**	**NHIS/ LLDRM[3]**	**USFS/ LLDRM[3]**	**HDR[4]**	**NHIS/ LLDRM[3]**	**USFS/ LLDRM[3]**	**HDR[4]**	**NHIS/ LLDRM[3]**	**USFS/ LLDRM[3]**	**HDR[4]**	**NHIS/ LLDRM[3]**	**USFS/ LLDRM[3]**	**HDR[4]**	**NHIS/ LLDRM[3]**	**USFS/ LLDRM[3]**	**HDR[4]**
Dragon's Mouth Orchid	*Arethusa bulbosa*	-	-	S	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Dissected Grapefern	*Botrychium dissectum*	-	-	T	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Triangle Moonwort	*Botrychium lanceolatum*	-	RFSS	T	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
Mingan Moonwort	*Botrychium minganense*	SC	-	T	1	1	1	0	0	0	0	0	0	0	0	1	0	0	2
Pale Moonwort	*Botrychium pallidum*	-	RFSS	T	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Least Grapefern	*Botrychium simplex*	-	RFSS	T	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Blue Beech	*Carpinus caroliniana*	-	-	S	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
White Adder's-mouth	*Malaxis monophyllos var brachypoda*	-	RFSS	T	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Clustered Bur-reed	*Sparganium glomeratum*	-	RFSS	T	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Canada Yew	*Taxus canadensis*	-	RFSS	S	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Torrey's manna-grass	*Torreychloa pallida*	SC	-	S	0	0	2	0	0	2	0	0	1	0	0	0	0	0	0
New England Violet	*Viola novaeangliae*	-	-	S	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0

Total	-	-	-	**1**	**1**	**5**	**0**	**0**	**7**	**1**	**0**	**5**	**0**	**0**	**4**	**1**	**0**	**3**

Notes:

1. The NHIS and USFS databases, in many cases, appear to document the same occurrences. Thus, adding the number of occurrences would likely result in an overestimation species frequency.
2. State: SC = Special Concern
   USFS: RFSS = Regional Forester Sensitive Species
   LLBO: E = Endangered; T = Threatened: S = Sensitive
3. Individual data sets for the LLDRM-listed species were not available; however, the LLDRM provides their occurrence information to the NHIS and CNF. Therefore, the NHIS and USFS data sets include the LLDRM-developed occurrence information for those species identified in the table as LLDRM sensitive species.
4. Surveys as described in HDR, 2009.

Sources: MnDNR NHIS, 2009; USFS, 2009; HDR 2009

Dragon's Mouth (*Arethusa bulbosa*)

The Dragon's Mouth is a LLDRM sensitive species (S). It grows in acidic habitats such as sphagnum bogs, coniferous swamps, open fens, and moist, acid, sandy meadows. Most often it is found growing at the water's edge (Wesley, 2009).

The NHIS has no record of the Dragon's Mouth occurring within any of the Route Alternatives. However, it has documented one occurrence within Segment Alternative E. The USFS documented preferred habitat for Dragon's Mouth within the CNF. However, the species itself has not been documented within the CNF and is not known to occur within the Project portion of the LLR.

Dissected Grapefern *(Botrychium dissectum)*

The Dissected Grapefern is a LLDRM threatened species (T). It occupies a variety of habitats ranging from grassy openings and roadsides to dry, mesic, or wet forests. It is often found in sites that are somewhat disturbed by human activities. Specimens of the Dissected Grapefern have been collected within the CNF in mesic sugar maple and basswood forests. Much of this species' life cycle occurs underground and the number of aboveground plants may vary from year to year (Chadde et al., 2001).

The USFS documented one occurrence of the Dissected Grapefern within the CNF portion of Route Alternative 2. There are no records of this species occurring within Route Alternatives 1 and 3 (Table 3.8-5). Field surveys (HDR, 2009) documented two occurrences of this species within the Route Alternative 2 and one occurrence within the LLR portion of Segment Alternative E (Table 3.8-6).

Triangle Moonwort *(Botrychium lanceolatum)*

The Triangle Moonwort is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM threatened species (T). It is most often found in moist, partially shaded areas in coniferous or rich deciduous forests, or in moist grassy or rocky areas. In Minnesota, it most typically grows in northern hardwood habitats. Individual plants do not appear aboveground every year (Chadde et al., 2001).

The NHIS and USFS documented one occurrence of the Triangle Moonwort within the CNF/LLR portions of Route Alternatives 1 and 2, respectively. However, there are no records of this species occurring within Route Alternative 3 or Segment Alternative E. Field studies (HDR, 2009) identified one occurrence of this species within Segment Alternative B (Tables 3.8-5 and 3.8-6).

Mingan Moonwort *(Botrychium minganense)*

The Mingan Moonwort is a state special concern species (SC) and a LLDRM threatened species (T). It occupies a variety of moist or mesic habitats, but in Minnesota it is most commonly associated with maple/basswood forests. Minnesota populations also have been documented in transition areas between uplands and wetlands, in dry-mesic woods, and in moist woods under white cedar. Much of this species' life cycle occurs underground and individual plants do not appear aboveground every year (Chadde et al., 2001).

The NHIS and USFS documented two occurrences of the Mingan Moonwort within the CNF and LLR portions of Route Alternative 1 (Table 3.8-5) and one occurrence within Segment Alternative B (Table 3.8-6). Field surveys (HDR, 2009) documented five occurrences of this species within Route Alternative 1, four occurrences within Route Alternative 2, one occurrence within Segment Alternative F, and two occurrences in Segment Alternative N. There are no records of this species occurring within Route Alternative 3.

Goblin Fern *(Botrychium mormo)*

In Minnesota, the Goblin Fern is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM endangered species (E). It is usually associated with mid-age or older deciduous hardwood forests with a relatively closed canopy that provides dense shade and a deep leaf layer. Forest communities providing the Goblin Fern habitat are often dominated by sugar maple and basswood. The Goblin Fern does not appear aboveground every year, especially during years of drought (Casson et al., 2002).

The NHIS and USFS documented three occurrences of the Goblin Fern within the CNF and LLR portions of Route Alternative 1, one occurrence within Route Alternative 2, and one occurrence within Route Alternative 3 outside the CNF and two occurrences within the CNF and LLR boundary. Field surveys (HDR, 2009) identified three occurrences within Route Alternative 1 and 13 occurrences within Route Alternative 3 (Table 3.8-5). This species was not identified within any of the Segment Alternatives (Table 3.8-6).

Pale Moonwort *(Botrychium pallidum)*

The Pale Moonwort is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM threatened species (T). It grows in variety of habitats, but it occurs most often in open areas and in habitats that have regular disturbance regimes. In Minnesota, reported habitats include maple/basswood forests, red and jack pine forests, sandy ridges, wetlands, and disturbed areas such as lots and pits. Much of this species' life cycle occurs underground and individual plants do not appear aboveground every year (Chadde et al., 2003b).

The NHIS has documented five occurrences and the USFS has documented nine occurrences of this species within Route Alternative 2. Field surveys (HDR, 2009) identified six occurrences of this species within Route Alternative 1, one occurrence within Route Alternative 2, and four occurrences within Route Alternative 3 (Table 3.8-5). This species is also known to occur within Segment Alternatives F and N (one occurrence each) (Table 3.8-6).

St. Lawrence Grapefern *(Botrychium rugulosum)*

The St. Lawrence Grapefern is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM threatened species (T). In Minnesota, listed habitat preferences of the St. Lawrence Grapefern include dry areas with short grasses; jack pine, red pine, and aspen/balsam-fir forests; and openings within these forest types. Other habitats include the margins of ephemeral pools in forests dominated by pines, spruce, and paper birch/aspen. Much of this specie's life cycle occurs underground and individual plants do not always occur aboveground every year (Chadde et al., 2003c).

The NHIS and USFS documented six occurrences of this species and field surveys (HDR, 2009) identified one occurrence within the LLR/CNF portion of Route Alternative 2 (Table 3.8-5). This species is not known to occur within Route Alternatives 1 or 3 or any of the Segment Alternatives, although suitable habitat does exist (Table 3.8-6).

Least Grapefern *(Botrychium simplex)*

The Least Grapefern is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM threatened species (T). In Minnesota, the Least Grapefern has been found in a variety of habitats including northern hardwood forests of sugar maple and basswood, black ash and cedar swamps, jack pine woods, and disturbed areas such as borrow pits, tailings ponds, and road shoulders. In the CNF, the Least Grapefern has been found in habitats such as depressions in an open area dominated by reed canary grass, open fields with non-native grass, and northern hardwood stands (Chadde et al., 2003a).

The NHIS has no record of the Least Grapefern occurring within any of the alternatives outside of the CNF. However, the NHIS (four occurrences) and USFS (seven occurrences) have documented this species within the LLR/CNF portion of Route Alternative 2. Field surveys (HDR, 2009) identified six occurrences of this species within each of Route Alternatives 1 and 3, five occurrences within Route Alternative 2, and two occurrences within Segment Alternative F (Tables 3.8-5 and 3.8-6).

Blue Beech *(Carpinus caroliniana)*

The Blue Beech is a LLDRM sensitive species (S). It thrives in deep shade and is common in the understory of late successional hardwood forests in Minnesota, and is typically associated with maples, basswood, oaks, black cherry, or paper birch (Smith, 2008). Additional habitat types include moist soils on lower slopes in valleys and along the borders of streams and swamps (HDR, 2009).

The NHIS has documented one occurrence of this species within Segment Alternative N. Field surveys (HDR, 2009) identified three occurrences of this species within Route Alternative 1. There are no records of this species occurring within Route Alternative 3 (Tables 3.8-5 and 3.8-6).

Ram's Head Lady's Slipper (*Cypripedium arietinum)*

The Ram's Head Lady's Slipper is a LLDRM threatened species (T). In Minnesota, the Ram's Head Lady's Slipper occurs in swamps, bogs, and lowland forests dominated by northern white cedar, tamarack, balsam fir, or black spruce. It also occurs in drier upland conifer forests that may be dominated by white pine and red pine (MnDNR, 2009c).

There are no records of the Ram's Head Lady's Slipper occurring within Route Alternatives 1 and 2. The NHIS documented one occurrence of Ram's Head Lady's Slipper within the LLR/CNF portion of Route Alternative 3 (Table 3.8-5) although outside the LLR boundary. There were no species documented during the recent field surveys (HDR, 2009).

Spatulate-leaved Sundew (*Drosera intermedia)*

The Spatulate-leaved Sundew is a LLDRM sensitive species (S). It occurs in the wettest parts of bogs and on sandy shores that are subject to periodic inundation (Voss, 1985).

Field surveys (HDR, 2009) documented this species within Route Alternative 2. There are no records of this species occurring within Route Alternative 1, Route Alternative 3, or any of the Segment Alternatives (Tables 3.8-5 and 3.8-6).

Few-flowered Spike Rush *(Eleocharis quiqueflora)*

Few-flowered spike rush is a state special concern (SC) species, federal Regional Forester Sensitive Species (RFSS), and LLDRM sensitive (S) species. It is typically found in cold coniferous poor fens or moist meadows in calcareous areas. This species flowers from late June through late July and fruiting occurs in early July through late September (WiDNR, 2009a).

The NHIS has documented one occurrence of this species within the LLR/CNF portion of Route Alternatives 1 and 2, but it is not known to occur within Route Alternative 3 or any of the Segment Alternatives (Tables 3.8-5 and 3.8-6).

Sweet grass *(Hierchloe odorata)*

Sweet grass is a LLDRM sensitive species (S). It is most commonly found in wet meadows and bogs, and it usually grows among other grasses and shrubs (Walsh, 1994). This species is also considered an important traditionally-gathered plant to the LLBO. For further discussion of the LLBO member use of this plant, refer to Section 3.9, Cultural Resources, and 3.12, Environmental Justice.

Field surveys (HDR, 2009) documented two occurrences of this species within Route Alternative 2. There are no records of this species occurring within Route Alternative 1, Route Alternative 3, or any of the Segment Alternatives (Tables 3.8-5 and 3.8-6).

White Adder's-mouth (*Malaxis monophyllos var. brachypoda*)

The White Adder's-mouth is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM threatened species (T). In Minnesota, the White Adder's-mouth is typically found on Sphagnum hummocks in coniferous swamps, often in shaded areas under white cedar, black spruce, or tamarack. It has also been found growing in peat soil in hardwood swamps (HDR, 2009).

The NHIS and USFS documented one occurrence of the White Adder's-mouth within the LLR/CNF portion of Route Alternative 1. Field surveys (HDR, 2009) documented one occurrence of this species within Segment Alternative C (Tables 3.8-5 and 3.8-6). There are no records of this species occurring within the other Route or Segment Alternatives.

One-flowered Broomrape *(Orobanche uniflora)*

The one-flowered broomrape is a state species of concern (SC), a federal Regional Forester Sensitive Species (RFSS), and a LLDRM threatened species (T). It is typically found in sandy prairies, thickets, moist woods, and along streambanks. The flowering period occurs from April through June (WiDNR, 2009b).

The NHIS identified one occurrence of this species within the CNF and LLR portion of Route Alternative 1. This species is not known to occur within Route Alternative 2, Route Alternative 3, or any of the Segment Alternatives (Tables 3.8-5 and 3.8-6).

White Pine *(Pinus strobus)*

White pine is a LLDRM sensitive species (S). It is found in mixed woods, sandy plains and dunes, bogs with tamarack, swampy woods, rock ridges, and cedar swamps. It thrives in full sunlight and is common to xeric northern pine forests and mixed hardwoods (Carey, 1993).

Field surveys (HDR, 2009) found the species commonly occurring in all age classes within Route Alternatives 1 and 2. There are no documented observations of this species within Route Alternative 3 (Tables 3.8-5 and 3.8-6).

Clubspur Orchid *(Platanthera clavellata)*

The Clubspur Orchid is a state listed species of concern (SC), a federal Regional Forester Sensitive Species (RFSS), and a LLDRM threatened species (T). The species is most commonly found in tamarack-spruce bogs, where it grows in Sphagnum moss. It also grows in loose moss in balsam-cedar-spruce swamps and in alder thickets or damp woods (Case, 1987).

Field surveys (HDR, 2009) documented one occurrence of this species within the CNF portion of Route Alternative 3. There are no records of this species occurring within Route Alternative 1, Route Alternative 2, or any of the Segment Alternatives (Tables 3.8-5 and 3.8-6).

Tubercled rein-orchid *(Platanthera flava var. herbiola)*

The Tubercled rein-orchid is a state listed endangered species (E). The species prefers sunny or partially shaded habitats of wet prairies, meadows, swales in mesic prairies, or the sandy or peaty habitats along the edges of marshes, swamps, or lakeshores. The Tubercled rein-orchid is only found in high quality habitats that show little if any impact from human activities; degraded habitats with a substantial number of nonnative species are not suitable for its growth (MnDNR, 2009o).

Field surveys (HDR, 2009) documented one occurrence of this species within the CNF portion of Route Alternative 3. There are no records of this species occurring within Route Alternatives 1 or 2, or any of the Segment Alternatives (Tables 3.8-5 and 3.8-6).

Clustered Bur-reed *(Sparganium glomeratum)*

The Clustered Bur-reed is a federal Regional Forester Sensitive Species (RFSS) and a LLDRM threatened species (T). It is an emergent wetland species that most commonly occurs in shallow water with a substrate of fine textured organic soils. It often occurs in association with grasses and sedges (Otter Tail Power et al., 2008a).

The NHIS and USFS documented two occurrences of clustered bur-reed within Route Alternative 1. Field surveys (HDR, 2009) documented two occurrences of this species within Route Alternative 3 and one occurrence within Segment Alternative B (Tables 3.8-5 and 3.8-6).

Canada Yew *(Taxus canadensis)*

The Canada Yew is a federal Regional Forester Sensitive Species (RFSS) and a DRM sensitive species (S). It is a shade tolerant species, found in mature forests of spruce-fir, mixed conifer-northern hardwoods, and northern hardwoods. It is highly intolerant of forest disturbances (Otter Tail Power et al., 2008a).

The USFS documented two occurrences of the Canada Yew within the LLR/CNF portion of Route Alternative 1, and one occurrence within the LLR/CNF portion of Route Alternative 2. Recent field surveys (HDR, 2009) documented two occurrences of this species within Route Alternative 3 (Table 3.8-5).

Torrey's manna-grass *(Torreychloa pallida)*

Torrey's manna-grass is a state listed species of concern (SC) and a LLDRM sensitive species (S). It grows in swamps, marshes, bogs, and margin of lakes and streams (Davis, 2007).

Field surveys (HDR, 2009) documented one occurrence of this species within Route Alternative 1, two occurrences within Segment Alternatives B and C, and one occurrence within Segment Alternative E. There are no records of this species occurring within Route Alternatives 2 and 3 (Tables 3.8-5 and 3.8-6).

American elm *(Ulmus americana)*

The American elm is a LLDRM sensitive species (S). It commonly grows on wet flats and bottomlands but is not restricted to these sites. It grows best on rich, well-drained soils (Colodanto, 1992).

Field surveys (HDR, 2009) found this species commonly occurring in all age classes within all Route and Segment Alternatives.

Slippery elm *(Ulmus rubra)*

The slippery elm is a LLDRM sensitive species (S). It grows in moist, rich soils of lower slopes, streambanks, river terraces, and bottomlands but is also found on much drier sites (Coladonato, 1993).

Field surveys (HDR, 2009) found this species commonly occurring in all age classes within the Route and Segment Alternatives.

New England Violet *(Viola novaeangliae)*

The New England violet is a LLDRM sensitive species (S). It is found on undisturbed acidic, xeric, or xeric-mesic rock or sand substrates. It grows under partially or totally closed canopy of mixed hardwoods and conifers (NatureServe, 2009).

Field surveys (HDR, 2009) documented one occurrence of this species within Route Alternative 2 and Segment Alternative E, and two occurrences within Segment Alternative C (Tables 3.8-5 and 3.8-6).

Humped Bladderwort *(Utricularia gibba)*

The humped bladderwort is a LLDRM Sensitive species (S). It is an aquatic herb species without roots that may be floating, submerged, or creeping along a substrate (University of Texas, 2009).

The NHIS identified three occurrences of this species within Route Alternative 1 (Table 3.8-5). This species was not identified during field surveys (HDR, 2009) and is not known to occur within the other Route Alternatives or any of the Segment Alternatives.

3.8.1.6. Route Alternative 1

Nineteen species of special concern are known to occur within Route Alternative 1 (Tables 3.8-1, 3.8-3, and 3.8-5) including the northern goshawk, great blue heron, red-shouldered hawk, bald eagle, osprey, dissected grapefern, triangle moonwort, mingan moonwort, goblin fern, pale moonwort, least grapefern, blue beech, few-flowered spike rush, white adder's-mouth, one-flowered broomrape, clustered bur-reed, Canada yew, Torrey's manna-grass, and humped bladderwort.

The State-listed species known to occur are bald eagle, mingan moonwort, few-flowered spike rush, one-flowered broomrape, and Torrey's manna grass. The USFS-listed species are northern goshawk, red-shouldered hawk, triangle moonwort, goblin fern, pale moonwort, least grapefern, few-flowered spike rush, white adder's-mouth, one-flowered broomrape, clustered bur-reed, and the Canada yew. All of the state and USFS-listed species known to occur within Route Alternative 1 are also on the LLDRM sensitive species list (Tables 3.8-1, 3.8-3, and 3.8-5). The LLDRM sensitive species known to occur are the great blue heron, osprey, blue beech, and humped bladderwort

Species of special concern are only known to occur within seven of the 12 Segment Alternatives associated with Route Alternative 1 (A, B, C, D, K, L, and N). Of these, Segment Alternatives B and N have the greatest number of species (six). However, the majority of the species are known to occur within these Segment Alternatives also occur within Route Alternative 1 (Tables 3.8-2, 3.8-4, and 3.8-6). New England violet, which is known to occur within Segment Alternative C, is the only species of concern for these Segment Alternatives that does not also occur within the Route Alternative.

3.8.1.7. Route Alternative 2

Route Alternative 2 has the fewest species of special concern known to occur (Tables 3.8-1, 3.8-3, and 3.8-5) including northern goshawk, bald eagle, Connecticut warbler, osprey, black-backed woodpecker, dissected grapefern, mingan moonwort, goblin fern, pale moonwort, St. Lawrence grapefern, least grapefern, spatulate leaved sundew, few-flowered spike rush, sweet grass, clubspur orchid, Canada yew, and New England violet.

The State-listed species known to occur include bald eagle, mingan moonwort, and few-flowered spike rush. The USFS-listed species are the northern goshawk, Connecticut warbler, black-backed woodpecker, goblin fern, pale moonwort, St. Lawrence grapefern, least grapefern, few-flowered spike rush, and Canada Yew. All of the above-listed species, with the addition of sweet grass and New England violet, are on the LLDRM sensitive species list.

Species of special concern are only known to occur within five of the 13 Segment Alternatives associated with Route Alternative 2 (C, F, K, L, and N). Of these, Segment Alternative N has the greatest number of species (six). However, the majority of the species are known to occur within these Segment Alternatives also occur within Route Alternative 2 (Tables 3.8-2, 3.8-4, and 3.8-6). Torrey's manna-grass and white adder's mouth (Segment Alternative C) and blue beech (Segment Alternative N) are the only species of concern for these Segment Alternatives that do not also occur within Route Alternative 2.

3.8.1.8. Route Alternative 3

Route Alternative 3 contains the greatest number of species of special concern of any of the Route Alternatives. Twenty-one species of special concern are known to occur within the alternative, including northern goshawk, Le Conte's sparrow, black tern, yellow rail, trumpeter swan, bay-breasted warbler, sandhill crane, bald eagle, Connecticut warbler, black-backed woodpecker, moose, creek heelsplitter, black sandshell, snapping turtle, goblin fern, pale moonwort, least grapefern, ram's head lady's slipper, clubspur orchid, tubercled rein-orchid, and clustered bur-reed.

The State-listed species known to occur within the Route Alternative are yellow rail, trumpeter swan, bald eagle, puma, snapping turtle, creek heelsplitter, black sandshell, clubspur orchid, and tubercled rein-orchid. The USFS-listed species are the northern goshawk, Le Conte's sparrow, black tern, yellow rail, trumpeter swan, bay-breasted warbler, Connecticut warbler, black-backed woodpecker, creek heelsplitter, black sandshell, goblin fern, pale moonwort, least grapefern, clubspur orchid, and clustered bur-reed. With the exception of black tern and tubercled rein-orchid, all of the above-listed species known to occur within Route Alternative 3 are on the LLDRM sensitive species list.

There are nine species of special concern known to occur within Segment Alternatives E, R, and T (Tables 3.8-2, 3.8-4, and 3.8-6), five of which do not occur within Route

Alternative 3: American bittern, dragon's mouth orchid, Canada yew, Torrey's manna-grass, and New England violet.

3.8.1.9. Leech Lake Reservation

As stated above, LLDRM endangered, threatened, and sensitive species occur within the Study Areas for each of the Route and Segment Alternatives. Table 3.8-7 identifies the LLDRM sensitive species known to occur within the Route and Segment Alternatives for the Project. Route Alternative 1 contains the greatest number of LLDRM sensitive species (19) and Route Alternative 3 contains the fewest (15). Refer to the discussions above for additional details regarding LLDRM sensitive species occurring within the Route and Segment Alternatives.

Table 3.8-7: Sensitive Species within the LLR

Route and Segment Alternatives	LLDRM Sensitive Species Known to Occur (Status[1])
Route Alternatives	
1	Northern goshawk (E), great blue heron (S), red-shouldered hawk (T), bald eagle (T), osprey (S), dissected grapefern (T), triangle moonwort (T), mingan moonwort (T), goblin fern (E), pale moonwort (T), least grapefern (T), blue beech (S), few-flowered spike rush (S), white adder's-mouth (T), one-flowered broomrape (T), clustered bur-reed (T), Canada yew (S), Torrey's manna-grass (S), humped bladderwort (S)
2	Northern goshawk (E), bald eagle (T), Connecticut warbler (S), osprey (S), black-backed woodpecker (T), dissected grapefern (T), mingan moonwort (T), goblin fern (E), pale moonwort (T), St. Lawrence grapefern (T), least grapefern (T), spatulate-leaved sundew (S), few-flowered spike rush (S), sweet grass (S), Canada yew (S), New England violet (S)
3	Gray wolf (S), snapping turtle (S), creek heelsplitter (SC), black sandshell (SC), northern goshawk (E), Le Conte's sparrow (S), yellow rail (T), trumpeter swan (E), bay-breasted warbler (S), sandhill crane (S), bald eagle (T), Connecticut warbler (S), black-backed woodpecker (T), goblin fern (E), pale moonwort (T), least grapefern (T), ram's head lady's slipper (T), clubspur orchid (T), clustered bur-reed (T)
Segment Alternatives	
A	Northern goshawk (E)
B	Northern goshawk (E), red-shouldered hawk (T), triangle moonwort (T), mingan moonwort (T), clustered bur-reed (T), Torrey's manna-grass (S)
C	Triangle moonwort (T), white adder's-mouth (T), Torrey's manna-grass (S), New England violet (S)
D	Northern goshawk (E)
E	Le Conte's sparrow (S), American bittern (S), moose (X), puma (E), creek heelsplitter (SC), sandhill crane (S), dragon's mouth orchid (S), dissected grapefern (T), Canada yew (S), Torrey's manna-grass (S), New England violet (S)
F	Mingan moonwort (T), pale moonwort (T), least grapefern (T)
K	Northern goshawk (E)
L	Northern goshawk (E)
N	Northern goshawk (E), red-shouldered hawk (T), osprey (S), mingan moonwort (T), pale moonwort (T), blue beech (S)
R	Le Conte's sparrow (S)
T	Le Conte's sparrow (S), bay-breasted warbler (S)

Note: LLDRM Status: E = Endangered; T = Threatened; S = Sensitive; X = Extirpated
Source: LLLLDRM, 2009d

3.8.1.10. Chippewa National Forest

As stated above, USFS-listed RFSS's occur within the Study Areas for each Route Alternative. Route Alternative 3 contains the greatest number of RFSS's (13) and Route Alternative 2 contains the least (9) (Tables 3.8-1, 3.8-3, and 3.8-5). There are between one and three RFSS occurrences within each of the Segment Alternatives (Tables 3.8-2, 3.8-4, and 3.8-6). Refer to the discussions above for further species-specific details regarding USFS sensitive species occurring within the CNF portions of the Route and Segment Alternatives.

Several of the RFSS-listed species have been identified as CNF Management Indicator Species by the USFS. Identification of Management Indicator Species are required by the National Forest Management Act and are incorporated into the land and resource management plans for all national forests to "provide a means of monitoring and evaluating the effects of actions on biotic resources, including specific species, communities, habitats, and interrelationships among organisms" (USDA, 2004). The CNF selected four management indicator species to represent habitats and the assemblage of animals occurring on the LLR and CNF. Table 3.8-8 lists the management indicator species currently monitored in the CNF and the habitats the species inhabit.

Table 3.8-8: CNF Management Indicator Species

Common Name	Scientific Name	Vegetative Community
Bald Eagle	*Haliaeetus leucocephalus*	Lake and Rivers
Gray Wolf	*Canis lupus*	All Forested Habitats
Northern Goshawk	*Accipiter gentiles*	Mature Deciduous and Coniferous Upland
White Pine	*Pinus strobes*	Mature Lowland Coniferous Forest

Source: USFS, 2004

3.8.2. Direct/Indirect Effects

This section evaluates the potential impacts of the Project on species of special concern that are known to occur within the feasible 125-foot ROW evaluated for each alternative. Impacts to these species would be considered major if the Project would result in:

- Direct effects to Federal, State, USFS, or LLDRM-listed species, including the taking (removal or loss) of an individual or population due to habitat destruction; a change in an individual or population's habitat use due to noise; or visual disturbance from construction, clearing, and maintenance activities.
- Indirect effects to Federal, State, USFS, or LLDRM-listed species, such as increased competition for resources or habitat due to displacement of individuals from the affected area into the territory of other animals; or other indirect effects which cause mortality or reduced breeding and recruitment in the future population.
- Direct or indirect effects on habitat types that affect population size and long-term viability for Federal, State, USFS, or LLDRM-listed species. Direct effects include vegetation removal by clearing, burial, or other destructive activity. Indirect effects include changes within larger ecological units (e.g., the Northern Minnesota Drift and Plains Ecoregion), but not necessarily within the Study Areas, that could occur at a later point in time such as a change in long-term vegetation composition or dominance; habitat conversion; habitat fragmentation; invasion by non-native species; or disruption of natural disturbance regimes (e.g., the annual natural hydrological cycle).

3.8.2.1. No-Build Alternative

The No-Build Alternative would result in no change to the existing environment and, as a result, no short- or long-term changes to Federal, State, USFS, or LLDRM species of special concern or their habitat would occur. The Project would not be constructed and no impacts to these species would occur.

3.8.2.2. General Impacts on Species of Special Concern

Potential impacts of the Project to individual species of special concern known to occur within the Route and Segment Alternatives depend upon the final design, location, and width of the ROW. There are currently 25 plant species of species concern (Tables 3.8-5 and 3.8-6) that occur within the Route and Segment Alternatives. Non-mobile plant species would be impacted if Project structures were sited on top of, or immediately adjacent to, known locations of these species or if individuals or populations would be destroyed during clearing and/or long-term maintenance of the ROW. In addition, species that occur in forested areas would be directly affected if the forest stands in which they occurred were cleared. State, USFS, or LLDRM sensitive tree species such as blue beech, white pine, American elm, and slippery elm would be at risk of a direct population loss from construction and long-term maintenance if they were located within the existing ROW. The sensitive flowering plants, grasses, and herbaceous species would be at risk for trampling from workers, construction equipment, and maintenance equipment over the life of the Project. The *Biological Assessment and Evaulation* for the Project (see Appendix G) notes that the MnDNR and LLDRM preliminarily determined that the use of Route Alternative 1 would jeopardize the only known one-flowered broomrape population in Northern Minnesota (HDR, 2009).

More mobile species, such as birds and mammals, would likely avoid the ROW during the construction period and move into surrounding, undisturbed habitat. The wildlife habitats impacted by the Project are relatively common within the region and the State; therefore, compatible habitat is likely located near the Project ROWs. While this migration may increase short-term competition for resources, it is unlikely that the region is overpopulated with these species such that short-term migration would lead to adverse effects on state-wide populations. The MnDNR, CNF, and LLDRM preliminarily determined that the Project may affect individuals of these mammal species within Route 1 and its Segment Alternatives but is not likely to affect the viability of the Planning Area or not cause a trend towards federal listing (HDR, 2009). Consultation with these agencies regarding formal concurrence with these findings is still ongoing.

Long-term impacts from habitat conversion within the ROWs could cause localized impacts to bird and mammal species dependent upon mature forests for foraging or nesting such as the bald eagle, great blue heron, osprey, Connecticut warbler, black-backed woodpecker, Canada lynx, and the gray wolf. The expansion of the existing ROWs could lead to an expansion of edge effects into previously interior forest habitat.

However, impacts to bird species could be minimized by avoiding known nesting sites during the breeding season by approximately one-eighth of a mile (660 feet) for large raptors and colonial waterbirds (e.g., bald eagles, great blue herons, and osprey) and maintaining approximately 200 feet around known nesting sites for smaller species such as Connecticut warbler and black-backed woodpecker.

The Project would not be located within the Federally-designated critical habitat for the Canada lynx. Lynx are uncommon in the Study Areas and, as stated above, snowshoe hare habitat is also relatively uncommon (less than 10 percent of each alternative). As a result, the Project would not result in an inability to meet the long-term management goals for the LAUs within the CNF. Therefore, the Route and Segment Alternatives are not likely to become common foraging habitat for Canada lynx and no adverse effects would be anticipated. The USFWS has preliminarily determined that that the Project would be not likely to adversely affect the Canada lynx and the CNF and LLDRM have preliminarily determined that the Project may adversely affect individuals but is not likely to affect the viability of the Planning Area (HDR, 2009). Consultation with these agencies regarding formal concurrence with these findings is still ongoing.

The Project is not located within the federally-designated critical habitat for the gray wolf. Gray wolves are not known to occur within Route Alternatives 1 or 2 and their Segment Alternatives, and transient individuals have been identified within Route Alternative 3. No den sites were identified during field surveys (HDR, 2009) or are known to historically occur within the Route and Segment Alternatives. The Project would convert forested habitat to grassland/shrub habitat within the affected ROW. However, this land would still be available as foraging habitat following the completion of construction activities. The total area affected by any of the Route Alternatives (approximately 1,760 acres or 2.8 square miles) would account for less than 10 percent of the typical wolf pack territory (20 to 214 square miles). Gray wolves would likely avoid the Route and Segment Alternatives during construction. However, the Route and Segment Alternatives are unlikely to result in a long-term, direct loss of habitat for gray wolves. The USFWS has preliminarily determined that that the Project would be not likely to adversely affect the gray wolf and the CNF and LLDRM have preliminarily determined that the Project may adversely affect individuals but is not likely to affect the viability of the Planning Area (HDR, 2009). Consultation with these agencies regarding formal concurrence with these findings is still ongoing.

3.8.2.3. Route Alternative 1 and Associated Segment Alternatives

Sixteen plant species have been identified or are known to occur within Route Alternative 1 and its associated Segment Alternatives (dragon's mouth orchid, dissected grapefern, triangle moonwort, mingan moonwort, goblin fern, pale moonwort, least grapefern, blue beech, few-flowered spike rush, white adder's-mouth, one-flowered broomrape, clustered bur-reed, Canada yew, Torrey's manna-grass, New England violet, and humped bladderwort). All of these plants would be at risk of direct population losses from trampling, ROW clearing, or other construction-related disturbance. Thirteen of these species (dragon's mouth orchid, dissected grapefern, triangle moonwort, mingan moonwort, goblin fern, pale moonwort, least grapefern, blue beech, white adder's-mouth, one-flowered broomrape, Canada yew, Torrey's manna-grass, and New England violet) occur in forested areas where the clearing of those forest stands would affect the habitat ability of those species.

Seven of the known species (triangle moonwort, mingan moonwort, goblin fern, blue beech, white adder's-mouth, Canada yew, and New England violet) are primarily forest-dependent and would face a loss of canopy cover within the ROW. Therefore, clearing of the ROW could result in localized effects on these populations. The MnDNR, CNF, and LLDRM have preliminarily determined that the Project may affect individual mammals and forest and riparian-dependent plants within Route 1 and its Segment Alternatives but is not likely to affect the viability of the Planning Area or not cause a trend towards federal listing (HDR, 2009). Consultation with these agencies regarding formal concurrence with these findings is still ongoing.

The MnDNR and LLDRM preliminarily determined that the use of Route Alternative 1 would jeopardize the only known one-flowered broomrape population in Northern Minnesota (HDR, 2009); however, the CNF has preliminarily determined there to be no effect on this species. Consultation with these agencies regarding formal concurrence with these findings is still ongoing. This impact could be avoided through the use of Segment Alternatives N and O as well as a portion of Route Alternative 2 to relocate the route in the vicinity of this species.

New England violet only occurs in Segment Alternative C, so avoiding use of this segment would eliminate the potential impacts to this species. Four species (few-flowered spike rush, clustered bur-reed, Torrey's manna grass, and humped bladderwort) are primarily aquatic species and would only be affected to the extent that the Project would impact wetlands and other aquatic environments (refer to Section 3.6, Wetlands, for additional discussion about the potential effects to these areas). If impacts to wetlands and other aquatic features were avoided, the Project would be unlikely to impact these aquatic-dependent species. Dissected grapefern and pale moonwort thrive under disturbed conditions. Therefore, provided that the populations did not suffer a direct loss from trampling, the long-term impacts to these species are anticipated to be minimal.

The inherent flexibility in the micro-siting of the Project makes it unlikely that there would be adverse impacts to species of special concern within the ROW for this Route Alternative. However, the ultimate determination of the potential impacts of this Route Alternative is dependent upon the final design and location of the ROW within the Study Area.

3.8.2.4. Route Alternative 2 and Associated Segment Alternatives

Route Alternative 2 and its Segment Alternatives support a comparable species composition to Alternative 1 but fewer overall occurrences (dissected grapefern, mingan moonwort, goblin fern, pale moonwort, St. Lawrence grapefern, least grapefern, spatulate leaved sundew, few-flowered spike rush, sweet grass, Canada yew, and New England violet). Many of the forest-dependent (triangle moonwort, mingan moonwort, goblin fern, white adder's-mouth, Canada yew, and New England violet), aquatic-dependent (spatulate-leaved sundew and few flowered spike rush), and disturbance tolerant (dissected grapefern and pale moonwort) species are also known to occur within this Route Alternative. Therefore, the potential exists for similar indirect impacts to these species.

Least grapefern and sweet grass, both open canopy/grassland species, are known to occur within Route Alternative 2. These species would also have the potential for direct losses due to ROW clearing and maintenance. However, if these species were avoided during these activities, then the long-term impacts would be expected to be minimal.

The inherent flexibility in the micro-siting of the Project makes it unlikely that there would be adverse impacts to species of special concern within the ROW for this Route Alternative. However, the ultimate determination of the potential impacts of this Route Alternative is dependent upon the final design and location of the ROW within the Study Area. The MnDNR, CNF, and LLBO LLDRM have preliminarily determined that the Project may affect individual mammals and forest and riparian-dependent plants within Route Alternative 2 and its Segment Alternatives but is not likely to affect the viability of the Planning Area or not cause a trend towards federal listing (HDR, 2009). Consultation with these agencies regarding formal concurrence with these findings is still ongoing.

3.8.2.5. Route Alternative 3 and Associated Segment Alternatives

Twenty-six species of special concern are known to occur within Route Alternative 3 and its associated Segment Alternatives (northern goshawk, Le Conte's sparrow, black tern, yellow rail, trumpeter swan, bay-breasted warbler, sandhill crane, bald eagle, Connecticut warbler, black-backed woodpecker, American bittern, moose, creek heelsplitter, black sandshell, snapping turtle, dragon's mouth orchid, goblin fern, pale moonwort, least grapefern, ram's head lady's slipper, clubspur orchid, tubercled rein-orchid, clustered bur-reed, Canada yew, Torrey's manna-grass, and New England violet). Several species known to occur along Route Alternative 3 (e.g., creek heelsplitter, black sandshell, puma, gray wolf, and snapping turtle) are unique to this alternative. It is anticipated that the Project would have the same direct and indirect impacts on bird and plant species, and the same available mitigation measures as the other Route Alternatives. In addition, the avoidance of Segment Alternatives R and T would avoid potential impacts to Le Conte's sparrows and bay-breasted warblers in the

Blackduck vicinity. The potential impacts of the Project on the special concern species unique to this Route Alternative are discussed below.

Tubercled rein-orchid is a sensitive species which occurs only in high-quality, semi-aquatic habitats and is known to occur within Route Alternative 3. This species is particularly sensitive to human disturbance and would likely be directly impacted if the Project were to disturb its habitat. This species does not occur in the vicinity of Segment Alternative E and, therefore, this Segment Alternative could not be used to avoid this species.

The MnDNR, CNF, and LLDRM have preliminarily determined that the Project may affect individual mammals and forest and riparian-dependent plant species within Route 3 and its Segment Alternatives but is not likely to affect the viability of the Planning Area or not cause a trend towards federal listing (HDR, 2009). Consultation with these agencies regarding formal concurrence with these findings is still ongoing.

The unionid mussels (e.g., Creek Heelsplitter and Black Sandshell) would not be directly impacted because all river and stream crossings would be spanned. These species generally prefer small to medium streams; therefore the flexibility in micro-siting of the Project could span all small to medium streams such that there would be no direct impacts to these species. These species could potentially be indirectly impacted during construction due to the potential for increased run-off or siltation as a result of land clearing and ground disturbances near the shoreline. However, these impacts would be minimal, short-term, and mitigated through the implementation of a sediment and erosion control plan during construction.

The population of pumas within the State is likely small based upon the limited sightings and lack of evidence of breeding populations, which indicates that individuals are generally scattered and transient. Pumas require vast undisturbed forest habitats, therefore the Project would result in disturbance to a small portion of potential puma habitat in the region due to its use of existing ROWs. For this reason, it is expected that the Project would not result in direct impacts to Pumas nor would it pose an adverse impact to Puma habitat within the State. The MnDNR and LLDRM have preliminarily determined that the Project may affect individual pumas within Route 3 and its Segment Alternatives but is not likely to affect the viability of the Planning Area or not cause a trend towards federal listing (HDR, 2009). Consultation with these agencies regarding formal concurrence with these findings is still ongoing.

As discussed above, only transient gray wolves have been seen within Route Alternative 3 and it is believed to be a single pack territory. The potential impacts would be less than 10 percent of the potential home range for the pack and the area would be available as foraging habitat following construction. Therefore, the potential effects on gray wolves would be minimal.

The Project is not located within designated critical habitat for the gray wolf. Observations (HDR, 2009) indicate the likely presence of a single wolf pack whose territory includes the ROWs. The *Recovery Plan for the Eastern Timber Wolf* (USFWS, 1992), which is the same species as the Gray Wolf, identifies five main factors critical to the long-term survival of this species, including:

1) large tracts of wild land with low human densities and minimal accessibility by humans;
2) ecologically sound management;
3) availability of adequate wild prey;
4) adequate understanding of wolf ecology and management; and
5) maintenance of populations that are either free of, or resistant to, parasites and diseases new to wolves, or are large enough to successfully contend with their adverse effects.

The Project would not cause a major effect on these five critical factors because the Project would not contribute to a direct loss of suitable habitat or fragmentation of additional habitat, or an indirect decline in prey species due to habitat loss.

The overall footprint of the Project would not eliminate habitat, and is not expected to have a major effect the wolf population in the region. The Gray Wolf population in Minnesota (estimated at 2,922 gray wolves) is considered fully recovered by MnDNR because it has surpassed the federal delisting goal of 1,251 to 1,400 wolves. Therefore, the Project would not adversely affect Gray Wolf in Minnesota. The USFWS has preliminarily determined that that the Project would be not likely to adversely affect the gray wolf and the CNF and LLDRM have preliminarily determined that the Project may adversely affect individuals but is not likely to affect the viability of the Planning Area (HDR, 2009). Consultation with these agencies regarding formal concurrence with these findings is still ongoing.

As with the other Route Alternatives, the inherent flexibility in the micro-siting of the Project makes it unlikely that there would be adverse impacts to species of special concern within the ROW for this alternative. However, the ultimate determination of the potential impacts of Route Alternative 3 is dependent upon the final design and location of the ROW within the Study Area.

3.8.2.6. Leech Lake Reservation

Within the LLR, the only threatened, endangered, or sensitive species with the potential to be impacted would be within, or immediately adjacent to, the construction and operational ROW for the Project. There are 35 LLDRM sensitive species known to occur within the LLR portion of one or more of the Route and Segment Alternatives (Table 3.8-7). The potential impacts to these species are discussed as part of the general and Route Alternative-specific impacts discussed above.

Approximately 64 percent of Route Alternatives 1 and 2 are within the LLR, while less than 1 percent of Route Alternative 3 is within the LLR borders. Although Route

Alternative 3 does provide habitat for LLDRM sensitive species, these habitats do not occur within the LLR boundary. Therefore, the potential effects of Route Alternative 3 on the availability of LLDRM sensitive species within the LLR are negligible. To the extent that Route Alternative 3 would impact LLDRM sensitive wildlife species outside of the LLR, it is possible that these effects could indirectly influence the availability of these resources within the LLR. Although relative to Route Alternatives 1 and 2, the potential effects would likely be minimal. There are no Segment Alternatives associated with Route Alternatives 1 and 2 that would reduce the amount of the Route Alternatives within the LLR. Additionally, each of the Segment Alternatives also provide habitat for LLDRM sensitive species, therefore use of these Segments would not wholly avoid impacts to LLDRM sensitive species.

The potential mitigation measures available to offset these impacts would be comparable to those for the Route Alternatives, as described in Section 3.8.3.

3.8.2.7. Chippewa National Forest

Within the CNF, the only RFSS species with the potential to be impacted would be within, or immediately adjacent to, the construction and operational ROW for the Project. There are 20 RFSS species known to occur within the CNF portion of one or more of the Route and Segment Alternatives (Tables 3.8-1 through 3.8-6). The potential impacts to these species are discussed as part of the general and Route Alternative-specific impacts, discussed above.

Approximately 50 percent of the total areas for each of the Route Alternatives are within the CNF; however, it should be noted that the total area of Route Alternative 3 within the CNF is approximately 40 percent larger than Route Alternatives 1 or 2. There are no Segment Alternatives associated with any of the Route Alternatives that would reduce the amount of the Route Alternatives within the CNF. Additionally, each of the Segment Alternatives also provide habitat for RFSS species. Therefore, use of these Segments would not wholly avoid impacts to RFSS sensitive species relative to the main Route Alternative.

The potential mitigation measures available to offset these impacts would be comparable to those for the Route Alternatives, as described in section 3.8.3.

3.8.3. Mitigation

The primary mitigation measure for these species is avoidance of known locations to ensure that long-term project features (i.e., transmission line poles and support structures) are not located on top of, or immediately adjacent to, these species. The inherent flexibility in the micro-siting of the Project makes it unlikely that there would be adverse impacts to species of special concern within any of the Route Alternatives.

In the event that the species cannot be avoided, potential impacts could be reduced by fencing or flagging special concern species populations to prevent disturbance.

The MnDNR generally does not consider transplantation to be acceptable mitigation for taking of endangered or threatened species. In the event a take does occur, compensatory mitigation includes:

- funding state acquisition of another site where the species occurs that is currently unprotected and vulnerable to destruction;
- funding additional survey work to locate other sites; and/or
- funding research to improve our understanding of the habitat requirements or protection needs of the species.

To reduce impacts to known sensitive species, the Applicant has agreed to the following mitigation measures, which are also discussed above:

- Once selected, the approved route would be subject to field surveys prior to final design of the project. If impacts to these species would be unavoidable, mitigation measures including fencing/flagging during construction, or compensatory mitigation including off-site habitat preservation, funding sensitive species research and survey work, would be evaluated.
- To facilitate access to the ROW for maintenance, emergency situations, and to allow for visual identification during aerial surveys, the ROW must be periodically cleared of vegetation. To minimize impacts to the nesting success of species of special concern, clearing activities would be completed outside of the breeding season (April 15 and August 1).
- In addition to siting around known locations of special concern species and conducting maintenance activities outside of the breeding season, the Project would conduct pre-construction surveys and avoid identified active nesting and breeding locations by the following minimum distances: Raptors – 330 feet with limited activity within 660 feet; Colonial Waterbirds – 660 feet; and Gray Wolf dens – 0.5 mile.
- If previously unknown nesting/breeding sites are identified during construction, the Applicant would notify the appropriate resource agencies.
- An *Orabanche uniflora* Mitigation Plan will be developed if the Project Route is placed in close proximity of the known population(s).

3.9. Cultural Resources and Values

This section of the DEIS is continuing to be developed and refined as review and consultation under Section 106 of the National Historic Preservation Act proceeds.

3.9.1. Introduction

There is no legal or generally accepted definition of "*cultural resources*" within the Federal government. The term, however, is used throughout the Federal government to refer to historic, aesthetic, and cultural aspects of the human environment. Under the National Environmental Policy Act (NEPA) the human environment includes the natural and the physical (e.g., buildings) environment, and the relationships of people to that environment. Accordingly, a thorough NEPA analysis should address the human (social and cultural) and natural aspects of the environment, and the relationships between them. In meeting its requirements as the lead agency for NEPA, RUS must consider the impact of its actions on all aspects of the human environment, including "*cultural resources.*"

Cultural resources include archeological sites, defined by the National Park Service as locations "*that contain the physical evidence of past human behavior that allows for its interpretation*;" buildings; structures; and traditional resources and use areas. Those cultural resources which qualify for listing in the National Register of Historic Places (NRHP) must meet one or more of the following criteria for evaluation:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association, and:
>
> A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> B. That are associated with the lives of persons significant in our past; or
>
> C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> D. That yielded, or may be likely to yield, information important in prehistory or history (National Register Bulletin: How to Apply the Criteria for Eligibility, NPS, 1997).

The NRHP is a commemorative listing of those resources significant to the American past. Those cultural resources listed on or eligible for listing on the NRHP are designated "*historic properties*." Under the National Historic Preservation Act (NHPA), as amended 2006, "*historic property*" means "*any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register, including artifacts, records, and material remains related to such a property or resource (16 U.S.C. 470w).* In accordance with Section 106 of NHPA, 16 U.S.C. § 470f, RUS is required to take into account the effect of its undertakings on historic properties. The regulation, "Protection of Historic Properties" (36 CFR Part 800), implementing Section 106 establishes the process through which RUS and other federal agencies consider effects to historic properties in their decision making.

Minnkota Power Cooperative, Inc., Otter Tail Power Company and Minnesota Power (Applicants) are seeking financial assistance from RUS for the construction of a 230 kV transmission line between the cities of Bemidji and Grand Rapids in Northern Minnesota. RUS may fund this application, thereby making the Applicants' proposal an undertaking subject to review under Section 106 of NHPA and its implementing regulation (36 CFR Part 800). In addition, the U.S. Army Corps of Engineers (USACE) is considering the issuance of permits for the Applicants' proposed project under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and Section 404 of the Clean Water Act, (33 U.S.C. § 1344). The USACE may issue these permits thereby making the Applicants' project an undertaking subject to review under Section 106. Finally, the proposed project requires a Special Use Permit from the U.S. Forest Service (USFS) under 36 CFR § 251.58 to cross land within the Chippewa National Forest (CNF). The USFS-CNF may issue the Special Use Permit thereby making the Applicants' project an undertaking subject to review under Section 106.

In accordance with 36 CFR § 800.2(a)(2), USACE and CNF have designated RUS as the lead agency who shall act on their behalf, fulfilling their collective responsibilities under Section 106. As the lead agency, RUS is coordinating compliance between the Section 106 procedures and the steps taken to meet NEPA requirements. As such, studies and analyses conducted to comply with NEPA, including this EIS, would be used and expanded as appropriate by RUS to meet the requirements of Section 106. Pursuant to 36 CFR § 800.2(d)(3), RUS has used its NEPA procedures to meet its requirements for public involvement under 36 CFR Part 800.

3.9.2. Geographic Scope

Pursuant to 36 CFR § 800.16(d), the area of potential effects (APE) is defined as the area within which the Applicants' proposal has the potential to either directly or indirectly affect historic properties that may be present. Currently, the APE includes the 1,000-foot-wide route for each build alternative under consideration in this EIS. However, the APE also must address visual effects. Given the height of the proposed structures and the requirement to maintain an alignment cleared of vegetation, this project could alter a historic property's integrity by diminishing its setting or feeling. Accordingly, the APE would be adjusted and refined as RUS learns more about the historic properties that might be present and the project's specific effects on them.

3.9.2.1. Study Area

The study area includes the entire geographic area evaluated in order to develop all of the alternatives proposed in the *Macrocorridor Study* and *Alternatives Evaluation Study*. As such it encompasses the APE, but is much broader.

3.9.3. Consultation

This section described the consultation process for the Project, which is ongoing.

3.9.3.1. Early Coordination

The alternatives which were initially proposed by the Applicants in 2006 not only cross the CNF, but also lie within the exterior boundary of the reservation of the Leech Lake Band of Ojibwe Indians (LLBO). Given the geographic relationship between the project alternatives and the reservation, the LLBO was invited to become a cooperating agency under NEPA for the development of this EIS. This geographic relationship and the establishment of its Tribal Historic Preservation Office (THPO) also affords the LLBO a special role in Section 106 review and in the development of applicable agreements. Accordingly, shortly after forming their utility partnership in 2006, the Applicants began meeting with the CNF and the LLBO.

Then, on November 28, 2006, the Applicants met with RUS, CNF, LLBO and the Bureau of Indian Affairs (BIA) Midwest during which participants discussed creation of a cooperating agency agreement and development of a plan of action that would establish how to best proceed to incorporate the requirements of both NEPA and Section 106.

In an effort to avoid unnecessary duplication as much as possible, RUS considered the various requirements of the federal and state regulatory agencies with the intent of bringing those all together into one environmental document.

Discussion between the Applicants, the CNF, the LLBO, the counties, townships and cities and the public continued throughout 2007. The Applicants attended Local Indian Council (LIC) meetings and hosted numerous open houses in an effort to present the project and gather input on the two route alternatives that had been proposed. During these discussions in the late Spring and early Summer, the LLBO expressed considerable concern that the proximity between the CNF, the reservation and the two alternatives which had been proposed increased the likelihood that traditional resources important to the tribe could be negatively impacted. The LLBO also voiced concern about the possible cumulative effects of the project as proposed at that time when considered with the impending construction of the Enbridge Pipeline.

The LLBO specifically requested that the project avoid any impact to that part of the Ten Section from east of Pike Bay to U.S. Highway 2. The Ten Section was originally set aside under the Morris Act (1902) to protect old-growth red and white pine from logging and illegal timber theft. The CNF has long managed Ten Section with a focus on retention of old-growth forest characteristics and natural processes. As such, it is a landscape that contains traditional resources and uses, and areas important to the LLBO.

In July 2007, the Applicants filed draft versions of the *Macrocorridor Study* and the *Alternatives Evaluation Study* with the RUS.

In response to these documents, the LLBO again expressed grave concern about the proposed use of the Central Corridor. According to the LLBO, the proposed central corridor is already cluttered with infrastructure so this project would further diminish lands that had been set aside as the homeland of the tribe. This additional loss of land from this project further diminishes the opportunity for LLBO band members "*to practice traditional, cultural and spiritual activities*" (LLBO, 2007) within the proposed corridor. The LLBO THPO was particularly concerned about the adequacy of the steps that had been taken thus far to identify historic properties, particularly those to which the tribe might attach religious and cultural significance. The THPO pointed out that the MCS and AES which had been filed in 2007 mention rice beds only in connection with their economic importance to native communities; completely ignoring the importance of these places as "*a cultural identifiable resource*" (LLBO, 2007).

In reponse to the LLBO's comments, as well as comments from the CNF, DRM and other agencies, RUS identified three additional macrocorridors. After review of summary environmental data, including summary information about known cultural resources, for each of these three macrocorridors, RUS selected one to be included for evaluation in the DEIS.

3.9.3.2. Initiation of Consultation

Multiple meetings among the agencies throughout 2007 culminated in development of a final draft plan of action titled, "Plan of Action for NHPA Compliance and Tribal Consultation, Proposed Bemidji to Grand Rapids 230 kV Transmission Line, Minnesota" (July 17, 2007) that affirmed the role of RUS as lead agency for compliance with Section 106, but directed the USACE to initiate consultation on behalf of the lead agency. In accordance with this plan of action, the USACE initiated consultation with the Minnesota State Historic Preservation Office (SHPO) in July 2007. The USACE invited Indian tribes to participate in government-to-government consultation in August 2007. The USACE selected the tribes to be invited using the Native American Graves Protection and Repatriation (NAGPRA) online consultation database, which lists those Indian tribes according to their interest in specific states and counties. The Indian Tribes listed in Table 3.9-1 were invited to participate in consultation by the USACE on behalf of RUS.

The invitations included a layout of the proposed corridor and a preliminary two-mile visual APE. In addition to providing a decision about participating in consultation, the

USACE requested comment on the preliminary APE, and the consultants selected by the Applicants to conduct field surveys. The USACE followed-up this invitation with telephone inquiries to inquire as to a tribe's interest in participating in consultation and ensure that the invitation and other documentation had been received. The USACE staff then provided a list of the Tribes that accepted consultation to the Applicants (Otter Tail Power et al., 2008a).

In August 2007, RUS assumed full responsibility for consultation. At that time, in addition to the federal agencies and the SHPO the following tribes had identified an interest in participating in consultation – the LLBO, Red Cliff Band of Lake Superior Chippewa, Mille Lacs Band of Ojibwe, Lower Sioux Indian Community and the Santee Sioux Tribe of Nebraska.

Table 3.9-1: Indian Tribes Invited to Consult

Name of the Nation	
Leech Lake Band of Ojibwe	Red Cliff Band of Lake Superior Chippewa
Bois Forte Band of Chippewa	Red Lake Band of Lake Superior Chippewa
Bad River Band of Lake Superior Chippewa	Santee Sioux Nation, Nebraska
Flandreau Santee Sioux Tribe of North Dakota	Sisseton-Wahpeton Oyate of the Lake Travese Reservation
Fond du Lac Band of Lake Superior Chippewa	Sokogan Chippewa Community
Grand Portage Band of Lake Superior Chippewa	Spirit Lake Nation
Keweenaw Bay Indian Community	St. Croix Band of Lake Superior Chippewa
Lac Courte Oreilles Band of Lake Superior Chippewa	Upper Sioux Community
Lac Vieux Desert Band of Lake Superior Chippewa	White Earth Band of Ojibwe
Lower Sioux Indian Community	Assiniboine and Sioux Tribes of Fort Peck
Prairie Island Indian Community	Mille Lacs Band of Ojibwe

To the extent practicable, RUS has endeavored to conduct meetings to meet the purposes of both NEPA and Section 106.

A more detailed discussion of the activities undertaken by RUs to meet its consultation responsibilities under Section 106 will be developed for review by consulting parties prior to inclusion in the EIS.

3.9.4. Cultural Resources History of the Study Area

This section discusses the history of the Study Area as it relates to cultural resources.

3.9.4.1. Introduction

Only a few archeological sites date to the earliest periods of human occupation. The vast majority of these human habitations were located near bodies of open water. Many of these water-oriented habitation sites have been found along margins of bogs that once held open water but may be hundreds of feet from present shorelines. Other sites have been submerged due to natural fluctuations of lake levels in past millennia or flooding caused by construction of dams in the past 120 years. Wind-blown sands that were deposited over parts of the area several thousand years ago may also bury some sites in upland settings.

The remaining more recent sites include those associated with industrial logging (beginning about 1890), homesteading and Anishinabe home sites, early resorts and tourism, and depression era sites developed through governmental natural resource management programs. Anishinabe traditional use areas, most of which pertain to natural resource gathering, have also been recorded and mapped within the CNF. The numbers of these types of locations likely would increase as our knowledge of them is better developed.

The traditional landscape occupied by American Indian peoples within the project area prior to the arrival of Europeans has been altered forever by these activities. However, core beliefs and traditional practices continue to flourish among local Anishinabe despite the enormous pressures to adopt western culture to the exclusion of their own, or to be forcibly separated from the vast majority of their traditional land and resource base. The removal of the land base and alterations in its use through the construction of dams, industrial logging, and other developments has significantly affected the distribution and accessibility of traditional resources. Maintaining the health, availability and access to these resources is of vital concern to Indian tribes involved in traditional practices within the area.

3.9.4.2. Background

Following the deglaciation that occurred about 12,000 years ago, the area within and surrounding the APE has been a focal point for human settlement. Archaeological sites within the area reveal human presence as early as about 9,000 years ago. The evidence of these early inhabitants comes from a few, usually deeply buried, archeological sites that are small with few artifacts. (Risjord, 2005; Dobbs, 1990a and 1990b). From that time forward, humans have affected their surroundings in a variety of ways, and the extent and intensity of the human impacts on the environment has increased through time.

Historically, human settlement within and immediately surrounding the APE is distinctive due to several factors, such as the cultures present; abundant food staples from an aquatic system that included vast fish resources and extensive wild rice beds; the opportunity for unimpeded water transport; and proximity to major prairie and forest ecotones.

With the possible exception of the use of fire, impacts of the earliest people within the ecosystem would be local and of short duration given low population density and a nomadic settlement pattern. As the millennia pass, however, the archaeological record reveals the use of new technologies and subsistence-settlement patterns that support larger populations, living in semi-permanent or regularly visited habitation areas. These changes are evidenced in the last three thousand years, and are most clearly recognized in the past one thousand years.

About 6,000 years before present, material remains evidence a changing adaption that has been designated as the Archaic period. Cultures of this period continued reliance on large game hunting and evidence increasingly diversified technologies associated with hunting, trapping, fishing, foraging, woodworking and plant processing. This diversification of culture and associated technologies is believed to reflect a more highly regionalized adaptation to local environmental conditions. Chipped stone tools, such as stemmed and notched projectile points, dominate, but the use of pecked and ground stone implements also became widespread. Evidence of the exploitation of diverse floral and faunal resources suggests a seasonal round type subsistence-settlement system, with habitation areas often located along the margins of lakes and major rivers. Archeological investigation has established that at this time trade networks connected the Archaic cultures of Minnesota with resources as far away as the Gulf of Mexico (Anfinson, 1987; Wilford, 1941, 1955, and 1960; Risjord, 2005).

While intensive gathering continued to provide the bulk of subsistence, designated as the Woodland period, beginning about 800 BC, also appears to have been associated with incipient plant domestication. Wild rice, however, remained a staple food. Settlement patterns resembled those appearing previously, with particularly intense occupation of stream/lake junctions late in the period. An especially significant technological innovation of the Woodland peoples is the development of ceramics. Earthwork (mound) construction frequently associated with mortuary activity also developed at this time.

The larger populations of the last several centuries prior to the arrival of Europeans created greater impact within the ecosystems than previous occupations. The development of fire-dependent vegetative communities within this area is likely the direct result of the human use of fire during this time. With the exception of fire, however, these impacts would continue to be localized. In terms of wide-ranging landscape processes, human impact through the use of fire was a major process. Prior to the latter half of the nineteenth century, forest communities of the area were largely shaped by fire that often swept in from the prairies to the west or was ignited, either accidentally or purposefully, by local native communities. These re-occurring disturbance events influenced present day vegetation communities and brought a unique "prairie influence" to the area.

It is possible that several hundred, perhaps as many as a few thousand people could have lived within the area at various points in time during these later centuries. Such occupation could affect the local availability of plant and animal resources. Regularly visited habitation areas would have created non-forested openings, diminished wood available for fuel or building materials and otherwise altered local plant communities. In the area within and surrounding the APE, the archeological remains of these have dense middens of processed, burned, and trampled animal bone and other debris and occasionally include the development of anthropic soil horizons. While scores of archaeological sites identified along the shorelines attest to the impact of early aboriginal people, such effects are minor when compared with the large-scale extraction of resources to come with the arrival of Europeans.

By about 1630, the western portions of what was to become the state of Minnesota were occupied by the Yankton Dakota, while the Santee Dakota occupied the east. The traditional tribal cultures were disrupted during the mid-seventeenth century, as European explorers and trade goods began to enter the region. French fur traders were among the first Europeans to arrive in northern Minnesota in the 1650s. As early as 1660, Sault Ste. Marie, traditionally a seasonal gathering place during the whitefish run, became a year-round stopping place for tribes due to the opportunity to trade with Europeans (Meyer, 1994). European trade, primarily for furs, created new pressures on and among the tribes of the region.

By the mid-1700s in the northeast of what was to become Minnesota the Anishinabe had largely displaced the Dakota. According to Anishinabe tradition, the five original clans emerged from an ocean which could have been the Atlantic Ocean or more likely Hudson's Bay. Sometime prior to 1500, the Anishinabe began a migration through the Great Lakes watershed to find a place where food grows on water (i.e., wild rice), guided by a vision of a *miigis* (cowrie shell) or Sacred Megis (turtle shell) (Meyer, 1994; Benton-Banai, 1979). Anishinabe oral tradition relates a 500-year journey, with some groups settling along the way. The *O'daw-wahg'*, who provided goods and were later called the Ottawa, settled at Lake Huron. The *Ish-ko-day'-wa-tomi*, who maintained the Sacred Fire and were later called the Potawatomi, settled in Michigan, first near the Mackinac Strait and then in lower Michigan. The *Ojibway*, who were the Faith Keepers, continued west to Lake Superior. The migration ended at Madeline Island, southernmost of the Apostle Islands and the location of La Pointe, Wisconsin (Benton-Banai, 1979). By the late 1600s through the fur trade and conflict, the Ojibwe were expanding displacing the Sioux tribes south and possibly further west (Gibbon, 2002).

In the 1700s, the first Anishinabe settlements in the region were located on small islands in Leech Lake (LLBO, 2009). The Anishinabe, like the Dakota tribes, seasonally harvested fish, game, maple sugar, fruit, berries, roots, and wild rice. Fish were harvested by netting and spearing, both from canoes and through ice. Fish were preserved by salting, smoking, or drying (Risjord, 2005). Even without agriculture, the plentiful wild rice and fish around Lake Superior allowed the Anishinabe to live in sedentary villages for seven months of the year, usually right at the lakeshore. Birchbark was employed in home and canoe construction and container manufacture. Cedar wood and bark were also used for these purposes. Sweet grass was also harvested, and often burned for medicinal and spiritual purposes (McClurken, 2000).

Beginning in 1837, treaties between the Anishinabe and the U.S. government opened the way for Euroamerican settlement. The establishment of Fort Snelling at the confluence of the Minnesota and Mississippi Rivers accelerated this settlement. First fur trading, then logging, agriculture, and mining attracted Euroamerican settlers to Minnesota (Risjord, 2005) which first became a Territory in 1849 and then the 32nd state in 1858.

In 1854 and 1855, treaties between the Anishinbe and the U.S. government allocated permanent reservation lands within ceded territories to the tribe, a rare provision at the time (Risjord, 2005). The Leech Lake Reservation was established by treaty in 1855, with revisions to reservation boundaries made in 1864, 1873, and 1874 (LLBO, 2009).

Through treaty and federal legislation most of the ancestral lands of the Anishinabe people were ceded and opened to logging, farming and permanent settlement by Euroamericans in the late nineteenth century. A Forest Reserve that would eventually become the Chippewa National Forest was established in 1902. This era of increased use and settlement forever changed the character of the area in a number of ways.

Commercial tree harvesting and the suppression of fire affected the composition, structure, and spatial arrangement of forested landscapes, and thus have likely affected associated wildlife. With the industrial logging initiated in the area that includes the APE a century ago, most of the old-growth pine was removed from the landscape within just a few years. The slash left behind in cutover areas created a high risk of catastrophic wildfire and the era of active fire suppression began. Fire suppression has caused a decline in fire dependent pine forests with an increase in those forest species, such as hardwoods, balsam fir and dense shrubs, that often displace fire-dependent communities in the absence of fire. While pine remains a major forest component and is still harvested, commercial timber operations of more recent decades have focused primarily on the use and regeneration of aspen.

During the early days of pine logging, the practice of temporarily damming waterways to provide flow for floating logs also altered both terrestrial and aquatic habitats. Permanent dams at Stump Lake, Cass Lake, and Lake Winnie and other smaller control structures now control water levels in the Mississippi River and headwaters lakes. One of the most dramatic permanent changes came with the construction of Winnie Dam, which raised the water elevation in the lake by about nine feet, and in the Turtle River flowage. These dams have changed the natural hydrology, affected aquatic and riparian communities associated with the lakes and rivers, and altered human use and settlement of shoreline areas.

Over the past 250 years of Euroamerican settlement, ecosystems within the project area have been affected through human intervention by a variety of means including the nearly complete removal of several fur-bearing mammal species during the fur trade era, and the removal and regeneration of timber resources on a vast scale beginning in the late 19th century. Development of more permanent human settlements, increasingly dependent on national and international economic systems, accompanied these changes. This was expressed in the development of modern land transportation routes, the construction of dams to float logs and to provide reliable water levels for business interests downstream, the elimination of fire from the ecosystem, the construction of summer homes, resorts and other recreation sites, the development of modern sports fisheries and wildlife management to serve larger human populations, and farming.

All of these cultural resources represent a remarkable record of human history that continues to have religious or cultural significance to present day communities. Although much of the resource remains in good condition they are all potentially subject to a variety of threats. Scores of archaeological sites have been damaged or destroyed through erosion associated with drastic water level fluctuations brought by construction of logging dams. Modern human use of shoreline areas for recreational access has also created erosion that has affected heritage sites. Other sites have been damaged through earth disturbing developments prior to the advent of legislation protecting heritage resources on public lands. Even with modern legal protections of heritage sites on public lands, human error in implementing project mitigation measures remains a threat. Private development of lakeshore or the margins of other riparian areas is an additional peril. A few sites in the area show physical evidence of vandalism or have had artifacts removed from surface exposures by relic collectors.

3.9.5. Known Cultural Resources

This section identified known cultural resources within the Study Area, including archeological resources and traditional resources.

3.9.5.1. Archeological Resources

The report titled, *Phase I Cultural Resource Investigation Research Design, Proposed Bemidji-Grand Rapids 230-kV Electrical Transmission Line, Minnesota* (ERM, 2009) contains records search results and draft recommendations prepared at the request of OES. This initial review is very preliminary. A more comprehensive reconnaissance level study of the APE, designed to gather information to determine the level of effort that will be needed to identify historic properties for the preferred alternative, is underway. The results of that study, however, were not avaible prior to publication of the DEIS. Many of the known resources recorded in the Project Study Area were identified through previous studies conducted for transportation projects, transmission and pipeline corridors, and surveys conducted on state and federally-owned management areas. Much of this information is maintained by the SHPO, although the USFS, the Leech Lake Heritage

Sites Program (LLHSP), the Leech Lake THPO, and the Office of the State Archaeologist keep their own records. Because of this, no one source should be considered a complete record of all recorded historic properties within the Project study area, but informational databases should supplement each other. Table 3.9-2 compares the number of acres within each route alternative that have been previously investigated.

Table 3.9-2: Summary of Acres Surveyed per Route Alternative

Route Alternative	Total Acres	Acres surveyed*
1	14,256	3,976
2	5,863	2,544
3	15,863	2,110
Crossover Segments	1,115	44
Total		**8,674**

Note: * For the purposes of this analysis, all Segment Alternatives for Route Alternatives 1 and 2 are included within their totals, and Crossover Segments were those north-south Segment Alternatives linking Route Alternatives 1 and 2.

3.9.5.2. Traditional Resources

In addition to archeological sites, cultural resources anticipated to be identified include resources of traditional importance and use by Indian tribes. Traditional resources are essential to the maintenance and realization of tribal lifeways. In its numerous comments on this Project, the LLBO has continued to emphasize the value of the Ten Section Area, located south of Pike Bay, to the tribe. In addition, the LLBO has also expressed concerns about potential impacts to the high conservation value forests within the Guthrie Till Plain.

The area of the current Leech Lake reservation was established in 1855 as the homeland for the LLBO. The Ten Section Area was established within this reservation under the Morris Act (1902) to protect the few remaining old growth red and white pines. Given the ever increasing pressure on limited natural resources experienced within the Study Area within the last 100 years, it is likely that this reserve is perhaps even more important to the LLBO today than when it was first established. According to the CNF, "*the old-growth forests of the Ten Section Area and the nearby northern hardwood forests of the Guthrie Till Plain/Cuba Hill Area include some of the most culturally important areas on the reservation for LLBO members to practice their traditional activities*" (NPS, 2000). It is possible that some of the traditional cultural resources associated with these locations could meet the criteria for listing on the NRHP and be properties to which the LLBO attach religious and cultural significance.

Wild rice traditionally has been an especially important staple of tribal lifeways - subsistence and exchange. Other plants that play an integral role in tribal lifeways include, but are not limited to, sage, sweetgrass, blueberry, blackberry, pincherry, and hundreds of others. Other types of culturally important areas include spiritual and ceremonial places.

Wild rice grows naturally within Hubbard, Beltrami, Cass, and Itasca counties. Based upon the MnDNR inventory, the range of natural wild rice today includes 55 counties in Minnesota. These areas support a minimum of 64,328 acres of natural wild rice when growing conditions are favorable. In particular, Beltrami lakes support approximately 2,438 acres of wild rice; Cass County lakes support approximately 8,323 acres; Hubbard County lakes support approximately 963 acres; and Itasca County lakes support 8,448 acres (MnDNR, 2008d).

At the request of RUS, the LLBO THPO is presently conducting a study to inventory traditional resources and use areas within the APE. The THPO study, however, will not be complete until recent biological survey information from the LLHSP has been provided and incorporated into the document.

3.9.5.3. Summary

Table 3.9-2 summarizes preliminary findings from literature searches conducted as part of the *Route Permit Application* and in December 2008 (ERM, 2009), and additional database searches conducted in 2009 by LLHSP. The number of sites within each alternative was determined using a database search of SHPO files, and an analysis of SHPO topographic maps for the four counties through which the three alternatives would pass. Additional archival research was conducted by LLHSP to supplement the SHPO data using databases and files from the U. S. Forest Service and the Leech Lake THPO that may not have been previously available from the SHPO. This initial review is preliminary. Reconnaissance level studies of known archeological and traditional resources located the APE are underway, but their results were not final at the time this DEIS was published. Also, to better compare the route alternatives, additional field research was conducted in 2009 on public lands on Route Alternative 3 by LLHSP. Results from the 2009 field survey include the identification of 14 newly recorded sites. Table 3.9-3 does not analyze by Route Segment.

Table 3.9-3: Summary of Cultural Properties By Route Alternative

Route Alternative	Historic	Prehistoric	Multi-component	Unknown	Total
1	18	17	1		36
2	19	4	1	1	25
3	41	15	2		58
Crossover	4				4
Totals	**81**	**25**	**4**	**1**	**123**

According to this data, 36 properties were identified in Route 1, 25 properties were identified in Route 2, and 58 properties were identified in Route 3. As shown in Table 3.9-3, Route Alternative 3 crosses the greatest number of cultural properties, while Route Alternative 2 crosses the least.

3.9.6. Direct/Indirect Effects

This section provides a description of the potential impacts of the No-Build Alternative, and Route Alternatives 1, 2, and 3.

The construction of new transmission line facilities could affect recorded and currently unknown cultural resources. The transmission line, with its pole installation and substation modification, has the potential to disturb archaeological sites. The Project could alter the setting and feeling of historic structures or landscapes, or the setting of and access to traditional cultural properties. In areas not previously disturbed and where archaeological potential is assessed to be high, such as near large lakes and river crossings, unrecorded archaeological sites or traditional cultural properties may be affected during construction of transmission structures, substations and substation modifications, or access roads. Historic buildings or other sites may be impacted, as well, in that construction of modern transmission structures may impact the historic viewshed in which above-ground archaeological and historic resources are located. Although extensive landscaping and contouring are not planned, possible impacts to archaeological resources that would apply to all of the route and route segment alternatives include:

- Subsurface excavations necessary to install structures
- Disturbance to surface soils throughout the route as a result of heavy construction vehicle equipment operation
- Disturbance to surface soils from dragging heavy objects (e.g., power poles)
- Disturbance to surface soils through grubbing, stump removal, and grading

Impacts to cultural resources, including historic structures, archaeological sites, and traditional cultural properties, would be considered significant if they result in adverse effects to historic properties that are eligible for listing on the NRHP as defined by Section 106 of the NHPA. If a cultural resource is identified as an historic property, the historic significance of the property is determined by evaluating it in terms of its ability to meet the National Register criteria (36 CFR § 800.4 (c)(1)). A cultural resource that meets the criteria is considered an historic property entitled to the consideration afforded by Section 106 of the NHPA, as outlined in the Advisory Council on Historic Preservation's implementing regulations (36 CFR 800). Potential impacts to each historic property would be evaluated in terms of the specific significance of the resource, and the potential for the Project to detract from that significance. However, it must be kept in mind that *adverse effect* under Section 106 does not equate with *significant impact* under NEPA, and that all aspects of a cultural environment need to be considered along with historic properties.

For example, impacts to traditional resource use, such as wild rice harvesting, maple sugaring, sweet grass harvesting, or berry picking, would depend upon the requirements of the resource, and the Project alternative. Game animal populations, including fish, are not anticipated to be affected by the Project. No indirect effects to traditional resource appreciation and use are anticipated. Potential direct and indirect effects to biological resources (i.e., flora and fauna) are discussed in Section 4.7. Potential direct and indirect effects to species of special concern are discussed in Section 4.8.

3.9.6.1. No-Build Alternative

The No-Build Alternative would not impact existing cultural resources either directly or indirectly. This alternative would allow for existing conditions to remain as they currently are. Archaeological and historic resources would neither be preserved in another manner nor damaged under the No-Build Alternative.

3.9.6.2. Route Alternative 1

Due to the number of pipelines constructed in the vicinity of Route Alternative 1, a number of cultural resource field surveys have been conducted within the area incorporated by this alternative. As indicated in Table 3.9-3, a total of 36 sites have been recorded within Route Alternative 1 including 18 historic sites, 17 prehistoric sites, and one multi-component site. Segment Alternatives A, B, C, D, J, K, L, M, N, O, P, and Q are associated with this Route Alternative.

3.9.6.3. Route Alternative 2

Similar to Route Alternative 1, a number of cultural resource surveys have been conducted in the area incorporated by Route Alternative 2. As shown in Table 3.9-3, a total of 25 sites have been recorded within Route Alternative 2 including 19 historic sites, four prehistoric sites, one multi-component site, and one unknown site. Segment Alternatives C, F, G, H, I, J, K, M, N, O, P, and Q are associated with this Route Alternative.

3.9.6.4. Route Alternative 3

Route Alternative 3 has not been the subject of as many surveys as Route Alternatives 1 or 2, but has the potential to contain a large number of archaeological and historic resources, as it is the longest of the possible routes. Archaeological sites relating to both prehistoric and historic habitation are common throughout the Study Area. The area is dense with lakes, wetlands, and abundant wild rice beds, which still are important resources in Native economies. To better understand this corridor, additional field survey of public lands was completed by LLHSP in 2009. As shown in Table 3.9-3, 58 sites have been identified within this Route Alternative including 41 historical sites, 15 prehistoric sites, and two multi-component sites. Segment Alternatives E, R, S, and T are associated with this Route Alternative.

3.9.6.5. Crossover Segments

There are four historic sites recorded within the Segment Alternatives that connect Route Alternatives 1 and 2. These segments could potentially be included in either Route Alternative 1 or 2.

3.9.7. Mitigation

Reconnaissance level studies of the APE are nearing completion, but are not yet available for inclusion in the DEIS. Through this study, information about previous archeological survey efforts and known sites has been gathered and evaluated in conjunction with pertinent environmental data to develop a predictive model for the presence/absence of archeological sites in the APE. Through an additional survey, RUS completed a preliminary identification of those resources and use areas located in the APE that are of traditional importance to Indian tribes. The size of the corridors under evaluation in this DEIS, however, precludes more detailed analysis at this time. Once a route has been selected, RUS will conduct more detailed studies to identify affected historic properties.

In accordance with 36 CFR §§ 800.4(b)(2) and 800.5(a)(3), RUS may phase Section 106 identification, evaluation and application of the criteria of effect. The regulations establish that phasing is appropriate "[w]*here alternatives under consideration consist of corridors or large land areas"* as is the case with the alternatives under consideration in this DEIS. RUS may defer the steps in Section 106 review if it is specifically provided for in a Programmatic Agreement (PA).

In meeting this requirement, RUS has developed a draft PA in consultation with the other federal agencies, LLBO, other participating Indian tribes, the SHPO and the Applicants. Because not all affected historic properties would be known prior to selection of the preferred alternative, the draft PA establishes procedures to guide the identification and evaluation of historic properties, the assessment of adverse effects to them, and the development of appropriate mitigation for any adverse effects. The PA establishes that avoidance of adverse effects to historic properties is preferred. An adverse effect might be avoided by shifting the ROW to exclude the area of the historic property. In addition, the PA outlines specific responsibilities for agencies, tribes and the Applicants, and contains protocols for inadvertent discoveries and pertinent administration provisions.

Under the terms of the draft PA, consultation is ongoing as RUS implements the proposed procedures. This approach affords the consulting parties an opportunity to continue their direct participation in project decision making. As such, the draft PA aims to establish an open and transparent environment for which the goals and process of consultation are clearly displayed and understood.

3.10. Land Use

This section provides a description of the land use patterns within the Study Area, which consists of the 1,000-foot-wide routes identified for the Route Alternatives and Segment Alternatives. Information from the Minnesota Department of Natural Resources (MnDNR) Geographical Analysis Program (GAP) and United States Forest Service (USFS) /Chippewa National Forest (CNF) landscape data was used to determine the Study Area's existing conditions and potential effects on those conditions.

3.10.1. Affected Environment

The MnDNR categorizes land use in the State of Minnesota into eight types: urban and rural development, cultivated land, hay/pasture/grassland, brush-land, forested, water, bog/marsh/fen, and mining (LMIC, 1999d). Land use typically is regulated by local and county zoning ordinances. Records of existing and future land use are maintained by these entities to plan for current and future development.

The description of the affected environment includes a discussion of the Study Area and the individual acreages for each alternative, zoning, and land cover, as defined by the MnDNR GAP analysis and information obtained from the USFS and CNF.

3.10.1.1. Study Area

The Study Area extends through portions of Beltrami, Cass, Hubbard, and Itasca counties in northern Minnesota. Portions of the Route and Segment Alternatives pass through the CNF and the Leech Lake Reservation (LLR).

Each Route Alternative crosses federal, state, and privately-owned land. Table 3.10-1 summarizes the approximate acreage of each Route Alternative and Segment Alternative.

Table 3.10-1: Acreage Crossed by Route Alternative and Segment Alternatives

Route and Segment Alternatives	Associated Route Alternatives	Total Acres	Leech Lake Reservation[1]		Chippewa National Forest [2]		State of MN	
			Acres	% of total Route or Segment Alternative	Acres	% of total Route or Segment Alternative	Acres	% of total Route or Segment Alternative
Route Alternatives								
1		8,382	5,232	62%	2,790	33%	1,280	15%
2		8,147	5,234	64%	3,999	49%	1,189	15%
3		14,118	35	0%	7,348	52%	1,429	10%
Segment Alternatives								
A	1	1,900	N/A	N/A	N/A	N/A	30	2%
B	1	1,270	1,270	100%	619	49%	235	19%
C	1, 2	525	482	92%	325	62%	119	23%
D	1	596	536	90%	19	3%	31	5%
E	3	1,281	1,161	91%	1,152	90%	231	18%
F	2	179	179	100%	98	55%	N/A	N/A
G	2	199	N/A	N/A	N/A	N/A	N/A	N/A
H	2	121	N/A	N/A	N/A	N/A	N/A	N/A
I	2	59	N/A	N/A	N/A	N/A	N/A	N/A
J	1, 2	53	N/A	N/A	N/A	N/A	N/A	N/A
K	1, 2	735	285	39%	N/A	N/A	51	7%
L	1	298	206	69%	N/A	N/A	N/A	N/A
M	1, 2	296	296	100%	N/A	N/A	N/A	N/A
N	1, 2	441	441	100%	441	100%	N/A	N/A
O	1, 2	325	325	100%	325	100%	N/A	N/A

P	1, 2	64	64	100%	64	100%	N/A	N/A
Q	1, 2	52	52	100%	N/A	N/A	N/A	N/A
R	3	233	N/A	N/A	110	47%	N/A	N/A
S	3	136	N/A	N/A	8	6%	N/A	N/A
T	3	262	N/A	N/A	73	28%	16	6%

Notes:

1. This designation refers to land within the Leech Lake Reservation Proclamation Boundary
2. This designation refers to land within the CNF.

Route Alternatives 1 and 2 are comparable in acreage, 8,382 and 8,147 acres, respectively, as would be expected given the similar length of these Route Alternatives. Route Alternative 3 encompasses the greatest amount of land (14,118 acres). Route Alternatives 1 and 2 also include the most land within the LLR, approximately 5,230 acres or 62 to 64 percent of the total route acreage. Route Alternative 3 includes the most CNF lands (7,348 acres or 52 percent of the total Route Alternative) and the least amount of land located within the LLR (only 35 acres). All Route Alternatives include a similar amount of state land, approximately 1,200 to 1,400 acres. Route Alternatives 1 and 2 and the associated Segment Alternatives include more than 5,000 acres of land on the LLR, with Segment Alternative B affecting the most land on the LLR (1,270 acres). Segment Alternatives A, B, C, D, E, K, and T all contain portions of State-owned lands.

3.10.1.2. Zoning and Land Use

The following evaluation provides a description of the zoning requirements for this Project, which are based on the Power Plant Siting Act. It also provides a description of the land use within each of the four counties, through which the Route Alternatives cross.

Zoning is used as a means of regulating permitted land uses in the State of Minnesota. Minnesota Statutes provide for this authority to promote the health, safety, morals, and general welfare of a community within the State. As indicated in Section 1, this Project is considered a Large Energy Facility under Minnesota Statute 216B.2421 and requires both a Certificate of Need and a Route Permit from the Public Utilities Commission.

Under the Power Plant Siting Act, Minnesota Statute 216E.10, the Route Permit issued for high voltage transmission line purposes "…shall be the sole site or route approval required by the state 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." (Minn. Stat. § 216E.10). However, the permit does not supersede federal or tribal regulations or permitting. Additional discussion about route permitting and local approval requirements and processes is provided in Section 1.

While local approvals are not required for the construction and operation of the transmission line, as aforementioned, existing zoning regulations govern how land is used. In the following discussion, current land use is presented for the areas in which the Route Alternatives pass per county.

The Study Area within Beltrami County is primarily low-density residential and commercial development, although it is classified as medium and high-density near and in the city of Bemidji. Outside of the Bemidji urban growth area, land use is primarily rural (Beltrami County, 2002). Land Use in the Study Area is depicted in Figure 3.10-1.

Land in the northern part of Hubbard County, the only portion within the Study Area, consists primarily of three classifications: low-density area, rural growth area, and public ownership use. County land use policy favors preserving the rural character of the rural growth area by encouraging existing agricultural uses, maintaining open spaces, and encouraging the development of size-appropriate residential and related developments (in the range of 2.5 to 3 acres). Land use policy recognizes publicly-owned land for its recreational and economic potential (Hubbard County, 2005 and Otter Tail Power et al., 2008b).

As part of the Cass County Comprehensive Plan, two land use plans have been adopted, one for private uses and one for public uses. The private land use plan cites the following difficulties with existing conditions:

- Demand continues to increase for commercial and residential development necessary for normal (local) growth that places more pressure on rural areas, small lakes, wetlands, and agricultural lands;
- As the makeup and density of land ownership increases, so do the expectations for services; and
- Physical limitations on remaining undeveloped property create environmental and logistical challenges (Cass County, 2002).

The primary objective for public land planning in Cass County is to retain the northwoods, lakes, and pristine rural environment of the County. As part of the strategy to maintain these resources, the County would like to acquire and maintain access to all county administered lands, which include existing rights-of-way (ROWs) (Cass County, 2002). The Study Area within Cass County primarily includes lands of a rural and forested nature. Over 50 percent of Cass County is forested, with approximately 35 percent covered by deciduous forest (LMIC, 1999c).

As part of the land use planning program for Itasca County, goals were set for a 20-year period extending to 2020. The goals included a provision for balancing land and water resources to enhance the natural beauty and resources of the county. In addition, the county established a goal to protect the unique settlement characteristics by maximizing the use of existing infrastructure and offering a diversity of development patterns. At the same time, the county seeks to encourage agriculture in areas that were farmed in the past. The county also intends to create a diverse economy, an integrated system of green space and recreational outlets, and a transportation system that meets the needs of its community members (Itasca County, 2007). In addition to its broad land use goals, the Itasca County Comprehensive Land Use Plan specifically addresses the need to investigate how to minimize the visual impacts of power lines along scenic roads. The Itasca County Study Area primarily includes lands of relatively rural nature, except for urban areas within the cities of Ball Club and Deer River. (LMIC, 1999c).

Leech Lake Reservation

LLDRM is responsible for the administration and management of all tribal, band, and allotted lands as they relate to surface and subsurface leasing, permitting, ROWs, land acquisition and disposal, and implementation of land use ordinances. LLDRM maintains a Land Use plan. One of the LLR priorities is to increase the Reservation trust's land base through land acquisition by purchase or by exchange (LLDRM, 2009c).

All of the Route Alternatives pass through portions of the LLR. Route Alternatives 1 and 2 crosses through the middle of the LLR, while Route Alternative 3 avoids the LLR for the great majority of its length. Segment Alternatives B, C, D, E, F, L, M, N, O, P, and Q are located either entirely or largely within the LLR.

Route Alternative 1 passes through the LLR between approximately MP 1-17.5 and 1-60. Route Alternative 2 passes through the LLR between approximately MP 2-15.5 and 2-59. Route Alternative 3 passes through the LLR near MP 3-110, while Segment Alternative E, the only Segment Alternative associated with this Route Alternative, is largely within the LLR.

Chippewa National Forest

The USFS has adopted a forest management plan to direct initiatives and development of resources within the CNF. The Forest Plan (2004) has the following goals related to overall land use:

- Promote ecosystem health and conservation using a collaborative approach to sustain the nation's forests and watersheds;
- Provide for a variety of life by managing biologically diverse ecosystems;
- Provide for sustained forest product uses in an environmentally acceptable manner;
- Provide forest settings and natural resources that enhance social and economic benefits at local, regional, and national levels;
- Provide management direction that enhances social and economic benefits for individuals and communities;
- Emphasize scenic quality in areas of high interest to people; and
- Emphasize a variety of forest settings that provide for a spectrum of social opportunities and benefits for people (CNF, 2004).

All of the Route Alternatives, as well as Segment Alternatives B, C, D, E, F, N, O and P contain portions of land managed by the Chippewa National Forest. Route Alternatives 1 and 2 crosses through the middle of the CNF, while Route Alternative 3 avoids the center portion of the CNF but crosses the greatest amount of CNF land overall. Alternative Segment B was developed by the Applicants to avoid the Pike Bay Experimental Forest of the CNF.

3.10.1.3. Land Cover

The Geographic Analysis Program (GAP) was used to classify the primary land cover types within the Study Area (Table 3.10-2). The Geographic Analysis Program maps land cover types from satellite imagery; land-based surveys are used to supplement data as needed. Types of land cover analyzed included: forest, shrubland, cropland/grassland, aquatic environment, urban area, and transportation.

GAP data is divided into levels providing a greater amount of detail with each progressive level. Level 1 provides basic vegetation cover data, while Level 4 gives detailed cover information ranging from vegetation types to urban density (Otter Tail Power et al., 2008a).

For this GAP analysis, impacts to forest cover were determined by quantifying the areas classified by Level 1 GAP data as deciduous, coniferous, or mixed forests. For each alternative and its ROW, acres of affected shrubland, cropland/grassland, and aquatic environment were determined by comparing Level 2 GAP data for each alternative and its representative ROW. Urban areas were determined by identifying the areas classified by Level 4 GAP data as high-density urban, low-density urban, and mixed development. Impacts to transportation also were determined using Level 4 GAP data (Otter Tail Power et al., 2008a).

As shown in Tables 3.10-2, forested areas comprise the greatest area of land cover along the Route Alternatives, ranging from 3,845 acres (46.9 percent) for Route Alternative 2, to 8,409 acres (53.0 percent) for Route Alternative 3. While patches of forest area are scattered throughout all of the alternatives, the area between the city of Cass Lake and the city of Deer River (which consists primarily of state-owned and CNF lands) is a nearly continuous forested area. This is reflected in the data provided for the CNF properties and LLR.

In comparison with Route Alternative 2, Route Alternatives 1 and 3 are composed of lesser areas of shrub land, urban, and transportation land uses, and greater areas of cropland/grassland. In addition, Route Alternative 3 has a lower percentage of aquatic environments (including surface water bodies and wetlands) as compared to the other two alternatives and the Segment Alternatives. The greater areas of transportation and urban land uses within Route Alternative 2 is due to the proximity of U.S. Highway 2 and the cities of Bemidji, Cass Lake, and Bena to this alternative.

Table 3.10-2: GAP Land Cover Types within Route Alternatives (Total, CNF, and LLR Jurisdictions)

Land Cover Types	Route Alternative 1		Route Alternative 2		Route Alternative 3	
	Acres	Percentage	Acres	Percentage	Acres	Percentage
Entire Route						
Forest	5,027	60%	3,845	47%	8,409	53%
Shrubland	1,094	13%	1,829	23%	2,351	15%
Cropland/Grassland	1,596	19%	1,067	13%	4,164	26%
Aquatic Environment	582	7%	553	7%	539	3%
Urban	38	0%	464	6%	143	1%
Transportation	35	0%	342	4%	257	2%
Total	8,372	100%	8,100	100%	15,863	100%
Leach Lake Reservation						
Forest	3,744	72%	2,881	56%	1,110	63%
Shrubland	723	14%	1,318	25%	198	11%
Cropland/Grassland	396	8%	372	7%	411	23%
Aquatic Environment	353	7%	336	6%	34	2%
Urban	0	0%	155	3%	0	0%
Transportation	5	0%	114	2%	2	0%
Total	5,221	100%	5,176	100%	1,755	100%
Chippewa National Forest						
Forest	2,413	87%	1,705	74%	5,825	64%
Shrubland	226	8%	391	17%	1,370	15%
Cropland/Grassland	56	2%	41	2%	1,457	16%
Aquatic Environment	72	3%	134	6%	310	3%
Urban	0	0%	5	0%	0	0%
Transportation	0	0%	33	1%	88	1%
Total	2,767	100%	2,309	100%	9,050	100%

As shown in Table 3.10-3, land cover along the Segment Alternatives is generally similar to land cover within the larger Study Area.

Table 3.10-3: GAP Land Cover Types within Segment Alternatives (Total, CNF, and LLR Jurisdictions)

Land Cover Types	Segment Alternatives																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Entire Route																				
Forest	1,037	1,060	457	215	636	93	70	34	8	0	302	151	207	414	312	40	3	63	32	113
Shrubland	197	99	46	77	181	13	8	8	4	1	176	17	29	27	7	3	0	16	7	17
Cropland/ Grassland	595	50	0	278	444	23	97	33	29	41	198	114	29	0	0	9	2	143	91	123
Aquatic Environment	61	61	22	22	34	4	5	6	2	0	54	15	31	0	4	0	0	3	0	8
Urban	1	0	0	0	0	45	18	40	15	11	1	0	0	0	0	12	0	0	0	0
Transportation	10	1	0	0	4	1	2	0	0	0	4	1	0	0	2	0	0	8	3	1
Total	**1,901**	**1,271**	**525**	**591**	**1,299**	**179**	**199**	**121**	**59**	**53**	**735**	**298**	**296**	**441**	**325**	**64**	**5**	**233**	**133**	**262**
Leach Lake Reservation																				
Forest	N/A	1,060	439	196	570	93	N/A	N/A	N/A	N/A	92	110	207	414	312	40	3	N/A	N/A	N/A
Shrubland	N/A	99	36	74	171	13	N/A	N/A	N/A	N/A	77	15	29	27	7	3	0	N/A	N/A	N/A
Cropland/ Grassland	N/A	50	0	242	384	23	N/A	N/A	N/A	N/A	62	65	29	0	0	9	2	N/A	N/A	N/A
Aquatic Environment	N/A	61	6	19	34	4	N/A	N/A	N/A	N/A	50	15	31	0	4	0	0	N/A	N/A	N/A
Urban	N/A	0	0	0	0	45	N/A	N/A	N/A	N/A	1	0	0	0	0	12	0	N/A	N/A	N/A
Transportation	N/A	1	0	4	2	1	N/A	N/A	N/A	N/A	3	1	0	0	2	0	0	N/A	N/A	N/A
Total	**N/A**	**1,270**	**482**	**536**	**1161**	**179**	**N/A**	**N/A**	**N/A**	**N/A**	**285**	**206**	**296**	**441**	**325**	**64**	**5**	**N/A**	**N/A**	**N/A**
Chippewa National Forest																				
Forest	N/A	575	104	19	563	93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	414	312	40	N/A	36	0	43
Shrubland	N/A	25	18	0	166	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	27	7	3	N/A	9	0	0
Cropland/ Grassland	N/A	9	0	0	398	23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	9	N/A	60	8	30
Aquatic Environment	N/A	9	3	0	34	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	4	0	N/A	2	0	0
Urban	N/A	0	0	0	0	45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	12	N/A	0	0	0

Transportation	N/A	0	0	0	2	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	2	0	N/A	3	0	0
Total	**N/A**	**619**	**125**	**19**	**1,163**	**179**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**441**	**325**	**64**	**N/A**	**110**	**8**	**73**

3.10.2. Direct/Indirect Effects

This section provides a discussion of potential land use impacts from the Project. Potential direct impacts include the following:

- Incompatibility with local land use and zoning
- Incompatibility with planned development
- Loss of use to landowners from building restrictions and use restrictions in the ROWs

Potential indirect impacts (i.e. occurrences that are not typically associated with a particular land use) to nearby land uses could include the following:

- Noise, addressed in Section 3.21
- Dust, addressed in Section 3.2
- Additional traffic, addressed in Section 3.19
- Increased trespassing and unauthorized uses

A brief discussion also is provided for impacts to locations in which multiple easements are required.

Direct and indirect effects of the Project are addressed for the No-Build Alternative, Alternatives 1 through 3 and their Segment Alternatives, the LLR, and the CNF.

3.10.2.1. No-Build Alternative

The No-Build Alternative would not impact existing land uses directly or indirectly. This alternative would be compatible with local land uses and zoning, because it would allow for the existing conditions and proposed future land uses to remain as it currently is. Planned development would continue as proposed. No loss to individual landowners would result because land would not be utilized for the transmission line under the No-Build Alternative. Furthermore, government landowners would not be impacted, because no public lands would be utilized.

3.10.2.2. Route Alternatives 1, 2, and 3

This discussion provides a description of the anticipated direct and indirect impacts upon local land use and zoning, planned development, loss of use to landowners, properties in which multiple easements are required, and easements on public lands from the Project. The analysis includes the expansion of the Boswell Substation, expansion or construction of a substation in the Cass Lake area and a feasible 125-foot

ROW for the Route Alternatives and Segment Alternatives. Actual impacts may vary depending upon the final location and width of the ROW.

As previously noted, this Project is not regulated by local zoning ordinances and land use policies. Minn. Stat. § 216E.10 provides for the preemption of local zoning for the purposes of a large energy facility in which a Route Permit is prepared and reviewed. However, consideration for the direct and indirect impacts of the alternatives is presented as part of the analysis of this Project.

Local Land Use and Zoning

With regard to local land use plans, the Project alternatives are consistent and compatible with the overall goals set forth by the various communities. Development of new resources is recognized in each county land use plan alongside consideration for natural resources, economic activities, and the health and well-being of the residents and visitors. In particular, as noted in the Beltrami County and Cass County goals for land use, residents expect services to be maintained and to be consistent with the amount of growth within a community. This Project addresses the need for additional sources of energy in this region of Minnesota.

Although the creation of easements would limit land use within the easement/ROW, the overall use of the parcel, and hence the land use designation, would not typically be altered.

Planned Development

The alternatives would not impact planned development directly. Within the four counties, planned development typically is most intense in the cities. Intensive development within Beltrami County, for instance, is most extensive within the city of Bemidji (Beltrami County, 2002). Similar patterns of development are present in the other three counties (i.e., close to cities). The alternatives typically are routed outside of the municipalities within the four counties.

Planned development might be impacted to the extent that communities would benefit from a continued supply or reliable electric power, thus indirectly supporting additional development.

Loss of Use

Landowners may experience both a temporary and long-term loss of use in areas where new ROW would be acquired for the Project. The temporary loss of use for landowners would occur during construction. During this time, machinery would be placed on individual property owners' lands to allow for the placement of poles and wires. The overall land use outside of the ROW, however, would not be altered during construction.

Indirect effects may include noise, dust, and additional traffic not typically associated with the existing land use, especially in rural or forested areas. As discussed in Section 3.21, Noise, the transmission conductors and transformers could produce audible noise levels depending upon weather conditions and their designs. Dust also may be stirred from the ground as machinery is used to raise the poles and to string the conductors. Impacts to recreation use from dust generation are expected to be minor and temporary. Additional traffic may be generated by the machinery used for construction. This type of traffic would not typically be present within certain land use types, such as forest lands.

A long-term loss of use of the ROW acquired for the Project would impact landowners where the Project is constructed. Acquisition of easements for the Project is described in Section 2. The landowner would maintain ownership of the property, and continue to pay taxes on the property, but the utility would acquire an easement allowing them to use the ROW in exchange for a monetary payment to the land owner. The easement agreement between the landowner and the Utility would outline any use restrictions applying to the easement. Although the landowner still has use of the land under easement, the easement agreement would prohibit structures and certain types of vegetation within the ROW.

Creation of the Project ROW and construction access roads may increase public access to private lands, creating the potential for increased trespassing and unauthorized use of such lands. Enforcement of private land use and trespassing laws would be the responsibility of local law enforcement. A description of community services in the Study Area, including local police departments and county sheriff's offices, is included in Section 3.17, Community Services.

As discussed in Section 3.18, Utility Systems, Route Alternatives 1 through 3 and Segment Alternatives A, G, H, I, K, L, and M follow existing pipeline or transmission easements for a significant portion of their total length. As a result, in many cases the ROW required for the Project would be adjacent to existing utility easements. The total ROW occupied by Enbridge pipelines in the Study Area (including existing pipelines and permitted lines under construction) would be 200 feet wide. If the Project were located adjacent to the Enbridge ROWs, total combined ROW for the Project and pipelines could be up to 325 feet. The total width and potential effects of co-locating easements are discussed in Section 3.18, Utility Systems.

In non-urban and non-forested settings, long-term impacts to land use are primarily the result of structure placement and maintenance and access roads.

For other land uses such as agriculture and shrub or grassland, current uses would be maintained for most of the ROW. For the purposes of this analysis, long-term impacts to these land uses were determined by quantifying the percent of each alternative with a specific affected cover type, calculated using the following equation:

Alternative length (miles) multiplied by the number of structures per mile multiplied by 300 square feet per structure multiplied by the percent cover in alternative, converted to acres.

Long-term forestland and urban impacts were calculated using a geographic information system (GIS). All forestlands and urban areas within the feasible 125-foot-wide ROW evaluated were identified as long-term impacts. Temporary impacts were assumed to occur for all land cover types except cropland/grassland in all areas within the 125-foot-wide ROW that were not long-term impacts. Temporary impacts were determined by subtracting the long-term impacts from the total area of these cover types within the ROW. Temporary impacts for cropland/grassland areas were calculated assuming a 30-foot-wide impact area rather than the full 125-foot ROW (Otter Tail Power et al., 2008a, modified).

Impacts for the LLR and CNF were calculated in the same way as described above. The CNF impacts are only for that portion of the alternatives that would be located on federally-owned parcels (Otter Tail Power et al., 2008a).

Table 3.10-4 provides a summary of the potential temporary and long-term land use impacts for the anticipated ROWs within each alternative. With two exceptions, the alternatives are not expected to result in major long-term impacts to the land uses within the affected ROW. These exceptions include forested lands, which would need to be cleared within the ROW to maintain an adequate clear zone along the transmission line, and urban lands, for which building would be restricted within the ROW.

Table 3.10-4: Acres of Land Affected within a Feasible 125-foot Right-of-Way

Type	Route Alternative 1		Route Alternative 2		Route Alternative 3	
	Long-Term Impacts	Temporary Impacts	Long-Term Impacts	Temporary Impacts	Long-Term Impacts	Temporary Impacts
Forest	579	0	439	0	825	0
Shrub Land	1	174	1	279	1	320
Cropland/Grassland	1	52	<1	31	1	119
Aquatic Environment	<1	65	<1	71	<1	68
Urban	0	3	<1	70	<1	7
Transportation	0	5	0	42	<1	50
Total	**580**	**299**	**441**	**493**	**828**	**464**
Total Temporary & Long-Term Impacts w/in ROW	879		934		1,391	
Total ROW	1,046		1,032		1,761	

Long-term impacts to forest land would range from 439 acres for Route Alternative 2 to 825 acres for Route Alternative 3. Shrub land impacts were generally identified as temporary, because shrubs would naturally re-establish once construction was completed. Discussion of impacts to wetlands, agriculture, and transportation and traffic are provided in Sections 3.6, 3.14, and 3.19, respectively.

All Route Alternatives would include the addition of equipment to the Wilton and Boswell substations. Improvements to the Wilton Substation (discussed in Section 2.4.1) would occur within the existing fenced area of the substation, and would not result in any changes to land use. The Boswell Substation would be expanded by approximately 1.3 acres to accommodate new equipment. There would be no change in the land use from the Boswell Substation expansion, as it would remain essentially industrial, in keeping with its location on the Boswell generating plant site.

It is likely that long-term impacts to land use would also occur as a result of the proposed substation configurations in the Cass Lake area. In Route Alternative 1, a new substation would be constructed in Section 30 of Pike Bay Township (T145 N, R 31 E); in Route Alternative 2, the existing Cass Lake Substation, located in Section 17 of Pike Bay Township (T145 N, R31W) would be expanded. In either case, approximately 4 acres of forested land would be converted long-term. Route Alternative 3 does not include any substation construction or improvements.

3.10.2.3. Leech Lake Reservation

As noted in Section 3.10.2.2, long-term impacts were calculated for each of the Route Alternatives located within the Leech Lake Reservation (LLR) using the same model as that used for the alternatives:

- For forest and urban lands, long-term impacts were assumed to equal the acreage of the 125-foot-wide ROW.
- For other land uses, the alternative length (in miles) was multiplied by the number of structures per mile and by 300 square feet per structure and by the percent cover in the alternative, converted to acres.

Table 3.10-5 summarizes the potential land use/cover impacts to the ROW within the LLR for each Route Alternative.

Table 3.10-5: Acres of Land Affected within a Feasible 125-foot Right-of-Way within the LLR

Land Cover Type	Route Alternative 1		Route Alternative 2		Route Alternative 3	
	Long-Term Impacts	Temporary Impacts	Long-Term Impacts	Temporary Impacts	Long-Term Impacts	Temporary Impacts
Forest	433	0	338	0	1	0
Shrub Land	<1	133	<1	201	<1	3
Cropland/Grassland	<1	13	<1	8	0	0
Aquatic Environment	<1	39	<1	39	0	0
Urban	0	0	<1	26	0	0
Transportation	0	1	0	21	0	0
Total	**434**	**186**	**339**	**295**	**1**	**3**
Total Temporary & Long-Term Impacts w/in ROW	620		633		4	
Total ROW	662		660		4	

Construction of the Project within the LLR would result in impacts similar to those identified for the entire length of the Route Alternatives. The greatest impact would be to forested lands, which would be converted. Long-term impacts to the forest within the LLR range from approximately 1 acre for Route Alternative 3 to 433 acres for Route Alternative 1. Route Alternative 3 is located primarily outside of the LLR, while Route Alternatives 1 and 2 travel through a large portion of the LLR.

3.10.2.4. Chippewa National Forest

According to the 2004 Management Plan, the CNF is located at the crossroads of three major ecosystems including the aspen, birch, spruce-fir and pines of the boreal forest and the maple-basswood hardwood forests.

A land use change from timber production to special use (i.e., utility ROW) would result in a long-term direct impact to CNF lands. As noted in Section 3.10.2.2, temporary and long-term impacts to the CNF were calculated using the same model as that used for the Route Alternatives and LLR. Table 3.10-6 summarizes the potential land use/cover impacts of the ROW for each Route Alternative within the CNF. Temporary impacts would include indirect effects as a result of construction activities, such as dust, noise, and increased traffic.

Table 3.10-6: Acres of Land Affected within a Feasible 125-foot Right-of-Way within the CNF

Land Cover Type	Route Alternative 1		Route Alternative 2		Route Alternative 3	
	Long-Term Impacts	Temporary Impacts	Long-Term Impacts	Temporary Impacts	Long-Term Impacts	Temporary Impacts
Forest	294	0	202	0	584	0
Shrub Land	<1	37	<1	57	1	168
Cropland/Grassland	0	2	0	1	<1	25
Aquatic Environment	<1	9	<1	18	<1	43
Urban	0	0	0	0	0	0
Transportation	0	<1	0	5	<1	19
Total	**294**	**48**	**202**	**80**	**585**	**255**
Total Temporary & Long-Term Impacts w/in ROW	342		282		840	
Total ROW	348		284		920	

Long-term impacts to the forest within the CNF range from 202 acres for Route Alternative 2 to 584 acres for Route Alternative 3.

3.10.3. Mitigation

A variety of mitigation measures could be implemented to reduce the potential land use impacts from construction and operation of the Project. Through the route-development process for the Project, the Applicants have attempted to minimize potential impacts by avoiding urban/residential areas to the extent possible, and by co-locating the alternatives along existing ROWs, such as highways, railways, existing transmission lines, and pipelines. The requested 1,000-foot-wide route would provide additional opportunities to avoid sensitive areas when locating a ROW of up to 125 feet.

Route Alternatives 1, 2, and 3 would all require clearing of trees, resulting in a long-term change in land cover. The HVTL route permit could require the Applicants to minimize tree removal, taking into account clearance requirements, and the large amount of tree cover in the Project area.

The following mitigation measures, which may be incorporated into the HVTL permit, are applicable to all of the Route Alternatives evaluated:

- The Applicants could work with the MnDNR, LLDRM, and the CNF to minimize and to avoid impacts to sensitive forested areas within the state and national forests. Areas disturbed in state and national forest land would be reseeded with a seed mix recommended by the appropriate agency's management. Seed mix will be developed in conjunction with appropriate resource agencies taking into consideration culturally important species;
- The Applicants could limit construction staging and lay-down areas to previously disturbed areas;

- The exact location of structure sites, ROWs, and other disturbed areas could be determined with landowners' or agencies' input;
- Conductor spans could be adjusted such that transmission line structures, where practicable, would avoid sensitive land uses. Likewise, construction and maintenance access roads would be located to avoid sensitive conditions;
- Construction activities could be limited to the ROW, unless access permission is obtained from adjacent landowners; and
- Fences, gates, and similar improvements that are removed or damaged during Project construction could be promptly repaired or replaced.

3.11. Socioeconomics

This discussion includes a description of the affected environment, direct and indirect impacts, and mitigation. It provides a discussion of the socioeconomic patterns within the four county area in which the Route Alternatives pass. Information from the United States Census Bureau (USCB) and the Minnesota Department of Administration (MDA) was analyzed to determine the existing conditions within the four-county area.

3.11.1. Affected Environment

The affected environment consists of the Study Area, which includes Beltrami, Cass, Hubbard, and Itasca counties and the Leech Lake Reservation (LLR). In addition to these counties, seven incorporated cities are located wholly or partially within at least one of the Route Alternatives, including:

- Bemidji (pop. 13,143);
- Blackduck (pop. 718);
- Cass Lake (pop. 813);
- Bena (pop. 104);
- Deer River (pop. 926);
- Zemple (pop. 72); and
- Cohasset (pop. 2,587) (MDA, 2008a).

Additional details about county and city population, housing, employment, and income characteristics of these jurisdictions are provided in the following subsections.

Data for the Study Area primarily was obtained from the U.S. Census Bureau's 2000 decennial census; 2000 census data is collected in 2000, but represents the demographic characteristics as of December 31, 1999. When available, U.S. Census Bureau estimates (USCB, 2008) also were obtained for the year 2008 from the American Community Survey (ACS). These estimates are based upon data collected in a single calendar year and describe the social, economic, demographic, and housing characteristics.

At the more local level (i.e., for jurisdictions with populations less than 65,000), population estimates were obtained from the MDA. No income characteristics or ethnic origins statistical data is available at the local or county levels for 2008.

The Route Alternatives cut across the boundaries of the Leech Lake Reservation (LLR) and the Chippewa National Forest (CNF). Available information for the LLR is limited to U.S. Census Bureau data using geographic based tables for the State of Minnesota and from the January 2007, *Indians, Indian Tribes, and State Governments* report created by the Research Department of the Minnesota House of Representatives (USCB, 2000p –

2000gg). Data from the 2007 American Community Survey is not available for this geographic location.

The CNF, however, is not discussed as a separate geographic location, because census information is not available for this area. Instead, these population groups are considered as part of the county in which they reside.

3.11.1.1. Population Characteristics

A summary of population characteristics in the Study Area is shown in Table 3.11-1. The following discussion provides an overview of the counties and the LLR contained within the Study Area.

Demographic characteristics for minority populations are contained in Section 3.12, Environmental Justice. Table 3.12-3 provides a listing of the specific U.S. Census block groups that the Route Alternatives cross. Population and economic data are analyzed at the census block group level, the most detailed level for which economic data is available.

The population within the LLR and four counties that comprise the Study Area is estimated as follows for 2008 (USCB, 2008):

- Leech Lake Reservation – 10, 205
- Itasca County – 44,379
- Beltrami County - 43,861
- Cass County – 28,654
- Hubbard County – 18,823

Overall, these counties are largely rural and sparsely populated, with an average of 16 persons per square mile, compared to the state average of 62 persons per square mile (USCB, 2000p – 2000ff).

Table 3.11-1: Population Characteristics by County and Township

COUNTY/ MCD	1990 Census	2000 Census	2008 Estimate	% Change (1990 - 2000)	% Change (2000 - 2007)	2020 Estimates	2008 Household Size
Minnesota	**4,375,099**	**4,919,479**	**5,287,976**	**12.40%**	**7.50%**	**5,943,240**	**2.4**
Leech Lake Reservation (LLR)	**8,669**	**10,205**	**N/A**	**17.7%**	**N/A**	**N/A**	**N/A**
Beltrami County	**34,384**	**39,650**	**43,861**	**15.30%**	**10.6%**	**52,370**	**2.5**
Bemidji city	11,165	11,917	13,413	6.7%	12.6%	14,173	2.1
Bemidji township	2,660	2,934	3,047	10.3%	3.9%	3,670	2.7
Black Duck	718	696	721	-3.1%	3.5%	734	2.0
Frohn township	1,151	1,408	1,544	22.3%	9.7%	1,943	2.7
Grant Valley township	1,040	1,450	1,776	39.4%	22.5%	2,390	2.6
Hines township	556	674	722	21.2%	7.1%	868	2.6
Sugar Bush township	113	193	226	70.8%	17.1%	319	2.7
Summit township	237	259	252	9.3%	-2.7%	277	2.3
Taylor township	133	108	116	-18.8%	7.4%	104	2.3
Turtle River township	799	1098	1,200	37.4%	9.3%	1597	2.6
Cass County	**21,791**	**27,150**	**28,654**	**24.6%**	**5.5%**	**34,510**	**2.3**
Bena city	147	110	95	-25.2%	12.6%	88	1.9
Cass Lake city	923	860	825	-6.8%	3.9%	764	2.5
Otter Tail Peninsula township	40	43	51	7.5%	9.7%	59	1.8
Pike Bay township	1,420	1,643	1,610	15.7%	22.5%	1,794	3.0
Wahnena township*	187		d/u	d/u	d/u	d/u	d/u
Wilkinson township	207	270	251	30.4%	17.1%	294	2.3
Hubbard County	**14,939**	**18,376**	**18,823**	**23.0%**	**2.4%**	**20,850**	**2.3**
Farden township	769	994	997	29.3%	0.30%	1,138	2.7
Guthrie township	386	436	478	13.0%	9.6%	497	2.6
Hart Lake township	343	466	483	35.9%	3.6%	552	2.7
Helga township	950	1109	1,247	16.7%	12.4%	1,396	2.7
Itasca County	**40,863**	**43,992**	**44,379**	**7.7%**	**0.90%**	**47,600**	**2.2**
Alvwood township	57	74	73	29.8%	0.3%	87	2.0
Bowstring township	217	242	215	11.5%	9.6%	213	2.0
Cohasset city	1,970	2,481	2,612	25.9%	3.6%	3,106	2.4
Deer River city	838	903	925	7.8%	12.4%	1,000	2.0
Deer River township	621	691	684	11.3%	0.30%	755	2.6
Kinghurst township	121	131	104	8.3%	9.6%	95	1.9
Lake Jessie township	252	335	340	32.9%	3.60%	415	2.4
Liberty township	66	91	89	37.9%	12.4%	107	2.2
Moose Park township	83	80	88	-3.6%	0.3%	85	2.5
Morse township	573	605	636	5.60%	9.60%	675	2.9
Oteneagen township	218	246	255	12.80%	3.60%	295	2.5

Stokes township	209	259	242	23.90%	12.40%	280	2.2
Wirt township	84	94	108	11.90%	14.90%	121	2.5
Zemple city	63	75	72	19.00%	-4.00%	82	2.5

Note: * Wahnena Township was unincorporated in 1995 and data were not available at the township level beyond 1990

Source: MDA, 2008a; MDA, 2008b; MDA, 2008c; Minnesota House Research, 2007; USCB, 2000gg; USCB, 1990

As shown in Table 3.11-1, Beltrami County continues to experience a greater rate of population growth than Minnesota as a whole. Both Cass and Hubbard Counties grew at a faster rate than the State of Minnesota through the 1990s, although the rate of growth has slowed since 2000. Some of the greatest rates of growth are shown in the townships, particularly those near Bemidji and Deer River, and Itasca County experienced the least increase with 0.1 percent annually. By the year 2020, Beltrami County is expected to continue to have the greatest increase in population to 52,370, which represents an average annual increase of 1.6 percent from 1999, and Itasca County is projected to continue to have the smallest increase with an average annual rate of 0.4 percent (MDA, 2008b and 2008c).

Also, as indicated in Table 3.11-1, in 2008 Beltrami County had the greatest average household size of 2.5 people and Itasca County had the smallest with an average of 2.2 people per household. During this same year, the State had an average of 2.4 people per household (MDA, 2008b).

Among the major cities within the Study Area, in 2008, the population ranged from a low of 718 in the city of Blackduck to a high of 13,143 in the city of Bemidji. The average annual population change ranged from a decrease of 0.7 percent in the city of Cass Lake to an increase of 1.9 percent in the city of Grand Rapids (MDA, 2008a). Population estimates for 2020 show increases for all areas, mostly modest in size.

Leech Lake Reservation

Routes 1 and 2 bisect the LLR. This area has a total population of 10,205 (USCB, 2000bb). Of the total population, 4,850 are American Indian alone (Minnesota House Research, 2007). The LLR encompasses 1,309.91 square miles, of which 337.39 are covered by water. Consequently, the population density is 10.5 people per square mile (USCB, 2000bb).

As previously indicated, data is not available for 2007 for the reservation from the U.S. Census Bureau or from the Minnesota House Research Department.

3.11.1.2. Housing Characteristics

The total number of housing units, ownership levels, and housing occupancy/vacancy levels for 2000 are presented in Table 3.11-2 (USCB, 2000p-z, 2000ff, and 2000gg). The

Census Bureau generally does not provide 2007 estimates for jurisdictions with less than 65,000 people, as is the case in this Study Area.

Seasonal/Recreational or Occasional Use housing units make up approximately 12 to 45 percent of the total housing units in the four counties in the Study Area, compared to approximately 5 percent for Minnesota as a whole. Most of these unoccupied units are considered seasonal or recreational units.

The proportion of owner-occupied units, ranging from approximately 75 percent in Beltrami County to 86 percent in Cass County is the same or greater than for Minnesota generally, which is approximately 75 percent.

Leech Lake Reservation

In the 2000 U.S. Census, a total of 6,828 housing units were identified within the LLR. Based upon the available acreage, the housing unit density for this area is 7.0 units per square mile (USCB, 2000bb). In 2000, the percentage of occupied units was 53.5 percent (USCB, 2000gg).

Table 3.11-2: Housing Characteristics of the Study Area

Housing Characteristic	Beltrami County		Cass County		Itasca County		Hubbard County		Leech Lake Reservation		Minnesota	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total Housing Units	16,989	100.0%	21,286	100.0%	24,528	100.0%	12,229	100.0%	6,828	100.0%	2,065,946	100.0%
Total Occupied Units	14,337	84.4%	10,893	51.2%	17,789	72.5%	7,435	60.8%	3,653	53.5%	1,895,127	91.7%
Owner-Occupied	10,684	74.5%	9,358	85.9%	14,768	83.0%	6,195	83.3%	2,948	80.7%	1,412,865	74.6%
Renter-Occupied	3,653	25.5%	1,535	14.1%	3,021	17.0%	1,240	16.7%	705	19.3%	482,262	25.4%
Total Unoccupied Units	2,652	15.6%	10,393	48.8%	6,739	27.5%	4,794	39.2%	3,175	46.5%	170,819	8.3%
Year-Round Units	678	4.0%	811	3.8%	992	4.1%	416	3.4%	282	4.1%	65,210	3.2%
Seasonal/ recreational/, occasional use units	1,974	11.6%	9,582	45.0%	5,747	23.4%	4,378	35.8%	2,893	42.4%	105,609	5.1%

Sources: USCB, 2000p-z, 2000ff, and 2000gg

3.11.1.3. Employment Characteristics

Table 3.11-3 provides a summary of employment and unemployment data for 2008. As shown in the table, unemployment varied significantly by county:

Beltrami County – 1,629 and 4.8 percent
Cass County – 872 and 3.7 percent
Itasca County – 1,493 and 4.1 percent
Hubbard County – 563 and 3.9 percent (data from 2000)

Thus, the Study Area had a total of 4,557 unemployed residents in 2008. One of the four counties had a greater unemployment rate than the State's 4.6 percent (MnDEED, 2009).

Table 3.11-3 provides a summary of 2008 and 2000 employment information for the population aged 16-years old and above (2008 information was unavailable for Hubbard County). The table provides background information about the total civilian labor force, the number of employed civilians, the number of unemployed civilians, and the rate of unemployment.

Table 3.11-4 provides information about 2000 and 2008 employment by industry for those residing within the Study Area, as well as for the State of Minnesota.

Table 3.11-3: Study Area Employment Information 2000 and 2008

Labor Force	Beltrami County		Cass County		Itasca County		Hubbard County		Leech Lake Reservation		State of Minnesota	
	2000	2008	2000	2008	2000	2008	2000	2008	2000	2008	2000	2008
Labor Force	19,554 (65.9%)	21,658 (64.4%)	12,523 (59.0%)	14,124 (60.4%)	20,606 (59.2%)	22,293 (61.1%)	8,573 (59.3%)	d/u	4,341 (60.0%)	d/u	2,691,709 (71.2%)	2,916,785 (71.5%)
Employed	18,085 (61.0%)	19,991 (59.5%)	11,658 (54.1%)	13,211 (56.5%)	19,222 (55.2%)	20,795 (57.0%)	8,004 (55.4%)	d/u	3,878 (53.6%)	d/u	2,580,046 (68.2%)	2,762,931 (67.8%)
Unemployed	1,465 (4.9%)	1,629 (4.8%)	853 (4.0%)	872 (3.7%)	1,380 (4.0%)	1,493 (4.1%)	563 (3.9%)	d/u	463 (6.4%)	d/u	109,069 (2.9%)	150,421 (4.6%)

Note: du – data unavailable
Source: U.S. Census Bureau, 2006-2008 American Community Survey and USCB, 2000gg

Table 3.11-4: Employment by Industry 2000 and 2008

Industry Sector and Class of Worker	Beltrami County		Cass County		Itasca County		Hubbard County		Leech Lake Reservation		State of Minnesota	
	2000	2008	2000	2008	2000	2008	2000	2008	2000	2008	2000	2008
Total employed, all sectors	18,085 (61%)	19,995 (59.4%)	11,658 (54.9)	13,211 (56.5%)	19,222 (55.2%)	20,795 (57.0%)	8,004 (55.4%)	d/u	3,878 (53.6%)	d/u	2,580,046 (68.2)	2,762,931 (67.8%)
Agriculture, forestry, fishing and hunting, and mining	689 (3.8%)	527 (2.6%)	488 (4.2%)	364 (2.8%)	876 (4.6%)	1,073 (5.2%)	398 (5.0%)	d/u	114 (2.9%)	d/u	67,883 (2.6%)	63,883 (2.3%)
Construction	1,244 (6.9%)	1,191 (6.0%)	1,135 (9.7%)	1,431 (10.8%)	1,491 (7.8%)	2,081 (10.0%)	750 (9.4%)	d/u	367 (9.5%)	d/u	15,3267 (5.9%)	181,680 (6.6%)
Manufacturing	1,717 (9.5%)	1,231 (6.2%)	(1,120 (9.6%)	1,071 (8.1%)	2,608 (13.6%)	2,113 (10.2%)	980 (12.2%)	d/u	273 (7.0)	d/u	419,271 (16.3%)	397,232 (14.4%)
Wholesale trade	406 (2.2%)	460 (2.3%)	308 (2.6%)	229 (1.7%)	509 (2.6%)	695 (3.3%)	192 (2.4%)	d/u	70 (1.8%)	d/u	92,854 (3.6%)	93,198 (3.4%)
Retail trade	2,248 (12.4%)	2,902 (14.5%)	1,600 (13.7%)	1,527 (11.6%)	2,412 (12.5%)	2,841 (13.7%)	1,044 (13.0%)	d/u	380 (9.8%)	d/u	307,714 (11.9%)	319,242 (11.6%)
Transportation and warehousing, and utilities	677 (3.7%)	681 (3.4%)	463 (4.0%)	418 (3.2%)	1,251 (6.6%)	912 (4.4%)	288 (3.6%)	d/u	162 (4.2%)	d/u	131,683 (5.1%)	126,837 (4.6%)
Information	388 (2.1)	328 (1.6%)	251 (2.2%)	175 (1.3%)	278 (1.4%)	198 (1.0%)	126 (1.6%)	d/u	36 (0.9%)	d/u	65,460 (2.5%)	61,829 (2.2%)

Industry Sector and Class of Worker	Beltrami County		Cass County		Itasca County		Hubbard County		Leech Lake Reservation		State of Minnesota	
	2000	2008	2000	2008	2000	2008	2000	2008	2000	2008	2000	2008
Finance and insurance, and real estate and rental and leasing	724 (4.0%)	1,011 (5.1%)	611 (5.2%)	581 (4.4%)	743 (3.9%)	889 (4.3%)	398 (5.0%)	d/u	171 (4.4%)	d/u	184,874 (7.2%)	208,750 (7.6%)
Professional, scientific, and management, and administrative and waste management services	836 (4.6%)	1,109 (5.5%)	581 (5.0%)	832 (6.3%)	1,215 (6.3%)	1,192 (5.7)	407 (5.1%)	d/u	160 (4.1%)	d/u	227,064 (8.8%)	257,336 (9.3%)
Educational services, and health care and social assistance	5,151 (28.5%)	6,325 (31.6%)	2,258 (19.4%)	2798 (21.2%)	4,265 (22.2%)	5,034 (24.2%)	1,891 (23.6%)	d/u	834 (21.5%)	d/u	539,111 (20.9%)	623,402 (22.6%)
Arts, entertainment, and recreation, and accommodation, and food services	2,039 (11.3%)	2,360 (11.8%)	1,554 (13.3%)	2074 (15.7%)	1,731 (9.0%)	2,101 (10.1%)	724 (9.0%)	d/u	831 (21.4%)	d/u	186,001 (7.2%)	219,195 (7.9%)
Other services, except public administration	896 (5.0%)	757 (3.8%)	590 (5.1%)	957 (7.2%)	986 (5.1%)	718 (3.5%)	423 (5.3%)	d/u	145 (3.7%)	d/u	118,322 (4.6%)	121,221 (4.4%)
Public administration	1,070 (5.9%)	1,109 (5.5%)	699 (6.0%)	754 (5.7%)	857 (4.5%)	948 (4.6%)	383 (4.8%)	d/u	335 (8.6%)	d/u	86,542 (3.4%)	89,126 (3.2%)

Industry Sector and Class of Worker	Beltrami County		Cass County		Itasca County		Hubbard County		Leech Lake Reservation		State of Minnesota	
	2000	2008	2000	2008	2000	2008	2000	2008	2000	2008	2000	2008
Class of Worker												
Private wage and salary workers	11,989 (66.3%)	13,693 (68.5%)	7,738 (66.4%)	9,225 (69.8%)	14,437 (75.1%)	15,904 (76.5%)	5,489 (68.6%)	d/u	2,292 (59.1%)	d/u	2,074,432 (80.4%)	2,244,964 (81.3%)
Government workers	4,482 (24.8%)	4,809 (24.8%)	2,307 (19.8%)	2,502 (18.9%)	3,169 (16.5%)	3,303 (15.9%)	1,471 (18.4%)	d/u	1,196 (30.8%)	d/u	318,932 (12.4%)	330,835 (12.0%)
Self-employed workers in own not incorporated business	1,522 (8.4%)	1,414 (7.1%)	1,553 (13.3%)	1,423 (10.8%)	1,533 (8.0%)	1,547 (7.4%)	1,015 (12.7%)	d/u	384 (9.9%)	d/u	178,586 (6.9%)	182,121 (6.6%)
Unpaid family workers	92 (0.5%)	75 (0.4%)	60 (0.5%)	61 (0.5%)	83 (0.4%)	41 (0.2%)	29 (0.4%)	d/u	6 (0.2%)	d/u	8,096 (0.3%)	5,011 (0.2%)

Note: du – data unavailable
Source: U.S. Census Bureau, 2006-2008 American Community Survey and USCB, 2000gg

As shown in the table, the top three employment industries in each of the counties in the Study Area in 2008 were:

- Beltrami County – educational, health care, and social assistance (31.6 percent); retail trade (14.5 percent); and arts, entertainment, recreation, accommodation, and food services (11.8 percent)
- Cass County – educational, health care, and social assistance (21.2 percent); arts, entertainment, recreation, accommodation, and food services (15.7 percent); and retail trade (11.6 percent)
- Itasca County – educational, health care, and social assistance (24.2 percent); retail trade (13.7 percent); and arts, entertainment, recreation, accommodation, and food services (10.1 percent)
- Hubbard County (for 2000) – educational, health care, and social assistance (23.6 percent); retail trade (13.0 percent); and manufacturing (12.2 percent) (MnDEED, 2009).

The top three employment sectors for the State included educational services, health care, and social assistance; manufacturing; and retail trade.

Many people derive economic benefit from the natural resources of the Study Area. For some people the primary employment is in natural resource based industries, as shown in Table 3.11-4. Table 3.11-4 also shows a higher percentage of the population on the LLR and in the counties comprising the Study Area to be self-employed workers.

Mammals, waterfowl, fish, boughs, berries, and wild rice, fishing are present within the Study Area, and are used by residents and visitors to the Study Area for cultural, recreational, and economic purposes. Recreational use of these resources is discussed in Section 4.13, traditional and cultural use of these resources is discussed in Sections 4.9 and 4.12.

Leech Lake Reservation

Within the LLR, 60.0 percent of the total population, aged 16 years and older, is within the labor force. Of the population within the labor force, 56.7 percent are female. While the overall unemployment rate on LLR is 6.4 percent, 10.7 percent of the civilian labor force within the LLR was unemployed (USCB, 2000cc).

Within the LLR, 27.1 percent of the population 16 years old and older worked within a management/professional occupation, while 23.2 percent worked within service occupations and 22.8 percent of the population worked within sales and office occupations. In addition, 13.1 percent worked in construction; 12.2 percent worked within production, transportation, and material moving occupations; and 1.5 percent worked in farming, fishing, and forestry (USCB, 2000dd). These numbers represent aggregates of the various employment industries. Additional information is presented in Table 3.11-4.

3.11.1.4. Income Characteristics

Table 3.11-5 provides 2000 income information for the Study Area counties and for selected cities in the Study Area; 2008 income information is also provided for counties, but is not available at the city level.

As shown in Table 3.11-5, the 2008 per capita income ranged from a total of $21,582 in Beltrami County to $27,984 in Hubbard County. The per capita income in all four counties was less than the State of Minnesota per capita income of $30,090 (MnOSD, 2009).

Leech Lake Reservation

Based upon available information, the 2000 median household income in the LLR was $28,137, median family income was $31,275, and per capita income was $13,103 (USCB, 2000ee). The median household income level was less than half that of the state level of $47,111 (USCB, 2000z). Information for the year 2007 was not available.

In addition to the reported income for LLR households, members fo the LLBO participate in subsistence activities and rely on the harvests of a variety of subsistence resources to supplement their diet and resources throughout the year. Subsistence is not only a source of food to these rural residents, it also holds cultural and historic significance for LLBO members who retain treaty rights for hunting and gathering activities on the LLR.

Table 3.11-5: Select Income Characteristics within the Project Area, 2000 and (2008)

Income Characteristics	Beltrami County			Cass County		Itasca County			Hubbard County	Leech Lake Reservation	State of Minnesota
	Bemidji City	Blackduck City	Beltrami County	Cass Lake City	Cass County	Deer River City	Cohasset City	Itasca County			
Percent of Individuals Below the Poverty Level	13.2% (du)	16.9% (du)	17.6% (16.2%)	29.0% (du)	13.6% (12.7%)	17.3% (du)	5.6% (du)	10.6% (11.5%)	9.7% (du)	21.7% (du)	7.9% (9.7%)
Median Household Income	$28,072 (du)	$21,848 (du)	$33,392 ($45,597)	$20,583 (du)	$34,332 ($41,204)	$21,900 (du)	$44,054 (du)	$36,234 ($43,965)	$35,321 ($42,231)	$28,137 (du)	$47,111 ($57,795)
Per Capita Income	$15,264 (du)	$12,536 (du)	$15,497 ($21,582)	$9,569 (du)	$17,189 ($24,268)	$13,078 (du)	$21,071 (du)	$17,717 ($3,317)	$18,115 ($27,984)	$13,103 (du)	$23,198 ($30,090)
Mean Household Income	$34,798 (du)	$28,664 (du)	$40,897 ($57,004)	$26,213 (du)	$41,609 ($55, 310)	$34,176 (du)	$52,075 (du)	$43,770 ($53, 393)	$42,253 (du)	$37,294 (du)	$59,189 (74, 304)

Note: (du) = data unavailable for 2008
Sources: U.S. Census Bureau, 2000 and MnOSD, 2009

3.11.2. Direct/Indirect Effects

This section provides a discussion about the potential direct and indirect impacts to the No-Build Alternative, the three Route Alternatives, the LLR, and the CNF on socioeconomic resources.

Potential direct and indirect impacts to socio-economic resources include the following:

- Loss of natural resources or access to them, including timber and water access
- Changes to subsistence-based economies including impacts created by construction and operation (both direct and indirect due to changes in habitat acreage and quality)
- Changes to local and regional economies, including impacts created by construction personnel (direct) and improved electric reliability (indirect)
- Impacts to the local tax base
- Impacts to property values
- Impacts to homes

This evaluation first addresses the direct and indirect impacts general to all of the Route Alternatives. Many of the potential socioeconomic impacts are not specific to any one Route Alternative, as both short- and long-term effects would be felt by the all of the populations located along the Project Route Alternatives. However, as Route Alternative 3 incorporates an overall larger route, some impacts may be more noticeable and severe due to the number of properties involved in its development. For example, Route Alternative 3 impacts more acreage of forested lands than the other Route Alternatives.

In general, socioeconomic analyses focus on changes to demographics, including population, housing, and income; changes to local and regional economies; and changes to the aesthetic quality of communities. Where information is available, specific details are provided for individual Route Alternatives. Consequently, the discussion of the general impacts is followed by an evaluation of each route alternative, impacts within the CNF, and effects within the LLR.

Natural Resource-Based Economies

One of the primary activities affected by the construction of the Route Alternatives would be timber harvesting. This would be a result of the permanent removal of forest land. As indicated in Section 3.15, Forestry, the Project would require clearing of some forest land, approximately 439 to 813 acres depending on the Route Alternative selected (Table 3.15-3, Forest Impacts within the 125-foot right-of-way (ROW)). As expected, Route Alternative 3 impacts the greatest amount of forested land, in part due to its overall length.

Regardless of ownership (i.e., public and private), the opportunity to harvest timber likely exists within most forestlands in the Route Alternatives. Timber removed within the ROW would be offered to the landowner, made available for local residents, or removed (Otter Tail Power et al., 2008a).

Indirect impacts associated with the loss of timber production may include a minimal loss or gain of work for those employed in the timber industry due to the amount of timber being processed. For example, additional jobs may be created in the forest products industry due to the removal of forestland for timber in the short-term, while jobs may be lost in the long-term if these resources are removed. Impacts to forestland and the estimated revenues from timber production are discussed in detail in Section 3.15, Forestry.

In addition to subsistence uses discussed in the following subsection, members of the Leech Lake Band of Ojibwe (LLBO) also participate in other commercial activities associated with the procurement of natural resources. These activities include timber harvesting, commercial rough fish and bait harvesting, commercial gill netting, wild rice harvesting, hunting, and bough harvesting (LLBO, 2009c). The potential to impact these catchment areas varies per Route Alternative.

As shown in Section 3.15, Forestry, based on the evaluation of a feasible 125-foot ROW within each Route Alternative, Route Alternative 1 would impact 579 total acres of forested area; Route Alternative 2 would impact 439 acres; and Route Alternative 3 would impact 813 acres. The direct loss of forested lands would involve the removal of trees on a permanent basis, as the land would not be returned to a forested setting. Therefore, the loss of forest land may impact hunting and bough harvesting activities. Indirect impacts associated with the loss of these areas may include both a minimal gain and loss of work for members of the LLBO participating in these activities. There may be an initial increase in sales resulting from the removal of the resources, while in the long-term if trees are not replanted, a loss of resources would be experienced.

With regard to water resources, Route Alternative 3 crosses 27 water courses, as compared to six for Route Alternative 1 and seven for Route Alternative 2. In addition, Route Alternative 3 crosses nine water basins, while Route Alternative 1 crosses only four and Route Alternative 2 only two. As discussed in Section 3.4.2, the Project has been designed to span surface water bodies to avoid placement of structures within these water bodies. Impacts to the procurement of fish may occur if water access points are blocked, either temporarily during construction, or long-term during operation of the Project. These crossings may impact the procurement of fish for commercial industries. Similar to the impacts resulting from the removal of forest, indirect impacts associated with access to a water resource may include a minimal loss of work for members of the LLBO participating in these activities. If impacts to water access points are not avoided, impacts associated with Route Alternative 3 may be more substantial than Route Alternatives 1 and 2, since more water courses and basins would be impacted by the construction of this Route Alternative.

Impacts to subsistence activities, such as hunting and gathering, are discussed in detail in Section 3.12, Environmental Justice.

Subsistence-Based Economies

This section considers the effects of the alternatives on subsistence uses in the study area. Subsistence activities include hunting and trapping, fishing, and the gathering of vegetation and berries primarily as a source of food, for medicinal purposes, for ceremonial activities, and for personal sale as an additional source of income, rather than as a recreational activity. Natural resources help ensure that people are able to heat their homes, to buy food, and to purchase other goods for their families. Within the LLR, approximately 10.7 percent of the population 16 years and over were unemployed (USCB, 2000ee). As such, natural resource procurement assists the LLR population. To the extent that this information was readily available from the Leech Lake Band and publicly-available sources, it is described below.

LLBO members participate in subsistence activities and rely on the harvests of a variety of subsistence resources to supplement their diet and resources throughout the year. Subsistence is not only a source of food to LLBO members but replaces in part necessities otherwise requiring additional cash income to acquire. In addition, the subsistence activities hold cultural and historic significance for LLBO members.

Negative impacts to subsistence-based economies may occur from the construction, operation, and maintenance of the Project as a result of loss of acreage for subsistence activities, fragmentation of habitat, and introduction/spread of invasive species due to increased disturbance/new corridors. These impacts would primarily be limited to projects located on the LLR where LLBO tribal members have hunting and gathering rights. The area of the current Leech Lake reservation was established in 1855 as the homeland for the LLBO. The Ten Section Area was established within this reservation under the Morris Act (1902) to protect the few remaining old growth red and white pines. Given the ever increasing pressure on limited natural resources experienced within the study area within the last 100 years, it is likely that this reserve is perhaps even more important to the LLBO today than when it was first established. According to the CNF, "*the old-growth forests of the Ten Section Area and the nearby northern hardwood forests of the Guthrie Till Plain/Cuba Hill Area include some of the most culturally important areas on the reservation for LLBO members to practice their traditional activities*."(NPS, 2000) The aforementioned Ten Section Area and Guthrie Till Plain/Cuba Hill Area are crossed by Routes 1 and 2, however Route 2 crosses the areas at less LLBO valued locations for subsistence activities.

The potential impacts to subsistence uses varies per Route Alternative. The aforementioned Ten Section Area and Guthrie Till Plain/Cuba Hill Area are crossed by Routes 1 and 2, however Route 2 crosses the areas at locations less valued by the LLBO for subsistence activities. The greatest impacts to subsistence activities are associated with Route 1, a lesser impact associated with Route 2 and minimal affect associated with Route 3 (LLBO, 2010).

Impacts to subsistence-based economies will be further assessed by LLR and the federal Cooperating Agencies for inclusion in the Final EIS.

Impacts to subsistence activities, are also addressed in Section 3.12, Environmental Justice.

Impacts to Local and Regional Economies

The construction of transmission lines can generate a significant economic contribution to the economy in the regions where the lines are constructed. Projects of this nature create and support jobs, generate significant tax revenue, and produce total economic impacts well in excess of the costs used for constructing the transmission lines (NorthStar, Inc., 2009).

Impacts to local and regional economies can be assessed using a variety of economic modeling programs. A common approach is to utilize a set of multipliers, consisting of labor, income, and total output. The use of multipliers is a standard way to identify the potential effects of a major change in a region's economy. These measures estimate the changes in labor, income, and output resulting from an initial change in spending (Coughlin and Mandelbaum, 1991).

A labor multiplier is used to understand the number of regional jobs a particular economic change is expected to generate or eliminate. Most employment multipliers are estimated in terms of jobs rather than "full-time equivalent" employees (Coughlin and Mandelbaum, 1991). Employment multipliers can vary depending on the type of industry involved.

The second type of multiplier is an income multiplier. Income multipliers translate the effects of changes in final demand into changes in household income (Coughlin and Mandelbaum, 1991). Based on an article by Robert O. Coppedge (2003), an economic development specialist, acceptable income multipliers should not exceed 2. For the most part, at the state level, income multiplier estimates should fall between 1 and 2 (Coppedge, 2003).

The final type of multiplier is an output multiplier, which for a given sector is the total value of sales by all sectors of the regional economy necessary to satisfy a dollar's worth of final demand for that sector's output (Coughlin and Mandelbaum, 1991).

In order to determine the appropriate multipliers for this evaluation, a literature review was conducted. This review provided a set of case studies for transmission lines and generating facilities throughout the country in which labor, income, and output multipliers were used. The results of this review are summarized as follows:

- **Femrite-Sprecher Line in Dane County, Wisconsin -** In a case study of the Femrite-Sprecher Line in Dane County, Wisconsin, a weighted overall multiplier of 1.525824 was used to determine the overall economic impact of a transmission line. This means that approximately 52.6 cents was generated indirectly for every dollar directly spent (NorthStar, Inc., 2009).
- **Arrowhead-Weston Line located in Minnesota and Wisconsin -** The weighted overall multiplier was 1.415912, which resulted in approximately 41.6 cents in indirect and inducted economic benefits for every dollar directly spent (NorthStar, Inc., 2009).
- **Mesaba Energy Project located in Minnesota -** For the Mesaba Energy Project, which includes the counties of Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis, the IMPLAN model was utilized to generate the secondary (indirect and induced) economic and job multiplier benefits of the Mesaba Project for both the Arrowhead Region and the State of Minnesota. Income multipliers were not utilized for this

evaluation. The construction regional output multiplier of approximately 1.5 was used. The operation regional output multiplier was 1.2. These multipliers accounted for direct impacts associated with the Mesaba Energy Project. The multiplier was calculated using the total output generated, which included direct, indirect, and induced costs, divided by the direct costs associated with the Project (Excelsior Energy Inc., 2006). Using the same logic shown to determine the overall multiplier for labor as for output, the construction regional labor multiplier of approximately 1.6 was used for the years 2007 through 2010. In the last year of construction, the multiplier was reduced to 1.1. The operation regional labor multiplier was 3.7 for a typical year of the operation. If the induced jobs were removed from consideration during operation, the multiplier would be reduced to 1.5.

- **San Francisco Electric Reliability Project Power Plant Licensing Case -** For the socio-economic evaluation of the San Francisco Project, indirect and induced economic impacts from construction and operation were evaluated. The multipliers were derived from the Type Social Accounting Matrix (SAM) model. The employment multiplier associated with the construction phase of the project was 1.4. The construction phase income multiplier was estimated at 1.2. For operations, the employment multiplier was 1.4, and the income multiplier was 2.0 (CEC, 2006). Output multipliers were not utilized for this analysis.

The multipliers from each of these case studies are summarized in Table 3.11-6, Case Study Multipliers.

Table 3.11-6: Case Study Multipliers

	Construction			Operation		
Case Study	**Labor[1]**	**Income[2]**	**Output[3]**	**Labor[4]**	**Income[5]**	**Output[6]**
Femrite-Sprecher Line	-	-	1.525824	-	-	-
Arrowhead-Weston Line	-	-	1.415912	-	-	-
Mesaba Energy Project	1.6	-	1.5	3.7	-	1.2
San Francisco Electric Reliability Project Power Plant	1.4	1.2	-	1.4	2.0	-
Multiplier to be Used for this Analysis	1.5	1.2	1.5	2.6	2.0	1,2

Notes:

1. The multiplier to be used for this analysis was derived by taking the midpoint between the two multipliers provided in the case studies.
2. The multiplier to be used for this analysis was derived from the only available multiplier found within the research of the case studies.
3. The multiplier to be used for this analysis was derived from the mode of the available multipliers.
4. The multiplier to be used for this analysis was derived by taking the midpoint between the two multipliers provided in the case studies.

5. The multiplier to be used for this analysis was derived from the only available multiplier found within the research of the case studies.
6. The multiplier to be used for this analysis was derived from the only available multiplier found within the research of the case studies.

As indicated in Section 2.4, Construction and Workforce, the Project would require approximately 75 temporary full-time employees to construct the transmission line and additional workers would be required for the substation modifications (see Table 3.11-7). In the event of unanticipated delays prior to commencement of construction, additional construction personnel may be required to meet an accelerated schedule to get the Project online by the end of 2011. These construction jobs generally would not create new long-term jobs in the Study Area due to the small size of the labor force. Opportunities for part-time personnel also may be available during the construction of the Project, including jobs associated both directly and indirectly with the Project. As shown in Table 3.11-7, indirect jobs generated from the Project would include approximately 112.5 jobs for each of the Route Alternatives. The overall impact of these jobs would be minimal within the four county region incorporated by the overall Project.

To the extent that local contractors are used for portions of the construction, total direct wages and salaries paid to contractors and workers in surrounding counties would contribute to the total personal income of the region. These construction jobs would provide a short-term influx of income to the area. As indicated in Table 3.11-7, approximately $3.8 million dollars would be generated by the construction of the Route Alternatives. This amount would create minimal socio-economic impacts to the overall region consisting of the four counties.

Construction expenditures made for equipment, energy, fuel, operating supplies, and other products and services would benefit businesses in the local communities. Additional personal income would be generated for residents in the region and the State by circulation and recirculation of dollars paid out by the Applicants as business expenditures and State and local taxes.

Short-term indirect positive economic impacts would result from these construction activities. Revenue likely would increase for some local businesses, such as hotels, restaurants, gas stations, and grocery stores, due to increased spending from workers associated with construction of the Project. The revenue generated would vary between $81.6 and $86.85 million for construction. This amount would create minimal socio-economic impacts to the overall region consisting of the four counties over the construction and operation of the transmission lines.

Table 3.11-7: Construction and Operation Workers and Expenditures

Activity	Number of Workers, Income, or Cost	Multiplier	Total
Construction of Route Alternative 1			
Employment	75	1.5	112.5
Income[1]	$3,144,825	1.2	$3,773,790
Total Output[2]	$62,600,000	1.5	$93,900,000
Construction of Route Alternative 2			
Employment	75	1.5	112.5
Income[1]	$3,144,825	1.2	$3,773,790
Total Output[2]	$65,600,000	1.5	$98,400,000
Construction of Route Alternative 3			
Employment	75	1.5	112.5
Income[1]	$3,144,825	1.2	$3,773,790
Total Output[2]	$99,100,000	1.5	$148,650,000
Operation of Route Alternative 1			
Employment	N/A	2.6	N/A
Income	N/A	2.0	N/A
Total Output[2]	$30,000	1.2	$36,000
Operation of Route Alternative 2			
Employment	N/A	2.6	N/A
Income	N/A	2.0	N/A
Total Output[2]	$30,000	1.2	$36,000
Operation of Route Alternative 3			
Employment	N/A	2.6	N/A
Income	N/A	2.0	N/A
Total Output[2]	$30,000	1.2	$36,000

Notes: N/A = Not available.

1. Income was determined by taking the midpoint of the mean household incomes for each of the four counties ($41,931) and multiplied by the total number of workers (i.e., 75).
2. Total output was based on the value of the construction or the annual maintenance cost as described in Section 2.2 (construction cost) or the Route Permit Application (Otter Tail Power et al., 2008).

In general, increasing transmission capacity and reliability would be an economic benefit to the surrounding communities and businesses. Additional capacity would not only provide electricity for economic growth from new or enlarged industry and businesses, it would help to assure that income was not lost as a result of a potential brownout or temporary blackout of power from severe weather events. This could have a long-term positive economic impact to the Study Area. The availability of reliable power also could have a positive effect on the quality of services provided to the public. An additional benefit would include an increase to the each county's tax base, resulting in an incremental increase in revenue from utility property taxes.

The Project would not directly impact any businesses and is not expected to have negative economic impacts. The operation and maintenance of the transmission line would not negatively impact the socioeconomic resources related to industry in the four-county area. As shown in Table 3.11-7, while minimal, the operation of the facility would generate some revenue ($36,000) to the local areas contained within the Route Alternatives. Impacts associated with labor and income were not evaluated.

Impacts to community resources (hospitals, public safety, etc.) are discussed in Section 3.17, Community Services.

Impacts to Local Taxes

Within the State of Minnesota, each county calculates its assessed property taxes based on the various rates set for the applicable year, the assessed values received from the State of Minnesota, and the assessor's office of each county. For example, the property taxes billed in 2009 were based on assessed values of property owned as of January 1, 2008 (Lindholm, 2010).

The Minnesota property tax formula varies depending on classification of property. In general, the formula is as follows:

Assessed Property Tax = Market Value X State Class Rate = Tax Capacity Value X Tax Capacity Rates
Plus
Tax Capacity Value X State General Tax Levy (if applicable)
Plus
Market Value X School Market Value Rate
Plus
Special Assessments (Lindholm, 2010)

Within this formula, the market value consists of the assessed market value for utility machinery, structures and other personal property, which is determined by the Minnesota Department of Revenue pursuant to Minnesota Rule 8100. The assessed market value for land and locally assessed structures is determined by county assessors (Lindholm, 2010).

The State of Minnesota sets the State Class Rate for the various classes of property and notifies the counties. In addition, tax capacity rates and school market value rates are determined annually by each individual taxing district (i.e., county, city or township, school district, and special taxing districts). These rates can fluctuate from year to year depending upon the taxing district's needs and the market value available for taxation. The tax capacity rates are used to calculate the portion of the taxes that are for each taxing district. A state general tax levy (Business Tax Rate) set by the State also is applied to applicable property and is included in the total tax due on the individual statements (Lindholm, 2010).

The total tax amount on each individual statement, including special assessments, is paid to the county. The county then allocates the tax amount paid to the state, county, city or township, schools, and the special taxing districts based on the rates billed and any special assessment applied. Certain transmission and distribution lines are subject to taxation at a countywide average rate. Taxes collected by the county based on the countywide average rate are allocated 50 percent to the county general fund and 50 percent to the general school fund (Lindholm, 2010).

The estimated property taxes for the transmission line, based on construction costs as detailed in Section 2.2 , and using a tax capacity rate averaged over the four counties in the Study Area, are shown in Table 3.11-8, Estimated Property Tax.

Table 3.11-8: Estimated Property Tax as of January 2010

	Variable	Route Alternative 1	Route Alternative 2	Route Alternative 3
Market Value	A	62,600,000	65,600,000	99,100,000
State Assessment Rate – Pay 2009	B			
Tax Capacity Value	C = A X B	1,252,000	1,312,000	1,982,000
State Business Tax Rate – Pay 2009 (45.535 %)	D			
Estimated State Taxes	E = C X D	$570,100	$597,400	$902,500
County Tax Capacity Rate – Pay 2009 (76.3%)[1]	F			
Estimated County Taxes	G =CxF	$955,300	.$1,001,100	$1,512,300
Total Estimated Property Taxes	H = E + G	$1,525,400	$1,598,400	$2,414,800
Estimated Property Taxes as a Percentage of Original Installation Cost (OIC)	I = H/A	2.44 %	2.44 %	2.44%

Note: 1 Represents an average tax capacity rate of the four counties in the study area: Beltrami (101.923 %), Cass (53.503 %), Hubbard (64.127 %), and Itasca (85.65 %) (Lindholm, 2010)

The value and location of assets is needed to estimate the local impact. Due to the limited information available at this time, the estimated impact to the various local taxing districts is not determinable.

Total estimated property taxes would range from approximately $1,5 million for Route Alternative 1, $1.6 million for Route Alternative 2, and $2.4 million for Route Alternative 3. This amount would have a minimal, although positive, impact on the overall four county area in which the transmission line would be located.

Impacts to Property Values

One concern of residents living near existing or proposed transmission lines is how proximity to the line could affect the value of their property. Research on this issue does not identify a clear cause and effect relationship between the two variables. Instead, the presence of a transmission line becomes one of several factors that interact to affect the value of a particular property. The impacts on residential property values do not appear to be significantly different within various land use types (i.e., agricultural versus suburban or urban) – or at least any difference is too subtle for current research to detect. Therefore, property value impacts appear to be similar for any of Route Alternatives or Segment Alternatives evaluated in this document. A discussion of property values is provided below.

Property Value Concerns

In general there are three primary concerns raised regarding the potential impact of a nearby high-voltage transmission line on property value:

- **Concern or fear of possible health effects from electric or magnetic fields:** While no conclusive evidence of the effects of EMF on health exists, it is recognized that people's concerns about this issue can influence their decisions related to purchase of property. EMF effects are addressed in Section 3.20, Safety and Health, in this document.
- **The potential noise and visual unattractiveness of the transmission line:** The visual profile of transmission line structures and wires may decrease the perceived aesthetic quality of property. The transmission facility would not generate noise above the state noise standards, and is not considered an issue.
- **Potential interference with farming operations or foreclosure of present or future land uses:** On properties that are farmed, installation of a transmission line can remove land from production, interfere with operation of equipment, create safety hazards, and foreclose the opportunity to consolidate farmlands or develop the land for another use.

Property Value Research

The relationship between transmission lines and property values is complicated by a variety of factors including variability over time and across different areas of the world, variability due to different land uses, and limited sale data for similar properties before and after installation of a transmission line. Because of these complexities, real estate appraisers, utility consultants, and academic researchers have studied the issue of how to assess the impacts of transmission lines on property values since the 1950s. A summary of these study types is provided in Table 3.11-9.

Table 3.11-9: Property Value Study Types

Study Type	Description	Pros	Cons
Attitudinal Studies	Surveys to assess perceptions about property value impacts.	One of the first techniques used to study property value impacts from transmission lines.	Substantial differences may exist between people's perceptions about how they would behave and their actual behavior when confronted with the purchase of property.
Valuation Studies	Comparison of sales prices for properties that are similar, except for proximity to a power line.	Avoids uncertainties related to personal perception of value.	Value judgment involved in choosing similar pairs; limitations in the number of adequately similar property pairs.
Statistical Analysis	Evaluation of large sample sizes and a high number of variables using multiple regression analysis.	Better ability to account for numerous variables that affect sales. Provide the best information to date on the effects of transmission lines on property values.	Applicability of study results to specific properties and specific areas depends on the characteristics of the sample

Potential impacts related to the marketability of a property include factors such as sale price, the amount of time required to sell, and the debt carried over this time. The types of studies done to assess changes in sale price of property containing a transmission line have evolved over time.

For example, between 1978 and 1982, Jensen and Weber and the Jensen Management Company conducted three studies in west-central Minnesota. The studies in 1978 and 1982 are of particular interest because they consider effects to agricultural land. The 1978 study found that the landowners cited an inconvenience from the presence of the line, but had not paid less for their land. The 1982 study, however, found that there was a broad range of effect, from no effect to a 20 percent reduction, which depended on the amount of disruption to farm operations (Kroll and Priestly, 1992).

In the mid-1990s, Northern States Power hired a real estate appraisal group to collect market-substantiated information about the impact attributable to the imposition of transmission line easements on residential property values in suburban and undeveloped areas near Eau Claire and La Crosse, Wisconsin. The Solum Group examined 200 residential property transactions adjacent to or in close proximity to high voltage electric transmission lines in urban, suburban, and rural areas of western Wisconsin. The selection process used in his study concentrated primarily on upper-price-level residences and vacant lots ready for construction on the assumption that these properties would be most sensitive to potential negative influences. The report asserted that the very minor positive and negative impact results observed indicate that there is virtually no impact present that is attributable to the presence of a transmission line encumbrance on residential properties (Solum, 1985).

In 1996, a separate study of the impact of overhead high voltage transmission lines on residential property values in Seattle and Vancouver found little impact (Cowger et al., 1996). The literature review completed for that study also indicated the following:

- Overhead transmission lines can reduce the value of residential and agricultural property. The impact is usually small (0 through 10 percent) for single-family residential properties.
- Other factors such as location, improvements, and lot size are more likely to be major determinants of sale price.
- Impacts on sales are most likely to occur on property crossed or immediately adjacent to the lines.
- In areas where the ROW has been landscaped or developed for recreational use, positive impacts have been measured.
- Impacts may be greater for small properties than for larger properties.
- Impacts are more pronounced immediately after construction of a new line and diminish over time.

The Public Service Commission of Wisconsin addressed the issue of changes in property value associated with high voltage transmission lines in their Final Environmental Impact Statement for the Arrowhead – Weston Electric Transmission Line Project. Their analysis of the relationship between property values and transmission lines looked at approximately 30 papers, articles, and court cases covering the period from 1987 through 1999 (PSCW, 2000).

The Wisconsin analysis identified two types of property value impacts that property owners may experience, which included potential economic impacts associated with the amount paid by a utility for a ROW easement and potential economic impacts regarding the future marketability of the property. The first type of property value typically refers to the "market price of the land with and without the encumbrance of the line" (PSCW, 2000). The second refers to sale price, the amount of time required to sell a property, and the debt amount carried over that time (PSCW, 2000).

The Final EIS provides six general observations from the studies evaluated by its authors, including the following:

- A potential reduction in sale price for single family homes may range from 0 to 14 percent.
- Adverse effects on the sale price of smaller properties could be greater than effects on the sale price of larger properties.
- Other amenities, such as proximity to schools or jobs, lot size, square footage of a house, and neighborhood characteristics, often have a much greater effect on sale price than the presence of a power line.
- Adverse effects created by the presence of a transmission line appear to diminish over time.

- Effects on the sale price of property most often are observed for property crossed by or immediately adjacent to a transmission line. However, effects also have been observed for properties that are located farther away from the line.
- The value of agricultural property is likely to decrease if the transmission line poles are placed in an area that inhibits farm operations (PSCW, 2000).

The EIS reported that in Midwest states, such as Minnesota, Wisconsin, and the Upper Peninsula of Michigan, the average decrease appears to be between 4 and 7 percent. The authors of that EIS concluded: "It is difficult to make predictions about how a specific transmission lie would affect the value of specific properties."

Due to the variables required for an analysis of the potential affect of the Project on property values, impacts to property values are not evaluated individually by Route Alternative.

Impacts to Homes

Short-term impacts to residents, local business owners, and customers in the Study Area primarily would be related to disruption caused by temporary construction activities. Transportation impacts related to construction activities are discussed in Section 3.19, Traffic and Transportation, and noise impacts are discussed in Section 3.21, Noise.

Long-term impacts may include displacement of residences or businesses due to location within the Project ROW.

The National Electric Safety Code (NESC) requires certain clearances between transmission line facilities and buildings for safe operation of the transmission line. The applicants would acquire ROWS for each project sufficient to maintain clearances required to safely operate the transmission lines.

In the event that a structure is located within the ROW required for a new transmission facility, that structure would be displaced; meaning the property would need to be purchased by the utility and removed from the area. As shown in Table 3.11-10, the potential for displacement varies by Route Alternative and Segment Alternative. The house counts proviced in Table 3.11-10 are provided as a way to compare each Route or Segment Alternative's potential to displace homes; in practice the routing of transmission lines in Minnesota rarely results in displacement of residences.

As indicated in Table 3.11-10, Route Alternative 3 would be located in proximity to more residences than Alternative Routes 1 and 2. This most likely is due to the length of this route as compared to the other Route Alternatives. As expected, the greatest number of residences affected would be located within a distance of 500 -1000 feet. The preferred location of the transmission lines is away from residential properties, thus as expected, fewer residences would be located within 0 to 62.5 feet.

Table 3.11-10: Number of Residences – Distances from the Feasible Right-of-Way Center Line

Route and Segment Alternatives	Entire				CNF Owned Lands				Lands within LLR Boundary			
	Distance from Evaluated Feasible Center Line				Distance from Evaluated Feasible Center Line				Distance from Evaluated Feasible Center Line			
	0-62.5’ (Feasible 125' ROW)	62.5-200’	200-500’	500-1000’	0-62.5’ (Feasible 125' ROW)	62.5-200’	200-500’	500-1000’	0-62.5’ (Feasible 125' ROW)	62.5-200’	200-500’	500-1000’
Route Alternatives												
1	3	23	86	92	0	0	1	0	0	8	19	19
2	15	54	227	269	0	0	2	0	9	27	79	104
3	25	102	357	444	3	24	63	20	0	0	0	0
Segment Alternatives												
A	2	13	52	49	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
B	1	0	0	0	0	0	0	0	1	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	1	0	0	0	0	0	0	0	0	0
E	2	8	34	23	1	8	25	20	2	8	24	19
F	0	3	14	33	0	0	3	10	0	0	14	33
G	0	4	23	29	0	0	0	0	0	0	0	0
H	1	7	18	11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
I	1	3	6	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
J	0	0	0	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
K	0	0	5	6	N/A	N/A	N/A	N/A	0	0	2	3
L	0	0	1	3	N/A	N/A	N/A	N/A	0	0	1	3
M	0	0	2	1	N/A	N/A	N/A	N/A	0	0	2	1
N	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0
P	1	2	9	20	1	2	9	20	1	2	9	20

Q	0	0	0	0	N/A	N/A	N/A	N/A	0	0	0	0
R	0	3	4	3	0	1	1	1	N/A	N/A	N/A	N/A
S	1	0	4	4	0	1	1	0	N/A	N/A	N/A	N/A
T	0	5	5	3	0	1	2	0	N/A	N/A	N/A	N/A

Note: N/A = not applicable

Federal, state, and local regulations dictate property acquisition requirements. Affected landowners would be compensated for their property at fair market value. Additionally, Minnesota Statute 216E.12, subd. 4 (sometimes referred to as the "buy the farm" provision) allows landowners of certain classes of land (e.g., homestead, agricultural, or seasonal residential recreational, as defined in Minnesota Statute 273.13) the option of requiring the Applicants to purchase the owner's entire property if the transmission line crosses a portion of the property.

3.11.2.1. No-Build Alternative

The No-Build Alternative would not directly impact existing socioeconomic conditions in the Study Area. This alternative would not result in the displacement of homes and businesses, because it would allow the existing conditions to remain as they currently are. No loss of land use would result because land would not be utilized for the transmission line under the No-Build Alternative. This alternative would not entail any compensation to local landowners because no land would be taken for use by the Project. Impacts to local economies from construction personnel would not occur within the ROC.

Indirect impacts from this alternative are related to reliability of electric service. As discussed in Section 2, this alternative would not provide a long-term remedy to regional electric reliability. Therefore, local and regional communities would not benefit from the improved electric reliability anticipated from this Project, and may experience a loss of reliable electric power, either through blackouts or interruptions in power quality.

3.11.2.2. Route Alternative 1

As indicated in Section 3.11.2, Route Alternative 1 would impact approximately 579 acres of forest land, and cross six water courses and four water basins. The loss of natural resources in these areas would have a minimal impact on commercial activities associated with the procurement of forest and water products, including, but not limited to timber and fish. In the short-term, revenue and jobs may be generated when resources are removed from the Route Alternative; while in the long-term, losses may be experienced if these resources are not replenished. The gain or loss is anticipated to be minimal as compared to the entire Project area. Localized impacts may be more substantial and felt at a more individual level.

As discussed in the Subsistence-Based Economies heading of Section 3.11.2 Route 1 would result in the greatest impacts to subsistence-based economies. LLBO members participate in subsistence activities and rely on the harvests of a variety of subsistence resources to supplement their diet and resources throughout the year. Subsistence is not only a source of food to LLBO members but replaces in part necessities otherwise requiring additional cash income to acquire. Route 1 crosses highly valued areas of the

LLR utilized for traditional gathering and subsistence activities. Negative impacts to subsistence-based economies may occur from the construction, operation, and maintenance of the Project as a result of loss of acreage for subsistence activities, fragmentation of habitat, and introduction/spread of invasive species due to increased disturbance/new corridors. These impacts would primarily be limited to projects located on the LLR where LLBO tribal members have hunting and gathering rights. Impacts to subsistence-based economies will be further assessed by LLR and the federal Cooperating Agencies for inclusion in the Final EIS.

As shown in Table 3.11-7, impacts to the local economy also are anticipated to be minimal. Like the other two Route Alternatives, 75 direct jobs would be created by the construction of the transmission lines. This potentially could create 112.5 jobs within the overall Project area. This amount is minimal in terms of all available jobs within the four counties. Likewise, an increase in income is anticipated to yield approximately $3.77 million dollars. With regard to the entire region, this impact would be minimal. In addition, not all of these dollars would be returned to the region, as people potentially can spend earnings anywhere within the state of Minnesota or elsewhere. The anticipated output is $81.6 million dollars. This is less than that expected from Route Alternative 2. However, this amount also is not anticipated to create substantial impacts, as the revenue generated from equipment and materials could be spent outside the immediate region. Short-term minimal impacts are anticipated to occur, as some revenue would be returned to the local areas in which the Route Alternative would pass either from construction workers or expenditures associated with the Project.

With regard to the local tax base, monies would be divided depending on the percentage of the transmission line being located within each county. The total estimated property taxes would amount to approximately $1.5 million, based on the estimated capital costs. In terms of individual properties, impacts to property values were not evaluated individually by Route Alternative.

Route Alternative 1 contains the fewest number of homes within or near a feasible 125-foot ROW evaluated. The majority of these homes (all of the three homes within the feasible 125-foot ROW and up to 23 of the homes up to 200 feet either side of the feasible ROW evaluated,) occur in a few locations on the western portion of the Route Alternative: In Beltrami County, south of 16th Street SW, where the ROW would rejoin the Great Lakes Pipeline; in Hubbard County and near County Highway 36 in Helga Township, near 309th Avenue in Farden Township, and again near 323rd Avenue also in Farden Township. While property values may be impacted by the distance between the property and transmission line, the number of homes cannot be used to evaluate this type of impact.

The following segments associated with this Route Alternative also contain homes either within the feasible 125-foot ROW evaluated or outside of the ROW evaluated, but within 200 feet of the evaluated center line:

- Segment Alternative A, a 15.7-mile segment following an existing 115 kV transmission line to the south of Bemidji, contains up to two residences within the feasible 125-foot ROW evaluated and has 13 homes within 200 feet of the identified feasible center line.
- Segment Alternative B, a 10.5-mile segment that avoids the Ten Section area and Pike Bay Experimental Forest, contains one home within the feasible 125-foot ROW evaluated.
- Segment Alternative P, a 0.4-mile segment connecting Route Alternatives 1 and 2 near Ball Club, has one home outside of the ROW evaluated, but within 200 feet of the identified feasible center line.

All build alternatives would improve electric power reliability in the Study Area. In addition, Route Alternatives 1 and 2 would improve the transmission infrastructure in the Cass Lake area because those Route Alternatives would include construction of a new substation or modification of an existing substation near the city of Cass Lake.

3.11.2.3. Route Alternative 2

As indicated in Section 3.15, Forestry, Route Alternative 2 would impact the least amount of forested land, approximately 439 acres, as compared to the other two Route Alternatives. In addition, this Route Alternative would cross seven water courses and two water basins.

Similar to Route Alternative 1, the loss of natural resources in these areas would have a minimal impact on commercial activities associated with the procurement of forest and water products, including, but not limited to timber and fish. In the short-term, revenue and jobs may be generated when resources are removed from the Route Alternative; while in the long-term, losses may be experienced if these resources are not replenished. The gain or loss is anticipated to be minimal as compared to the entire Project area. Localized impacts may be more substantial and felt at a more individual level.

As discussed in Section 1.1.2 Subsistence Based Economies, Route 2 would result in negative impacts to subsistence-based economies. LLBO members participate in subsistence activities and rely on the harvests of a variety of subsistence resources to supplement their diet and resources throughout the year. Subsistence is not only a source of food to LLBO members but replaces in part necessities otherwise requiring additional cash income to acquire. Route 2 crosses some highly valued areas of the LLR utilized for traditional gathering and subsistence activities. Negative impacts to subsistence-based economies may occur from the construction, operation, and maintenance of the Project as a result of loss of acreage for subsistence activities, fragmentation of habitat, and introduction/spread of invasive species due to increased disturbance/new corridors. These impacts would primarily be limited to projects located on the LLR where LLBO tribal members have hunting and gathering rights. Impacts to subsistence-based economies will be further assessed by LLR and the federal Cooperating Agencies for inclusion in the Final EIS.

As shown in Table 3.11-7, impacts to the local economy also are anticipated to be minimal. Like the other two Route Alternatives, 75 direct jobs would be created by the construction of the transmission lines. This potentially could create 112.5 jobs within the overall Project area. This amount is minimal in terms of all available jobs within the four counties. Likewise, an increase in income is anticipated to yield approximately $3.77 million dollars. With regard to the entire region, this impact would be minimal. In addition to jobs and income, the anticipated overall economic output is $86.85 million dollars. As previously shown, this amount is not anticipated to create substantial impacts, as the revenue generated from equipment and materials could be spent outside the immediate region and therefore, not returned to the local economy. Short-term minimal impacts are anticipated to occur, as some revenue would be returned to the local areas in which Route Alternative 2 would pass either from workers or expenditures associated with the Project.

With regard to the local tax base, monies would be divided depending on the percentage of the transmission line being located within each county. The total estimated property taxes would amount to approximately $1.6 million, based on the estimated capital costs. In terms of individual properties, impacts to property values were not evaluated individually by Route Alternative.

Route Alternative 2 contains more homes within or near the feasible 125-foot ROW evaluated than Route Alternative 1, and half as many as Route Alternative 3. The majority of homes, all of the 15 within the feasible 125-foot ROW evaluated and 48 of the 54 of the homes oup to 200 feet either side of the feasible ROW evaluated) occur within six locations: in the Midge Lake area; in Bemidji near Division Street, in Bemidji near Carr Lake Road and Madison Avenue Southwest, near West Winnie Road NE in Bena, in Ball Club, and in Deer River.

The following segments associated with this Route Alternative also contain homes either within the feasible 125-foot ROW evaluated or outside of the ROW evaluated, but within 200 feet of the evaluated center line:

- Segment Alternative F, a 1.3-mile segment that would skirt the City of Cass Lake to the south has three homes outside of the ROW evaluated, but within 200 feet of the identified feasible center line. These homes appear to be in the area where the segment crosses MN Highway 371 near Golf Course Road.
- Segment Alternative H, a 1-mile segment which follows an existing 115 kV line has one homes within the feasible 12-foot ROW evaluated, and seven homes within 200 feet of the identified feasible center line.
- Segment Alternative I, a 0.5-mile segment which follows the Enbridge pipeline has one homes within the feasible 12-foot ROW evaluated, and three homes within 200 feet of the identified feasible center line.

- Segment Alternative P, a 0.4-mile segment connecting Route Alternatives 1 and 2 near Ball Club to the south has one home outside of the ROW evaluated, but within 200 feet of the identified feasible center line.

All build alternatives would improve electric power reliability in the Study Area. In addition, Route Alternatives 1 and 2 would improve the transmission infrastructure in the Cass Lake area because those Route Alternatives would include construction of a new substation or modification of an existing substation near the city of Cass Lake.

3.11.2.4. Route Alternative 3

As shown throughout this analysis, Route Alternative 3 may have more impacts on the local socio-economic conditions to its overall length as compared to the other two Route Alternatives. For example, Route Alternative 3 would impact approximately 813 acres of forest land and cross 27 water courses and nine water basins. While the loss of natural resources in these areas would have a minimal impact on commercial activities associated with the procurement of forest and water products, these impacts would be greater than that associated with Route Alternatives 1 and 2. In the short-term, revenue and jobs may be generated when resources are removed. However, in the long-term, losses may be experienced if these resources are not replenished. As with the other Route Alternatives, localized impacts may be more substantial and felt at a more individual level.

With the construction of Route Alternative 3, 75 direct jobs would be created. This potentially could create 112.5 jobs within the overall Project area, as shown in Table 3.11-7. This amount is minimal in terms of all available jobs within the four counties. Likewise, an increase in income is anticipated to yield approximately $3.77 million dollars. With regard to the entire region, this impact would be minimal. In addition, not all of these dollars would be returned to the region, as people potentially can spend earnings anywhere within the state of Minnesota or elsewhere. The total economic output was not calculated for Alternative Route 3.

As discussed in Section 1.1.2 Subsistence Based Economies, Route 3 would result in the least impact to subsistence-based economies. LLBO members participate in subsistence activities and rely on the harvests of a variety of subsistence resources to supplement their diet and resources throughout the year. Subsistence is not only a source of food to LLBO members but replaces in part necessities otherwise requiring additional cash income to acquire. Negative impacts to subsistence-based economies may occur from the construction, operation, and maintenance of the Project as a result of loss of acreage for subsistence activities, fragmentation of habitat, and introduction/spread of invasive species due to increased disturbance/new corridors. These impacts would primarily be limited to projects located on the LLR where LLBO tribal members have hunting and gathering rights. Impacts to subsistence-based economies will be further assessed by LLR and the federal Cooperating Agencies for inclusion in the Final EIS.

With regard to the local tax base, monies would be divided depending on the percentage of the transmission line being located within each county. The total estimated property taxes would amount to approximately $2.4 million, based on the estimated capital costs. In terms of individual properties, impacts to property values were not evaluated individually by Route Alternative.

Route Alternative 3 contains the greatest number of homes within (25) or near (102) the feasible 125-foot ROW (Table 3.11-10). The majority of these homes are located along the western and northern portions of the route in the following locations: north of 16th Street SW in Beltrami County where Route Alternative 3 deviates from Route Alternative 1 and continuing east to the north of Lake Marquette; along Tyler Avenue NE in Beltrami County where Route Alternative 3 travels north to Power Dam Road NE; along Power Dam Road NE where Route Alternative 3 would follow an existing 69 kV transmission line; along County Roads 30 and 13 on the northern portion of the route; and north of the city of Deer River on MN Highway 6 before the route joins Route Alternatives 1 and 2 prior to the Boswell Substation.

The following segments associated with this Route Alternative also contain homes either within the feasible 125-foot ROW evaluated or outside of the ROW evaluated, but within 200 feet of the evaluated center line:

- Segment Alternative E, a 10.6-mile segment following MN Highway 6 within the boundaries of the LLR, contains up to two residences within the feasible 125-foot ROW evaluated and has eight homes within 200 feet of the identified feasible center line.
- Segment Alternative R, a 1.8-mile segment that, combined with Segment Alternative S or T, avoids the city of Blackduck, has three homes outside of the ROW evaluated, but within 200 feet of the identified feasible center line.
- Segment Alternative S, a 1.0-mile segment connecting Segment Alternative R and Route Alternative 3 east of Blackduck, contains one residence within the feasible 125-foot ROW evaluated.
- Segment Alternative T, a 2.0-mile segment connecting Segment Alternative R and Route Alternative 3, has five homes outside of the ROW evaluated, but within 200 feet of the identified feasible center line.

All build alternatives would improve electric power reliability in the Study Area. In addition, Route Alternatives 1 and 2 would improve the transmission infrastructure in the Cass Lake area because those Route Alternatives would include construction of a new substation or modification of an existing substation near the city of Cass Lake. Route Alternative 3 would not provide this benefit, as there are no new substations or substation improvements associated with this Route Alternative.

3.11.2.5. Leech Lake Reservation

Socioeconomic impacts to the LLR would be similar to those discussed for the Route Alternatives and Segment Alternatives. Specifically, the Project may provide potential short-term employment opportunities for residents of the reservation and would increase expenditures to local businesses, including the Palace and Northern Lights casinos, and other businesses located on the reservation.

As compared to the other two alternatives, Route Alternative 3 would be expected to generate fewer socioeconomic impacts to the LLR compared to Route Alternatives 1 and 2, because much of this alternative is located to the north of the reservation.

All of the Route Alternatives would increase electric power reliability in the Study Area, including the Leech Lake Reservation. As noted in Section 2.4.2.3, Route Alternatives 1 and 2 would either construct a new substation in the Cass Lake area or expand the existing Cass Lake Substation to improve load-serving capability in the Cass Lake Area, which is at the center of the Leech Lake Reservation. Route Alternative 3 would not make any improvements to the load-serving capability in the Cass Lake area.

As discussed above, members of the Leech Lake Band of Ojibwe (LLBO) also participate in other commercial activities associated with the procurement of natural resources. These activities include commercial rough fish and bait harvesting, commercial gill netting, wild rice harvesting, hunting, and bough harvesting (LLBO, 2009c). The potential to impact these catchment areas varies per Route Alternative.

Based on the evaluation of a feasible 125-foot ROW, Route Alternative 1 would impact 433 total acres of forested area within the LLR ; Route Alternative 2 would impact 335 acres within the LLR; and Route Alternative 3 would impact 1 acre within the LLR. The direct loss of forested lands would involve the removal of trees on a permanent basis, as the land would not be returned to a forested setting. Route Alternative 3 would impact significantly less forested areas within the LLR, although members of the LLBO may use forested areas on public lands along Route Alternative 3 that are outside the LLR. The loss of forest land may impact hunting and bough harvesting activities. Indirect impacts associated with the loss of these areas may include both a minimal gain and loss of work for members of the LLBO participating in these activities. There may be an initial increase in sales resulting from the removal of the resources, while in the long-term if trees are not replanted, a loss of resources would be experienced.

With regard to water resources, Route Alternative 1 crosses five water courses and three water course basins within the LLR, as compared to three water courses and one water basin for Route Alternative 2. Route Alternative 3 does not cross any water courses or water basins within the LLR. As discussed in Section 3.4.2, the Project has been designed to span surface water bodies to avoid placement of structures within these water bodies. Impacts to the procurement of fish may occur if water access points are blocked, either temporarily during construction, or long-term during operation of the Project. Similar to the impacts resulting from the removal of forest, indirect impacts associated with access to a water resource may include a minimal loss of work for members of the LLBO participating in these activities. As previously indicated, impacts associated with Route Alternatives 1 and 2 would be more substantial , as Route Alternative 3 avoids the LLR.

In addition to the aforementioned socioeconomic impacts, subsistence activities may be impacted by the construction of the Route Alternatives. Impacts on these activities are discussed for each Route Alternative within Section 3.12, Environmental Justice.

3.11.2.6. Chippewa National Forest

Direct short-term positive or negative socioeconomic impacts to the CNF generally are considered to be minimal, since a majority of the potential impacts would be more regional and realized off of CNF lands. However, the CNF would have the largest amount of timber removed from its property as compared to other land owners. As shown in Table 3.15-1, the total amount of forested land included within the CNF varies from 1,705 acres to 5,095 acres. Approximately 202 to 584 acres are located within the feasible 125-foot ROW (Table 3.15-5). The loss of these forest resources would have a direct impact on the volume of timber sold for commercial purposes.

In addition, because some residential properties are located within the CNF, both temporary and long-term impacts would result. These impacts primarily would be associated with the construction and operation of Route Alternative 3, because this alternative incorporates the most acreage of CNF lands when compared to the other Route Alternatives. In addition, Route Alternatives 1 and 2, which cross a large area of the Leech Lake Reservation, would have long lasting impacts to the Leech Lake trust resources within CNF boundaries. The trust responsibility is further discussed in Section 3.12, Environmental Justice.

3.11.3. Mitigation

A variety of mitigation measures could be implemented to reduce the potential impacts to socioeconomic resources from construction and operation of the Project. Mitigation measures that are typically included in permits are noted; cases where additional mitigation measures may be incorporated as a permit condition are also noted. Any CNF forest lands cleared for a special use permit would result in a loss of trust resources of the Leech Lake Band of Ojibwe and must be mitigated by the CNF.

3.11.3.1. Natural Resource-Based Economies

As previously discussed, a loss of natural resources in forested areas and those containing water courses and basins may result in the loss of commercial gain from the sales of timber, fish, and boughs. Mitigation for the loss of forest resources is provided in Section 3.15.3. Although the ROW would no longer be forested, it could be replanted with other low-growing species, such as berries, to continue providing some economic use of the ROW. Measures for water resources are provided in Section 3.4.3; watercourses would be spanned; the Project could be routed to avoid impacting water access points. As previously discussed, the impacts are expected to be positive in the short-term, but would result in minimal losses in the long-term if the resources were not replenished.

3.11.3.2. Subsistence-Based Economies

As previously discussed, LLBO members participate in subsistence activities and rely on the harvests of a variety of subsistence resources to supplement their diet and resources throughout the year. Subsistence activities result not only in a source of food to LLBO members but replace in part necessities otherwise requiring additional cash income to acquire. Some form of compensation for negative impacts to subsistence-based economies due to the construction, operation, and maintenance of the Project may be required as the Project may result in the loss of acreage for subsistence activities, fragmentation of habitat, and introduction/spread of invasive species due to increased disturbance/new corridors. Impacts to subsistence-based economies and mitigation recommendations will be further assessed by LLR and the federal Cooperating Agencies for inclusion in the Final EIS.

3.11.3.3. Local and Regional Economies

Construction of the Project would result in minimal short-term positive economic impacts for communities within the Study Area. As shown in Table 3.11-7, additional jobs and revenue would be created by the Project. However, within the overall four county region, these impacts would be minimal (i.e., the creation of 112.5 jobs, $3.8 million in income, and $81-86 million in total output). In general, increasing transmission capacity and reliability would be an economic benefit to the surrounding communities and businesses. For these reasons, the Project is not expected to have negative economic impacts on local and regional economies. As such, no mitigation measures are proposed to address the socioeconomic impacts.

3.11.3.4. Taxes

The payments of taxes to the counties in which the transmission line and associated infrastructure are located are not anticipated to generate negative impacts. For this reason, no mitigation measures are needed.

3.11.3.5. Property Values

Easement payments to landowners are required to compensate landowners for loss of use of the utility easement on their property.

3.11.3.6. Homes and Businesses

Residents and local business owners and customers in the Study Area primarily would be affected by temporary construction activities and long-term aesthetic changes. As discussed previously in Section 3.1, Aesthetics, the HVTL permit typically requires the Applicants to work with landowners to identify aesthetic concerns and attempt to minimize visual impacts related to the Project. In addition, land owners may be affected by changes in land use for creation of the Project ROW. Specifically, agricultural land and prime farmland would be temporarily disrupted during construction. Mitigation measures specific to agricultural land use and prime farmland are discussed in Section 3.14, Agriculture. To minimize impacts to land owners, the Applicants have agreed to the following mitigation measures:

- The exact location of structure sites, the ROW, and other disturbed areas would be determined with landowners' or agencies' input.
- The minimum area necessary would be used for transmission line access roads.
- Construction activities would be limited to the ROW, unless access permission is obtained from adjacent landowners.

Landowner compensation would be established by individual easements. Additionally, Minnesota Statute 216E.12, subd. 4 (sometimes referred to as the "buy the farm" provision) allows landowners of certain classes of land (e.g., homestead, agricultural, or seasonal residential recreational, as defined in Minnesota Statute 273.13) the option of requiring the Applicants to purchase the owner's entire property if the transmission line crosses a portion of the property.

3.12. Environmental Justice

Executive Order 12898, which requires Federal Actions to address potential environmental justice impacts to minority and low-income populations, was signed by President Clinton on February 11, 1994. The responsible official must consider an action's potential for demographic, geographic, economic, and human health risk factors when conducting and documenting a National Environmental Policy Act (NEPA) related analysis. The directives from this order are addressed in this analysis of the direct and indirect impacts of the Route and Segment Alternatives.

This section describes minority and low-income populations within the Study Area. Information from the U.S. Census Bureau and Minnesota state sources was analyzed to determine the existing conditions and potential effects on those conditions. The analysis identifies whether the Project could have disproportionate impacts to minority and low-income populations just from potentially being sited in areas where those populations predominately reside. This analysis was conducted using census block groups to evaluate the percentages of these populations present in 2000. Then, regardless of whether the Project would be sited in areas with disproportionate minority and low-income population levels, the potential impacts to those populations are also evaluated based upon their potential displacement from, subsistence, and traditional uses of the Study Area. This section provides information about the affected environment, potential direct and indirect effects, and mitigation measures.

3.12.1. Affected Environment

The discussion about the affected environment provides a description of the region of comparison, a demographic overview, the existing minority populations, poverty and low-income populations, and groups with a Limited English Proficiency. This discussion draws upon information found in the 2000 U.S. Census for census block groups, counties, and Minnesota State information. A discussion of subsistence activities also is provided.

3.12.1.1. Regional Definition

This analysis considers the disproportionate adverse environmental and human health impacts to low-income and minority populations. It involves comparing the impacts in the area affected by the Project to the impacts in the region in which the Route and Segment Alternatives are located. The larger region, referred to as the Region of Comparison (ROC), includes the four counties through which the alternatives pass - Beltrami, Cass, Hubbard, and Itasca counties. The Study Area for the environmental justice analysis (see Figures 3.12-1 through 3.12-3) contains 26 census block groups within the ROC that could be affected by the Project.[1] When relevant information is available for the LLR specifically, that information is provided alongside of the county-specific data.

3.12.1.2. Demographic Overview

The demographic overview provides information about the low-income and minority populations within the Study Area. The 2000 U.S. Census was used to extract data about low-income and minority populations within census block groups through the use of the Minnesota DATANET GeoAnalysis Tool (DATANET, 2000). To determine whether an individual census block group contained disproportionately greater minority or low-income populations, data for each group was compared to similar data for the ROC.

Overall Study Area Minority Populations

Approximately 17 percent of the Study Area residents were members of a racial minority. The largest minority group in the Study Area was American Indian (i.e., Native American). Within the LLR, this group comprises approximately 44.7 percent of the reservation (USCB, 2000ee). As shown in Table 3.12-1, minorities constituted a greater percentage of the population within the Study Area than in the ROC and in the State. The white (i.e., Caucasian) population was the largest group within all four geographic areas – 83.2 percent in the Study Area, 87.6 percent in the four-county region, 51.7 percent in the LLR, and 89.4 percent in the State.

At 13.7 percent, the percentage of Native Americans in the Study Area was somewhat greater than in the ROC (10.1 percent) and significantly greater than for the State (1.1 percent). As expected, the largest concentration of Native American populations was in the LLR (44.7 percent). The Asian population in the Study Area was 0.3 percent, while the Asian populations measured at the ROC, LLR, and State levels represented 0.4 percent, 0.2 percent, and 2.9 percent of the total population, respectively. African-Americans comprised 0.2 percent of the ROC and also of the Study Area population; while the LLR percentage was 0.1 percent, and the State percentage is 3.5 percent.

"Hispanic" is an ethnic classification rather than a racial one in the 2000 U.S. Census and is treated as such in this document. Individuals identifying themselves as being "of Hispanic origin" accounted for approximately 0.9 percent of the total population in the

[1] A census block group is a cluster of census blocks having the same first digit of their four-digit identifying numbers within a census tract. For example, block group 3 within a census tract includes all blocks numbered from 3000 to 3999. Block groups generally contain between 600 and 3,000 people, with an optimum size of 1,500 people (USCB, 2001).

The first two digits reference the state code (i.e., Minnesota is 27); the next three indicate the county code; the next four the census tract; and the last three the block group.

Study Area, 0.8 percent in the ROC, 1.4 percent in the LLR, and 2.9 percent in the State (USCB, 2000a-e and ee).

Table 3.12-1: Racial Composition

Jurisdiction		White	African-American	Native American and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other	Two or More Races	Total
Study Area (includes 26 census blocks with the ROC)	Number of People	28,940	65	4,767	87	9	77	822	34,767
	Percent	83.2	0.2	13.7	0.3	0.03	0.2	2.4	-
ROC	Number of People	113,214	276	13,069	471	25	231	1,882	129,168
	Percent	87.6	0.2	10.1	0.4	0.0	0.2	1.5	-
Beltrami County	Number of People	30,394	142	8,071	225	8	82	728	39,650
	Percent	76.6	0.4	20.4	0.6	0.0	0.2	1.8	-
Cass County	Number of People	23,490	31	3,110	76	6	38	399	27,150
	Percent	86.5	0.1	11.5	0.3	0.0	0.1	1.5	-
Hubbard County	Number of People	17,698	32	391	50	1	40	164	18,376
	Percent	96.3	0.2	2.1	0.3	0.0	0.2	0.9	-
Itasca County	Number of People	41,632	71	1,497	120	10	71	591	43,992
	Percent	94.6	0.2	3.4	0.3	0.0	0.2	1.3	-
Leech Lake Reservation[1]	Number of People	5,278	9	4,561	16	4	26	311	10,205
	Percent	51.7	0.1	44.7	0.2	0.04	0.3	3.0	-
State of Minnesota	Number of People	4,400,282	171,731	54,967	141,968	1,979	65,810	82,742	4,919,479
	Percent	89.4	3.5	1.1	2.9	0.0	1.3	1.7	-

Note: 1. Includes Off-Reservation Trust Land. Demographic information provided for the LLR is also part of the data for the Study Area, ROC, and the counties.
Sources: DATANET, 2000 and USCB, 2000a-e and ee

Overall Poverty and Low-Income Concentrations

Based upon the 2000 U.S. Census, approximately 13.4 percent of the Study Area was comprised of low-income individuals (Table 3.12-2). In comparison, 13.2 percent of the four-county ROC, 21.7 percent of the LLR, and 7.9 percent of the State of Minnesota's population was below the poverty level (USCB, 2001).

As shown in Table 3.12-2, the median household income for the State was greater than each of the four counties and for the LLR. In addition, the median household income was significantly greater for the State than for the median value of the Study Area. The median household income for the State was $47,111, while the range for the Study Area was $22,546 to $52,045 with a median value of $33,661.

Table 3.12-2: Number of People Living Below the Poverty Level and Median Household Income in 2000

Characteristic	Study Area	ROC	Leech Lake Reservation	State of Minnesota
Individuals				
Number of Persons Below Poverty Level	4,654	16,647	2,168	380,476
Percent of Persons Below Poverty Level	13.4	13.2	21.7	7.9
Households				
Median Household Income	$33,661[1]	$33,392 (Beltrami) $34,332 (Cass) $35,321 (Hubbard) $ 36,234 (Itasca)	$28,137	$47,111

Note: 1. The values of the median household income in each census group ranged from $22,546 to $52,045. The figure shown in the table is the median value of this range.
Sources: DATANET, 2000 and USCB, 2000k-o

Census Block Group Minority and Low-Income Populations

One method for determining whether significant low-income or minority populations exist in a Study Area is to collect information for census block groups within the Study Area and then determine whether one or both of the following two criteria is met:

1. The low-income or minority population of the census block group or ROC exceeds 50 percent overall; or

2. The low-income or minority population percentage of the ROC is significantly greater (typically at least 20 percentage points) than the low-income or minority population percentage in the geographic area chosen for comparative analysis (in this case the four-county comparative geographic area).

Census block groups are shown in Figure 3.12-1.

Table 3.12-3 provides a summary of the racial composition and poverty status for census block groups in the Study Area. As shown in that table, the percentage of the populations in the census block groups living below the poverty level in 2000 ranged from 3.0 to 28.4 percent. Thus, there do not appear to be disproportionate populations of low-income people in the Study Area, based upon the criterion of an overall 50 percent of people living below the poverty level. Similarly, there are no disproportionate populations of low-income people in the Study Area based upon the 20 percentage point difference criterion, because no census block group had greater than 33.2 percent of the people living below the poverty level (i.e., the 13.2 percent level in the ROC plus 20.0 percentage points). Figures 3.12-2 shows the location of minority populations by block group, while Figure 3.12-3 depicts the locations of populations below the poverty level.

For minority populations, three census block groups located in Cass County exceeded the 50 percent overall and 20 percentage point (i.e., 32.4 percent; 12.4 percent in the ROC plus 20.0 percentage points) criteria:

- Census Block Group 270219612001 with 68.2 percent,
- Census Block Group 270219612002 with 51.5 percent, and
- Census Block Group 270219612004 with 74.2 percent.

In addition, two census block groups in Itasca County exceeded the 20 percentage point criterion only:

- Census Block Group 270619802002 with 40.4 percent and
- Census Block Group 270619802003 with 38.6 percent.

Table 3.12-3: Minority and Poverty Status by Census Block Group within the Study Area

County	Census Block Group Identification Number	Total Number of People	Total Minority (%)	Poverty Rate (%)
Beltrami				
	270079501002	1,280	13.4	16.5
	270079501003	898	10.9	11.8
	270079501004	905	8.8	5.5
	270079501005	1,125	9.1	6.9
	270079503003	1,093	7.8	6.6
	270079503004	927	6.8	7.9
	270079504001	1,161	6.4	14.6
	270079504002	941	3.7	12.9
	270079507002	1,070	10.5	15.1
	270079507003	1,843	16.6	14.6
	270079507006	2,181	9.9	9.3
	270079509001	579	16.3	22.3
Cass				
	270219612001	1,265	68.2	22.6
	270219612002	706	51.5	25.9
	270219612004	1,198	74.2	28.4
Hubbard				
	270579701001	1,466	12.4	10.0
	270579701002	1,476	3.1	7.9
Itasca				
	270619801002	1,264	2.6	14.7
	270619801003	842	5.0	11.4
	270619802002	1,276	40.4	16.4
	270619802003	650	38.6	27.9
	270619803001	1,315	1.8	8.1
	270619803002	1,229	12.9	19.3
	270619803003	750	8.8	11.3
	270619804001	1,046	2.2	3.0
	270619807005	1,279	3.5	5.2

Source: DATANET, 2000

Limited English Proficiency

Limited English Proficiency populations also were identified using census block group data from the 2000 Census. For the portion of the population that was five years old and older, persons who spoke English "not well" or "not at all" were considered to have Limited English Proficiency.

Table 3.12-4 shows the Limited English Proficiency characteristics of the Study Area, ROC, and the State. The State of Minnesota had the greatest percentage of Limited

English Proficiency individuals at 3.6 percent, followed by the LLR with 1.5 percent, the ROC with 1.1 percent, and the Study Area with 0.87 percent.

Table 3.12-4: Limited English Proficiency

Characteristic	Study Area	ROC	Leech Lake Reservation	State of Minnesota
Population 5 years and over	32,471	121,682	9,295	4,591,491
Limited English Proficiency (individuals)	284	1,352	141	167,511
Limited English Proficiency (percent)	0.87	1.1	1.5	3.6

Sources: DATANET, 2000 and USCB, 2000f-j and ee

3.12.1.3. Subsistence Activities

Subsistence activities include hunting and trapping, fishing, and the gathering of vegetation and berries primarily as a source of food, for medicinal purposes, for ceremonial activities, and for personal sale as an additional source of income, rather than as a recreational activity. Natural resources help ensure that people are able to heat their homes, to buy food, and to purchase other goods for their families. Within the LLR, approximately 10.7 percent of the population 16 years and over were unemployed (USCB, 2000ee). As such, natural resource procurement assists the LLR population. To the extent that this information was readily available from the Leech Lake Band and publicly-available sources, it is described below.

Hunting and Trapping

Hunting and trapping activities occur throughout the ROC. Species commonly harvested include white-tailed deer, small game, and waterfowl. Small game species include the following:

- Mammals - cottontail rabbit, jack rabbit, snowshoe hare, and gray and fox squirrels; and
- Non-migratory birds - ruffed and spruce grouse, sharp-tailed grouse, and hungarian partridge.

Waterfowl include the following:

- A variety of ducks – mallard (the most common), black duck, gadwall, wood duck, pintail, hooded merganser, scaup, ringneck, redhead, coots, and others; and
- Canada, snow, and other geese.

Bear is another big game species that is hunted, but to a much lesser extent.

Hunting areas typically are concentrated in the Minnesota game refugees and state and federal forests. A state-issued license is required for all persons hunting in these areas, including members of the Leech Lake Band hunting outside of the reservation boundary. A tribal-issued license is required for members of the Leech Lake Band engaged in hunting within the reservation. All public land in state-owned Wildlife Management Areas (WMAs) is open to the hunting of all species of protected wild animals and trapping of mammals during established seasons (MnDNR, 2009k). Local game harvest information was not readily available.

Trapping occurs for the following species of furbearers:

- Raccoon,
- Red fox,
- Gray fox,
- Badger,
- Opossum,
- Bobcat,
- Fisher,
- Pine Marten,
- Mink,
- Muskrat,
- Beaver, and
- Otter.

Fishing

Harvesting of aquatic species occurs using a variety of methods, including angling with a rod and reel from the shore and a boat, ice fishing, spear fishing, and personal gill netting. Rod and reel is the most common harvesting method. Personal gill netting makes up less than 5 percent of the total harvest of game fish on the LLR. Although there are hundreds of lakes and rivers throughout the LLR and elsewhere in the Study Area, the most popular large lakes include Leech Lake, Lake Winnibigoshish, and Cass Lake (LLDRM, 2009a).

Over 50 species of fish can be found in area lakes and rivers with walleye, northern pike, largemouth bass, and panfish (e.g., perch, crappy, sunfish, and bluegills) being the most popular for sport fisheries. Less popular species that also are harvested include muskellunge, smallmouth bass, trout, and catfish. Tribal members also hold the lake whitefish, a species only found in some of the larger deeper lakes, in high regard (LLDRM, 2009a).

Gathering

Within the State of Minnesota, counties in the north and north-central region contain a large number of lakes supporting growth of natural wild rice. Among these counties are Cass County (8,323 estimated acres of wild rice) and Itasca County (8,448 estimated acres of wild rice) (MnDNR, 2008d). As aforementioned, these two counties are part of the ROC for this analysis. While wild rice concentrations are greatest within Cass and Itasca counties, it also is collected to a lesser extent within Beltrami (2,438 estimated acres of wild rice) and Hubbard (963 estimated acres of wild rice) counties (MnDNR, 2008d).

Wild rice generally requires some moving water, with rivers, flowages, and lakes with inlets and outlets being optimal areas for growth. It grows well at water depths of 0.5 to 3 feet; some plants, however, may be found in deeper waters. These resources can be threatened by changes in local hydrology, water quality, water-based recreation, shoreland development, and industrial activities (MnDNR, 2008d).

Natural wild rice can be hand harvested as a source of food. According to a 2008 report by the Minnesota Department of Natural Resources (MnDNR), approximately 4,000 to 5,000 people participate annually in hand harvesting natural stands of wild rice. In the State of Minnesota, the annual yield ranges from 4 to 8 million pounds. A recent study by the MnDNR of 2004-2006 state license buyers suggested that the average annual hand harvest was approximately 430 pounds per individual (MnDNR, 2008d).

Within the LLR, all tribal and non-tribal members must have LLR permits to harvest wild rice within the boundaries of the LLR (MnDNR, 2009k). Annual permits for harvesting within the reservation are issued by the Leech Lake Division of Resource Management.

Wild rice is regulated by the State and requires a license to harvest. The 2008 MnDNR Report provides the following information about local legislation:

> Minnesota state statutes provide that ownership of wild rice and other aquatic vegetation is vested in the state (MS 84.091). State statutes also establish regulatory control over wild rice removal and harvest (MS 84.10, 84.15, 84.027, 84.28). Exceptions to state harvest regulations apply in geographic locations that are described by treaties and subsequent agreements, statutes, and rules (MS 84.10, MR 6284.0600 and 6284.0700). State and tribal enforcement officers often operate under temporary agreements until formal agreements are finalized (MnDNR, 2008d).

According to the 2008 MnDNR Report, members of the Minnesota Chippewa Tribe (MCT) can harvest wild rice on specified lakes within some Minnesota counties with a tribal identification card issued under the sovereign authority of their respective tribal governments and current Minnesota statute (MS 84.10). Furthermore, Minnesota Statute 84.10 allows "persons of Indian blood, or residents of the reservation upon which (the) wild rice grain is taken” to gather wild rice from any of the waters within the original boundaries of the Leech Lake Reservation (MS 84.10).

As shown by this legislation, tribal governments have sovereignty over the harvest of wild rice within the boundaries of their reservations. In addition, some tribal governments also have the authority to regulate the wild rice harvest by tribal members within certain ceded lands, while other tribal rights exist for specific off-reservation waters. The state of Minnesota has jurisdiction over non-tribal harvesters within ceded territories and over all off-reservation wild rice harvests outside of the ceded lands (MnDNR, 2008d). In this regard, the 2009 Minnesota Statute 84.091 only provides an exception from licenses for children under the age of 18, who accompany adult gatherers.

It is much more difficult to find and gather traditional and medicinal plants within the LLR, compared to historic periods, because of heavy browsing by white-tailed deer and an increased presence of human activity. Heavy browsing has occurred as a result of the significant increase in white-tailed deer populations, itself the result of timber harvesting and human development that has increased the amount of habitat favorable to the deer (LLDRM, 2009b). Tribal members collect a variety of berries as a source of food from the spring through the fall, including wild strawberries, juneberries, raspberries, blueberries, blackberries, choke cherries, and wild grapes (CNF, 2009a).

Birch bark is a very important material for Native Americans; it historically was used to make baskets, cradle boards, canoes, and in covering wigwams. Today, Leech Lake tribal members retain the knowledge and skills to create birch baskets, and birch gathering remains a traditional activity (CNF, 2009a).

Native Americans also have used sweet grass for making baskets and for burning as incense. Both practices are associated with the Leech Lake Band of Ojibwe, although both activities are more common in other regions of the United States. Sweet grass is found in wetland and riparian environments. Sweet grass is considered by the Leech Lake Band of Ojibwe to be a sensitive species and is discussed in Section 3.8. According to the USDA, wild harvests should be restricted to salvage sites due to declining populations of the wild plants (USDA and NRCS, 2007).

Chippewa National Forest

Approximately 286 privately owned recreational residence lake lots in the CNF are currently under special use permit; no new special use permits are issued. There is no indication as to whether these residences are owned by low-income or minority residents, who may participate in subsistence activities to supplement their food sources or to provide for medicinal purposes and ceremonial activities. Lots are appraised every 20 years to determine the annual fees to be paid for the long-term land leases. These residences also are taxed by the State of Minnesota for the value of improvements and the value of the long-term lease rights. Private owners may sell their structures through the local real estate market, and new owners may assume the responsibility for the land use permit and annual fees (CNF, 2009b). No additional information is available to determine the financial or minority status of the individuals who own these lots.

Hunting is allowed on the CNF, and the high quality habitat provides excellent grouse and deer hunting opportunities. Species that can be harvested are the same as those described above for the surrounding ROC (CNF, 2009c). In addition, fishing also occurs in the CNF. Once again, the species that are harvested are similar to those in the surrounding lakes and rivers, including muskellunge, northern pike, walleye, largemouth and smallmouth bass, panfish (e.g., perch, crappie, and bluegill), and trout (CNF, 2009d). Gathering activities occurring in the CNF are similar to those occurring in the surrounding ROC, as described above (CNF, 2009a).

3.12.2. Direct/Indirect Effects

This section provides a description of the potential impacts that the Project may have on low-income and/or minority populations from the No-Build Alternative and the Route Alternatives. Impacts to the Leech Lake Reservation (LLR) and the Chippewa National Forest (CNF) also are evaluated. These discussions are followed by a comparison of the Route Alternatives. In Route Alternative tables presented in the following analyses, the number and listing of census block groups vary by alternative because each one traverses and, thus, potentially affects different block groups. The comparison of the alternatives provides a discussion of temporary and long-term impacts on minority and low-income populations within the Study Area and ROC. Potential direct impacts include the following:

- Displacement of homes and businesses
- Loss of scenic resources
- Employment effects
- Impacts to natural resources utilized through subsistence activities

Limited English Proficiency is not discussed with regard to the individual Route Alternatives, because less than 1.1 percent of the population over the age of five years old does not speak English at a level of “very well” or above. Impacts to subsistence activities are incorporated into the overall comparison of the Route Alternatives.

Table 3.12-5 summarizes and compares the overall percentages of minority, low-income, and LEP populations affected by each of the Route Alternatives. As shown by this table, all of the Route Alternatives have the potential to impact minority and low-income populations. Route Alternative 2 has the potential to affect slightly more individuals that are minority populations or that are living below the poverty level.

Table 3.12-5: Summary of Affected Environmental Justice Communities

Route Alternative	Minority Population (%)	Low-Income Population (%)	LEP Population (%)
1	21.1	13.5	0.32
2	26.2	15.4	0.46
3	9.6	11.8	0.15
ROC	12.4	13.2	1.1

Sources: DATANET, 2000 and USCB, 2000a-j

In the event that a structure, such as a home or outbuilding, is located within the right-of-way (ROW) required for the Project, that structure would be displaced; meaning the property would need to be purchased by the utility and removed from the area. An analysis of a feasible 125-foot ROW within all of the Route Alternatives shows that Route Alternative 3 has the greatest number of homes located within the ROW evaluated (Table 3.11-10). As discussed in Section 3.11.2, because neither the precise width nor the exact placement of the ROW has been established, it is unknown at this time whether the Project would cause the displacement of any individuals from their homes or businesses, which may include low-income and minority individuals. Federal, state, and local regulations dictate property acquisition requirements and that affected landowners would be compensated for their property at fair market value. The impacts associated with this acquisition would not be different for members of a low-income or minority group; therefore, no adverse impacts would result.

Aesthetics and Quality of Life

Residents in the vicinity of the Project primarily would be affected by temporary construction and long-term aesthetic changes, such as a loss of scenic resources. This loss could alter the experience of conducting traditional tribal ceremonial or hunting/gathering activities in areas where they have historically occurred. The Leech Lake Band of Ojibwe has indicated that certain areas located along Route Alternative 1 and to a lesser extent Route Alternative 2, including the Ten Section area and Guthrie Till Plain, have cultural significance for tribal members. Tribal members who use these areas for hunting, gathering, or cultural practices would be disproportionately affected by the placement of the ROW through these areas, since their experience would be altered by the visual intrusion of the ROW and overhead transmission line.

Minority populations living within the LLR, regardless of whether they engage in cultural practices or hunting/gathering activities, would experience a visual intrusion from the Project in areas where they live, work, and travel within the LLR. The Leech Lake Band of Ojibwe has indicated that tribal members living in the LLR have a greater interest and affinity for maintaining natural resources in the LLR due to the historical and traditional significant of the area. The majority of Route Alternatives 1 and 2 would be located within the boundaries of the LLR; thus, the visual intrusion of the Project across the LLR would disproportionately affect the population of the LLR.

Neither construction nor operation is considered to result in a disproportionate adverse impact to minority or low-income people occasionally traveling through the area because and the Project would affect everyone travelling through the area regardless of financial or minority status.

Economic and Employment Effects

All of the Project Route Alternatives could provide increased opportunities for firewood gathering or employment. During construction, the proposed Project likely would provide an opportunity for temporary employment for members of the minority and low-income communities in the area.

As noted in further detail in Section 3.11 Socioeconomics, the Project would not directly impact any businesses and is not expected to have negative economic impacts. The operation and maintenance of the transmission line would not negatively impact the socioeconomic resources related to industry in the four-county area; therefore no minority or low-income businesses would be impacted.

Subsistence

The Route Alternatives would impact food resources used by those conducting subsistence hunting, fishing, and gathering activities. This alteration could include some species moving out of an area and others moving into that area (e.g., such as might occur if trees were cut down and thus a greater prevalence of deer might occur), or changes in harvest success and levels. While access and use of traditional hunting and gathering areas would not be restricted by the Route Alternatives on a long-term basis, some temporary and long-term impact to the uses of those areas would result.

Vegetation within the transmission line route would be removed during construction. This would impact any gathering activities that occurred in these areas prior to construction, as well as impact the location of some species, which prefer closed areas as opposed to those free of vegetation. The potential introduction and spread of invasive species could result in long-term impacts to the ROW and adjacent areas.

During construction, some animal species also would be affected. For example, some mortality could occur to less motile or burrowing species, and abandonment of a nest site and the loss of eggs and/or young in avian species. Animal communities also may be temporarily disturbed during construction due to the movement of equipment, noise, and dust. Animal communities could be displaced long-term wher the opening of a forest canopy is converted to a non-pompatibel cover type.

In addition, some temporary disruptions may occur if access is limited, for safety purposes, to areas typically used for hunting and gathering.

Once in operation, the primary impact to vegetation would be the long-term conversion of existing vegetation communities to managed grassland or shrubland within the transmission line ROW. Low-growing vegetation, such as blueberries or raspberries, would be allowed to grow within the Project's ROW after re-establishment. Trees would not be allowed to re-establish within the Project's ROW.

With regard to wild rice, direct impacts to the wild rice plants are expected to be minimal. As indicated in Section 3.4.2, no temporary or long-term direct impacts to surface water resources would likely occur to public water inventory (PWI) basins or watercourses, in part because the Applicants have located Project Route and Segment Alternatives to avoid surface water features to the extent practicable. In addition, the Applicants anticipate that surface water features would be avoided by spanning the transmission line over the water bodies or redirecting the ROW to avoid these areas entirely. Long-term indirect impacts may be felt by existing, local gatherers because their views would be altered along waterways where rice gathering may occur. The gathering of wild rice and other products is discussed in Section 3.9, Cultural Resources and Values.

Health

The Project Route and Segment Alternatives would not have negative effects on public health. None of the alternatives would produce hazardous waste or conditions that might adversely affect local populations, provided there are no spills or leaks from construction equipment. These issues are discussed in greater detail in Section 3.20, Safety and Health.

3.12.2.1. No-Build Alternative

The No-Build Alternative would not impact minority and low-income populations directly or indirectly. This alternative would not result in the displacement of homes and businesses, because it would not change the existing conditions. No loss of scenic or economic resources would result because land would not be utilized for the transmission line under the No-Build Alternative. Furthermore, impacts to subsistence food resources of those populations for would not occur because existing hunting and gathering lands would not be utilized for this alternative.

3.12.2.2. Route Alternative 1

Route Alternative 1 crosses through 10 census block groups within all four counties of the ROC. The total population of the census block groups is 12,276. All of the Segment Alternatives associated with this Route Alternative are contained within the census block groups evaluated for Route Alternative 1. The discussion that follows includes a description of the minority concentrations and low-income groups contained within these census block groups.

All but one of the census block groups through which Route Alternative 1 passes are also crossed by Route Alternative 2.

Minority Concentrations

Table 3.12-6 shows the percentage of minority persons in each census block group in the Study Area for Route Alternative 1. Of the 10 census block groups that intersect with the alignment of Route Alternative 1, two of the block groups in Cass County have minority populations that exceed 50 percent. These block groups occur in the area surrounding Cass Lake. In addition, two other census block groups have minority populations that are greater than the ROC, one in Beltrami County and one in Itasca County.

Table 3.12-6: Route Alternative 1 - Minority Persons by Census Block Group

Jurisdiction	Region or Census Block Group Identification Number	Percent Minority	Greater than ROC? (Yes or No)
Minnesota		10.6	Not applicable
Leech Lake Reservation		48.3	Not applicable
ROC		12.4	Not applicable
Beltrami County			
	270079501003	10.9	No
	270079501004	8.8	No
	270079507003	16.6	Yes
Cass County			
	270219612001	68.2	Yes
	270219612002	51.5	Yes
Hubbard County			
	270579701001	12.4	No
	270579701002	3.1	No
Itasca County			
	270619802002	40.4	Yes
	270619803002	12.9	No
	270619807005	3.5	No

Sources: DATANET, 2000 and USCB, 2000e

Poverty and Low-Income Concentrations

Five census block groups intersected by Route Alternative 1 have a greater percentage of low-income residents than the ROC (Table 3.12-7). Four of these census block groups also have greater than average minority populations.

Table 3.12-7: Route Alternative 1 - Poverty Level by Census Block Group

Jurisdiction	Region or Census Block Group Identification Number	Percent Below Poverty Level	Greater than ROC? (Yes or No)
Minnesota		7.9	Not applicable
Leech Lake Reservation		21.7	Not applicable
ROC		13.2	Not applicable
Beltrami County			
	270079501003	11.8	No
	270079501004	5.5	No
	270079507003	14.6	Yes
Cass County			
	270219612001	22.6	Yes
	270219612002	25.9	Yes
Hubbard County			
	270579701001	10.0	No
	270579701002	7.9	No
Itasca County			
	270619802002	16.4	Yes
	270619803002	19.3	Yes
	270619807005	5.2	No

Sources: DATANET, 2000 and USCB, 2000o

Subsistence

Route Alternative 1 would impact the LLBO trust resources and subsistence way of life because of the loss of forest lands within the Cuba Hill and Ten Section areas. Construction of Route Alternative 1 would convert an estimated 579 acres of forested area. To the extent that these forested areas are used to conduct traditional ceremonial or hunting/gathering activities, the experience of conducting these activities would be altered and the potential harvest levels could also be altered as a result of shifting or lost species. Impacts to subsistence economies will be further assessed by LLBO and the federal cooperating agencies for inclusion in the Final EIS.

3.12.2.3. Route Alternative 2

Route Alternative 2 crosses 13 census block groups. The total population is 26,408. As with Route Alternative 1, Route Alternative 2 crosses census block groups contained within all four counties of the ROC. Segment Alternatives associated with this Route Alternative are contained within the census block groups evaluated for Route Alternative 2. Many are also crossed by Route Alternative 1.

Minority Concentrations

Of the 13 census block groups that intersect the alignment for Route Alternative 2, three have minority populations that exceed 50 percent. These three block groups are located in Cass County, in the area surrounding Cass Lake. Additionally, four other census block groups have minority populations that are greater than the ROC (Table 3.12-8). Two of these groups are in Beltrami County in the Bemidji area and two are in Itasca County in the greater Grand Rapids area near Deer River.

Table 3.12-8: Route Alternative 2 - Minority Persons by Census Block Group

Jurisdiction	Region or Census Block Group Identification Number	Percent Minority	Greater than ROC? (Yes or No)
Minnesota		10.6	Not applicable
Leech Lake Reservation		48.3	Not applicable
ROC		12.4	Not applicable
Beltrami County			
	270079501002	13.4	Yes
	270079501003	10.9	No
	270079501004	8.8	No
	270079507002	10.5	No
	270079507003	16.6	Yes
Cass County			
	270219612001	68.2	Yes
	270219612002	51.5	Yes
	270219612004	74.2	Yes
Hubbard County			
	270579701001	12.4	No
Itasca County			
	270619802002	40.4	Yes
	270619803001	1.8	No
	270619803002	12.9	Yes
	270619807005	3.5	No

Sources: DATANET, 2000 and USCB, 2000e

Poverty and Low-Income Concentrations

Eight census block groups intersected by Route Alternative 2 have a greater percentage of low-income residents than the ROC, as shown in Table 3.12-9. Three of these groups are in Beltrami County, three are in Cass County, and two are in Itasca County. Seven out of eight of these census block groups also have greater than average minority populations.

Table 3.12-9: Route Alternative 2 - Poverty Level by Census Block Group

Jurisdiction	Region or Census Block Group Identification Number	Percent Below Poverty Level	Greater than ROC? (Yes or No)
Minnesota		7.9	Not applicable
Leech Lake Reservation		21.7	Not applicable
ROC		13.2	Not applicable
Beltrami County			
	270079501002	16.5	Yes
	270079501003	11.8	No
	270079501004	5.5	No
	270079507002	15.1	Yes
	270079507003	14.6	Yes
Cass County			
	270219612001	22.6	Yes
	270219612002	25.9	Yes
	270219612004	28.4	Yes
Hubbard County			
	270579701001	10.0	No
Itasca County			
	270619802002	16.4	Yes
	270619803001	8.1	No
	270619803002	19.3	Yes
	270619807005	5.2	No

Sources: DATANET, 2000 and USCB, 2000o.

Subsistence

Route Alternative 2 would convert an estimated 439 acres of forested area, the least of the Route Alternatives evaluated. To the extent that these forested areas are used to conduct traditional ceremonial or hunting/gathering activities, the experience of conducting these activities would be altered and the potential harvest levels could also be altered as a result of shifting or lost species. Route 2 also contains the only documented occurrences of sweet grass in the Study Area. Impacts to subsistence economies will be further assessed by LLBO and the federal cooperating agencies for inclusion in the Final EIS.

3.12.2.4. Route Alternative 3

Route Alternative 3 crosses census block groups that are located within three counties of the ROC. Because Route Alternative 3 is considerably longer than Route Alternatives 1 or 2, 116 miles compared to 68 or 69 miles, this alternative passes through more census block groups than the other two Route Alternatives. The total population within these census blocks group is 31,854. This Route Alternative, however, does not pass through as much of the LLR as the other alternatives within the Study Area.

Minority Concentrations

Table 3.12-10 lists the percentage of minority persons in each census block group in the Study Area for Route Alternative 3. None of the 19 census block groups that intersect the alignment of Route Alternative 3 have minority populations that exceed 50 percent. However, five census block groups have minority populations that are greater than the ROC, two in Beltrami County and three in Itasca County.

Table 3.12-10: Route Alternative 3 – Minority Persons by Census Block Group

Jurisdiction	Region or Census Block Group Identification Number	Percent Minority	Greater than ROC? (Yes or No)
Minnesota		10.6	Not applicable
Leech Lake Reservation		48.3	Not applicable
ROC		12.4	Not applicable
Beltrami County			
	270079501003	10.9	No
	270079501004	8.8	No
	270079501005	9.1	No
	270079503003	7.8	No
	270079503004	6.8	No
	270079504001	6.4	No
	270079504002	3.7	No
	270079507003	16.6	Yes
	270079507006	9.9	No
	270079509001	16.3	Yes
Hubbard County			
	270579701002	3.1	No
Itasca County			
	270619801002	2.6	No
	270619801003	5.0	No
	270619802002	40.2	Yes
	270619802003	38.6	Yes
	270619803002	12.9	Yes
	270619803003	8.8	No
	270619804001	2.2	No
	270619807005	3.5	No

Sources: DATANET, 2000 and USCB, 2000e

Poverty and Low-Income Concentrations

Eight census block groups intersected by Route Alternative 3 have a greater percentage of low-income residents than the ROC, as shown in Table 3.12-11. Four of these blocks are in Beltrami County and four are in Itasca County. Of these eight census block groups, five also have a greater minority population.

Table 3.12-11: Route Alternative 3 - Poverty Level by Census Block Group

Jurisdiction	Region or Census Block Group Identification Number	Percent Below Poverty Level	Greater than ROC? (Yes or No)
Minnesota		10.6	Not applicable
Leech Lake Reservation		21.7	Not applicable
ROC		12.4	Not applicable
Beltrami County			
	270079501003	11.8	No
	270079501004	5.5	No
	270079501005	6.9	No
	270079503003	6.6	No
	270079503004	7.9	No
	270079504001	14.6	Yes
	270079504002	12.9	Yes
	270079507003	14.6	Yes
	270079507006	9.3	No
	270079509001	22.3	Yes
Hubbard County			
	270579701002	7.9	No
Itasca County			
	270619801002	14.7	Yes
	270619801003	11.4	No
	270619802002	16.4	Yes
	270619802003	27.9	Yes
	270619803002	19.3	Yes
	270619803003	11.3	No
	270619804001	3.0	No
	270619807005	5.2	No

Sources: DATANET, 2000 and USCB, 2000o

Subsistence

Route Alternative 3 would convert approximately 813 acres of forested area, the most of the Route Alternatives reviewed; however, Route Alternative 3 has the smallest impact to resources within LLR. To the extent that these forested areas are used to conduct traditional ceremonial or hunting/gathering activities, the experience of conducting these activities would be altered and the potential harvest levels could also be altered as a result of shifting or lost species.

3.12.2.5. Leech Lake Reservation

As previously mentioned, the Project area includes portions of the LLR. Route Alternatives 1 and 2 cross the entire length of the LLR. As shown in Section 3.10, Land Use, Route Alternative 1 crosses approximately 5,232 acres within a 1,000-foot-wide route, while Route Alternative 2 crosses approximately 5,234 acres. Route Alternative 3 crosses the least amount, at 35 acres.

The minority population in the vicinity of the Project area is predominately Anishinabe Indian. Communities within this area that include noticeable percentages of Native Americans include Cass Lake, Bena, Ball Club, and Deer River.

Impacts for environmental justice would be similar to those that are discussed for the three Route Alternatives in Section 3.12.2.7. Route Alternative 3 would have fewer impacts to the LLR than the other route alternatives, because much of this alternative is located outside of the reservation. As previously indicated, only 35 acres of the LLR are crossed by the 1,000-foot-wide Route Alternative 3.

3.12.2.6. Chippewa National Forest

All three Route Alternatives cross portions of CNF land. Impacts for environmental justice would be similar to those that are discussed for the three Route Alternatives in Sections 3.12.2.2-4.

The CNF has the responsibility to mitigate the impacts to their trust responsibility to the Leech Lake Band of Ojibwe (LLBO).

3.12.3. Mitigation

The Project would result in both temporary and long-term impacts to aesthetics and subsistence uses for minority or low-income populations in the Study Area. The following sections summarize the mitigation measures that could be implemented to reduce the potential impacts from construction equipment and activities. Mitigation measures that are typically included in permits are noted; cases where additional mitigation measures may be incorporated as a permit condition are also noted.

As previously indicated, any CNF forest lands cleared for a special use permit would result in a loss of trust resources of the LLBO and must be mitigated by the CNF.

Aesthetics

Residents in the vicinity of the Project primarily would be affected by temporary construction and long-term aesthetic changes, such as a loss of scenic resources. As discussed previously in Section 3.1, Aesthetics, the HVTL permit could require the Applicants to work with landowners to identify aesthetic concerns and to attempt to minimize visual impacts related to the Project. Specific mitigation measures for aesthetic impacts are addressed in Section 3.1.

The Leech Lake Band of Ojibwe has indicated that certain areas located along Route Alternative 1, including the Ten Section area and Guthrie Till Plain, have cultural significance for tribal members. Tribal members who use these areas for hunting, gathering, or cultural practices would be disproportionately affected by the Project, since their experience would be altered by the visual intrusion of the ROW and overhead transmission line. These impacts could be mitigated by siting the Project outside the areas identified for use in hunting/gathering or cultural practices. The Applicants have developed Segment Alternatives to avoid areas of tribal significant. Segment Alternative B would provide a variation to Route Alternative 1 that would largely avoid the Ten Section area.

Economic and Employment

The Project is not expected to result in an economic hardship to minority or low-income populations, so no mitigation measures are suggested.

Subsistence

Temporary and long-term disruption to hunting and gathering may occur during Project construction. To minimze long-term disruption to resources, the HVTL permit could require restoration of the ROWs, temporary work spaces, access roads, and other lands affected by constructions. Required restoration activities may include re-vegetation of plants used for gathering in the ROWs. The HVTL permit could require the Applicants to work with the MnDNR, LLB, CNF, landowners, and local wildlife management programs to restore and maintain the ROWs to provide a useful and functional habitat for plants, nesting birds, small animals, and migrating animals to minimize habitat fragmentation. Section 3.7, Biological Resources, provides mitigation measures for addressing vegetation and fauna. After time, animals and vegetation also would adapt to the new conditions, which would include the infrastructure for the transmission lines.

Direct impacts to wild rice plants are expected to be minimal. To minimize temporary impacts to wild rice, Project construction in wetland areas, when such areas cannot be avoided, would take place in the winter. Wooden or composite mats could be used to protect wetland vegetation. To reduce long-term impacts, the Project would span wetlands, floodplains, and water resources where possible to reduce the number of pole structures placed in wetlands, floodplains, and water resources. Impacts to subsistence economies will be further assessed by LLBO and the federal cooperating agencies for inclusion in the Final EIS.

Health

The Project would not have negative effects on public health, so no mitigation measures are suggested.

3.13. Recreation and Tourism

This section describes the recreational and tourism resources within the Study Area, defined as the 1,000-foot-wide routes for each Route and Segment Alternative. Federal and state recreational areas, lakes, water access points, and trails are identified using data from the Minnesota Department of Natural Resource's (MnDNR) Recreation Compass and the Chippewa National Forest's (CNF) resources. Hunting and fishing information was also obtained through the MnDNR, which was supplemented with local recreation and tourism estimates from various cities and counties located within and near the Study Area. This information was analyzed to determine the Study Area existing conditions and potential effects upon those conditions.

3.13.1. Affected Environment

The Study Area is viewed as a recreational destination within Minnesota because of the presence of numerous trails, rivers, lakes, national forest lands, and state lands. Recreational activities and tourism are important components of the local economy (Cass County, 2002). Popular activities at these locations include camping, fishing, hunting, wild rice harvesting, bird watching, canoeing, boating, swimming, biking, hiking, riding all-terrain vehicles (ATVs) and snowmobiles, and nature observation. In particular, the MnDNR Wildlife Management Areas (WMAs) and Scientific and Natural Areas (SNAs), and the CNF provide opportunities for viewing wildlife and ecosystems.

Federal, State and county managed lands compromise much of the ownership within the Study Area. These lands are highly interconnected, with many common boundaries and little to no visible definition of ownership on the ground. In addition, the four counties through which the Route Alternatives and Segment Alternatives cross rely on revenue generated from recreational activities (i.e., from tourism and seasonal residents), particularly Cass County. For these reasons, recreation effects are discussed with regard to the Route Alternatives and Segment Alternatives.

This section describes the recreational resources included within federal and state lands and local areas. The discussion incorporates both dispersed and developed recreational and tourism activities. Table 3.13-1 provides a summary of these resources.

Table 3.13-1: Recreational Resources for each Alternative

Location	Resource	Route Alternatives			Segment Alternatives																			
		1	2	3	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Federal (CNF)																								
	Chippewa National Forest	X	X	X	-	X	X	-	X	X	-	-	_	-	-	-	-	X	X	X	-	X	X	X
	Ladyslipper NF Scenic Byway	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Great River Road Scenic Byway	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	-
	Mi-Ge-Zi Trail	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Norway Beach Interpretive Trail	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pipeline Snowmobile Trail	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Soo Line Trail (ATV and snowmobile)	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Winnie Snowmobile Trail	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
State																								
	North Country Trail (GIA)	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Blue Ox Snowmobile Trail (GIA)	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cass County Snowmobile Trail(GIA)	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
	West Bowstring Trail	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Becida Snowmobile Trail (GIA)	-	-	-	X	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
	Paul Bunyan State Trail	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heartland State Trail	X	X	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	_	-
	Soo Line North State Trail (ATV)	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-
	Marcell Trails	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bushwacker Trail	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Welsh Lake State Forest parcels	X	X	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bowstring State Forest parcels	X	X	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ladyslipper MN Scenic Byway	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Avenue of the Pines Scenic Byway	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bemidji Slough WMA	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bemidji State Game Refuge	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mississippi River (Water Trail)	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pike Bay Loop Road Bike Route	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Moss Lake Road Bike Route	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	South Boundary Bike Route	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Local																								
	Sandtrap Golf Course	-	X	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-

	Bemidji High School Tennis Courts and Soccer Fields	-	X	-	-	-	-	-	-	X	X	X		-	-	-	-	-	-	-	-	-	-	-

Notes:

X = Resource occurs within the 1,000-foot-wide route
- = Resource does not occur within the 1,000-foot-wide route
GIA = Grant-in-Aid, trails that have a MnDNR cost-sharing program for their development and maintenance. This is delegated by state legislation and state stickers are required by operators on these trails.

3.13.1.1. Dispersed Recreational Activities

Dispersed recreational opportunities are those activities occurring outside of developed recreational sites including, but not limited to, activities such exploring the forested areas, winter activities, driving for pleasure, hunting, and forest product gathering. This discussion is divided into the following sub-sections: Trail Activities, Hunting and Gathering, Fishing and Water Recreation, and Auto Tours. Resources managed by the CNF are discussed in Section 3.13.1.4.

Trail Activities

The administrative boundaries of state and national forests within Minnesota are connected through state- and federally-designated trails and county and municipal trail systems. For this reason, some of the trails cross numerous jurisdictions. The trails offer opportunities for horseback riding, cycling, snowmobiling, cross country skiing, and off-road all-terrain vehicle (ATV) and motorcycle use. The Study Area incorporates land in state owned properties, each of the four counties, the Leech Lake Reservation (LLR), and the CNF.

As shown in Table 3.13-1 and Figure 3.13-1, the Route Alternatives and Segment Alternatives cross six state-designated trails:

- West Bowstring Trail: used for snowmobiling;
- Paul Bunyan State Trail: a multi-use trail providing opportunities for biking, hiking, in-line skating, and snowmobiling;
- Hartland State Trial: a multi-use trail providing opportunities for biking, hiking, in-line skating, and snowmobiling;
- Soo Line North State Trail: a 49-mile trail open to off-road vehicles between April and November and groomed for snowmobiles in the winter;
- Marcell Trail: used for snowmobiling; and
- Bushwacker Trail: used for snowmobiling.

The Study Area also includes four Grant-In-Aid (GIA) snowmobile trails, which cross numerous jurisdictions and include the following:

- North Country Trail;
- Blue Ox Snowmobile Trail;
- Cass County Snowmobile Trail; and
- Becida Snowmobile Trail.

The maintenance of GIA trails is the responsibility of the MnDNR. State-issued registration stickers are required by operators on these trails. The GIA trails are utilized by off-highway vehicles (OHV), where appropriate, as well as for hiking, biking, and snow activities. State statutes, MnDNR regulations, and county ordinances regulate the use of OHVs on these trails and other areas. For example, OHVs are prohibited from water bodies and wetlands, designated non-motorized trails, posted areas, and restricted areas on public lands.

In addition to the designated state and GIA trails, the Study Area also contains a number of snowmobile trails maintained by Beltrami, Hubbard, Cass, and Itasca counties.

While the public rights-of-way (ROWs) on roadways are not official trails, OHVs also are allowed to operate in these locations with some limitations. For example, OHVs cannot operate on the inside slope of the ditch, shoulder, and roadway of state or county roads. Class 2 all terrain vehicles (ATV) may be operated on the shoulder or extreme right side of county, township, and city roads if not prohibited by the road authority or other local laws (MnDNR, 2008b and 2008c). CNF regulates OHV use on national forest lands. These regulations are discussed in detail in Section 3.13.1.4.

Hunting and Gathering

The Study Area attracts thousands of hunters during deer season, as well as those who hunt small game and waterfowl. Route Alternatives 1, 3, and their associates Segment Alternatives cross the Bemidji Slough wildlife management area (WMA) (near MP 1-7 and 3-7). The WMA is located south of the city of Bemidji, in the northwest quadrant of the intersection of U.S. Highway 71 and MN Highway 46.

The WMA is part of the Bemidji State Game Refuge. The Bemidji State Game Refuge encompasses approximately 47,300 acres and includes the city of Bemidji, Lake Bemidji, Lake Bemidji State Park, portions of the U.S. Highway 2 corridor, and other transmission lines. This area is located near the Schoolcraft and Mississippi Rivers, Lake Marquette, Lake Plantagenet, Lake Irving, and Carr Lake. The Bemidji State Game Refuge is an area designated by the MnDNR, in which the hunting or trapping of some wild animals is prohibited. Hunting in the WMA and Bemidji State Game Refuge is open for small game, but not waterfowl. In addition, deer hunting is restricted within the WMA and game refuge.

All Route Alternatives cross portions of the Bowstring State Forest. Route Alternatives 1 and 2 cross portions of the Welsh Lake State Forest. In addition, all alternatives cross portions of the CNF. Hunting is allowed on state- and federally-owned forest parcels that are crossed by the Route Alternatives and Segment Alternatives (Otter Tail Power et al., 2008a).

For some people, primarily non-tribal members, the harvesting of wild rice is used as a recreational or educational activity. Large wild rice beds are protected and actively managed by the MnDNR. Users of this resource must purchase a license to harvest wild rice. Non-tribal members are allowed to gather wild rice on the LLR, as well. However, a license must be purchased from the LLR in order to participate in this activity on reservation lands. Licenses are issued to non-band members if they meet one or more of the following conditions:

- Have a tribal identification card w/enrollment number;
- Have a Minnesota Driver's License with current address; or
- Must be a resident of the LLR for 90 days (LLBO, 2009c).

Wild rice also represents an important part of the cultural heritage of the Leech Lake Band of Ojibwe (LLBO). As discussed in Sections 3.9 and 3.12, Tribal members of the LLBO gather wild rice, berries, boughs, and bark, when they are in season, from publicly owned lands within the boundaries of the Reservation. At times, permits are required (LLBO, 2009c). In many instances these activities are used to provide food or as an important part of their cultural practices and not as recreational activities. Additional detailed discussions about hunting and the gathering of wild rice and other foods with regard to subsistence uses is presented in Section 3.9, Cultural Resources and Section 3.12, Environmental Justice.

Fishing and Water Recreation

Several large lakes present within the Study Area are used for fishing and recreational boating. Section 3.4, Water Resources, outlines additional water resources within the Study Area. Additional information about fishing can also be found in Section 3.12, Environmental Justice.

All Route Alternatives run to the south of Lake Irving and Lake Bemidji. Both lakes host good fishing resources. Lake Bemidji has public access locations around the lake, including fishing piers (MnDNR, 2009j). Route Alternative 3 crosses the Turtle River Lake and Long Lake east of U.S. Highway 71 (MP 3-26 to 3-27). Turtle River Lake has special fishing regulations, while the fishing environment (i.e. good stock of fish and easy access) of Long Lake is in good condition (MnDNR, 2009j).

Twin Lake has an access point within Route Alternative 1 (between MP 1-23 and 1-24). This lake is located in Cass County (Otter Tail Power et al., 2008a). Twin Lake has a public access point operated by the United States Forest Service on the south side of the lake, off of County Road 22. This lake is used by anglers and includes an experimental regulation for northern pike (MnDNR, 2009j).

Within Cass County, Pike Bay (South Pike Bay Campground), Lower Sucker Lake (off Ketchum Road), and White Oak Lake have access points within 0.25 mile of Route Alternative 1, located near MP 1-22, 1-30, and 1-60, respectively. Segment Alternative B is located within 1,800 feet of an access point on Thirteen Lake (MP 1B-4). Route Alternative 2 is located within 170 feet of an access point to Cass Lake (between MP 2-20 and 2-21). Some of these lakes have special and/or experimental fishing regulations that limit some activities of anglers (MnDNR, 2009j).

Route Alternatives 1 and 2 are located to the south of Ball Club Lake in Itasca County (MP 1-54 to 1-55 and MP 2-52 to 2-54). Access points located on this lake are not crossed by the Route Alternatives. Public access is located on the west and south sides of the lake (MnDNR, 2009j). Alternative Route Segment C is located within 1,800 feet of an access point to the Mississippi River and within 130 feet of a Leech Lake River access point. These occurrences are near the border of Itasca and Cass counties. Route Alternative 3 does not appear to intersect with any known water access points in these counties.

The portion of the Mississippi River running through the Study Area is considered a water trail by the MnDNR. The MnDNR has divided the river into 10 subsections from Lake Itasca to the Iowa/Minnesota border. All Route Alternatives cross the Mississippi River just south of the city of Bemidji (near MP 1-3, 2-5, and 3-3), within the subsection known as Lake Itasca to Cass Lake. Route Alternatives 1 and 2 cross the Mississippi River at a second location located west of Ball Club Lake (MP 1-52 and between MP 2-50 and 2-51).

The Big Fork River is located within Itasca County northeast of Dora Lake. This river runs to the north, and outside the Study Area for Route Alternative 3. CNF has identified the Big Fork River is an Eligible Scenic River within the Wild and Scenic River Federal designation system (USDA, 2004), although there has been no formal designation as Wild and Scenic River.

Auto Tours

Cass County Road 10/39, which crosses Route Alternative 2 at U.S. Highway 2, is designated by the U.S. Forest Service (USFS) as a National Forest Scenic Byway and by the State of Minnesota as a scenic byway named the Ladyslipper Scenic Byway (Ladyslipper Scenic Byway, 2009).

MN Highway 46 between Deer River and Northome is designated as the Avenue of the Pines Minnesota Scenic Byway. Route Alternative 3 parallels this byway for approximately 0.5 mile between Cass County Highway 10 and Cass County Highway 29.

Portions of U.S. Highway 2 near the city of Bena and Ball Club Lake are designated as the Great River Road, a National Scenic Byway that runs parallel to the Mississippi River. All Route Alternatives cross this Scenic Byway.

3.13.1.2. Developed Recreational Activities

Developed recreational activities refer to those activities that are limited to a specific facility or area. This subsection is divided into local resources and passive recreational values.

Local Resources

Bemidji Area

All of the Route Alternatives begin near the city of Bemidji. Within the city, a number of facilities are present that offer recreational opportunities for both visitors and residents. For example, the Headwaters Science Center is located in downtown Bemidji, north of the western terminus of the Study Area (Otter Tail Power et al., 2008a).

Bemidji High School has tennis courts and soccer fields that are directly adjacent to Route Alternative 2 and Segment Alternative I (southwest of MP 2-2 to 2-3). The tennis courts and soccer fields are open to the public when not in use by the school. Also within the city of Bemidji is the Roger Lehmann Park, adjacent to the corridor. This park is located to the south of Lake Irving (Otter Tail Power et al., 2008a).

Paul Bunyan Animal Land is also located within Beltrami County. This facility is located adjacent to and north of U.S. Highway 2, north of Plantagenet Road. Route Alternative 2 is located near the railroad tracks that follow the boundary of this facility. In this location, the railroad tracks are located to the south of U.S. Highway 2. Route Alternative 1 is located slightly to the southwest of this facility, while Route Alternative 3 is located to the west.

North of the city of Bemidji is the Lake Bemidji State Park. Route Alternative 3 travels to the east of this location. The Wolf Lake State Wildlife Management Area (WMA) is located approximately 0.5 mile to the north of Route Alternative.

The Maple Ridge Golf Course is located along the county line between Hubbard and Beltrami counties, to the west of Alternative 3 (near MP 3-9). The distance between this alternative and the golf course is less than 0.5 mile.

Cass Lake Area

To the east of the city of Cass Lake, a number of resources are present, including the Norway Beach Recreation Area and Interpretative Trail and the Stony Point Resort. The Norway Beach Recreation Area and Interpretative Trail are located in Cass County, along the southern shore of Cass Lake. The Mi-Ge-Zi Bike Trail lies within this area and is managed by the CNF. Stony Point Resort provides recreational opportunities, including lodging, camping, and fishing (Stony Point Resort, 2009). Route Alternative 2 is located in proximity to these resources (Otter Tail Power et al., 2008a).

The Hole-In-Bog Peatland Scientific and Natural Area (SNA) is located approximately 600 feet south of Route Alternative 1 (MP 1-38 to 1-39). Route Alternative 2, south of the BNSF railway and west of MN Highway 371, crosses the Sandtrap Golf Course. This facility is located just to the west of Pike Bay and south of Cass Lake on Golf Course Road (near MP 2-19). A historic logging camp is located along Cass Lake as well (Otter Tail Power et al., 2008a).

Deer River Area

Route Alternative 3 passes to the west of the Blueberry Hills Golf Course, located to the north of Deer River along Golf Course Road (MP 3-104). The White Oak Casino is located at the intersection of U.S. Highway 2 and MN Highway 46, within 1 mile of Route Alternatives 1 and 2 and their associated Segment Alternatives (north of MP 1-59 and 2-58). Alternative 3 is located to the north of this facility.

Passive Recreational Values

Recreational opportunities can be defined by which recreational activities people are engaging in and where, along with the related facilities and infrastructure that are present in the Study Area. The overall visitor experience also is defined by passive uses, perceptions, and sentiments associated with the experience of visiting the region in which the Project is located.

The region of Minnesota represented by Beltrami, Cass, Hubbard, and Itasca counties provides a sense of place to its visitors and residents. Sense of place can be defined in numerous ways. For instance, people may develop emotional bonds to places, which are important to them for providing certain kinds of experiences that they value. "Sense of place can play an import role in fostering individual identity, influencing quality of life, reinforcing cultural traditions, and shaping attitudes toward the land and how it should be managed" (USDA, 2004).

Due to the numerous forests, lakes, and rural character within the Project area, these locations have a specific identity and character that take on multiple meanings for different individuals. Mental imagery and perception of place, landscape, and experience are important in understanding the connections that people feel between the places they visit and their experiences.

For these types of experiences, the number of visitors or the amount of facilities utilized are not the most important statistics to note. Instead, the overall visitor experience represents the intangible aspects associated with a recreational visit.

In addition to the above activities, organized recreational events are held annually within the Study Area. These activities are understood as passive activities, because people have the option of attending the events and participating at varying levels of involvement. The dates of typical annual activities held in 2009 are listed in Table 3.13-2 (Enbridge Energy, 2009).

Table 3.13-2: Recreational Events Occurring in or Near the Study Area

Recreational Event	2009 Date	Location
Goose Season Opener	March 1	Cass Lake
17th Annual Memorial Walk/Run	May 21	Cass Lake
Leech Lake Veteran's Memorial Day Pow-Wow	May 22-24	Cass Lake
Muskie Fishing Opener	June 6	Walker
Chippewa Triathlon National Get Outdoors Day	June 13	Cass Lake
Moondance Jammin Country Fest	June 18-120	Leech Lake area
Leech Lake 4th of July Pow-Wow	July 3-5	Cass Lake
Lake Winnie National Forest Bald Eagle Day	July 18	Cass Lake
Onigum 11th Annual Pow-Wow	July 24-26	Onigum
2nd Annual Mi Ge Zi Mountain Bike/Tour	Aug 15	Bemidji
Cha Cha Bahning 25th Annual Pow-Wow	Aug 21-23	Inger
Leech Lake Tribal Member Hunting Season Opener	Sep 1	Leech Lake Area
Bear Hunting Season Opener	Sep 1	Leech Lake Area
Leech Lake Labor Day Contest Pow-Wow	Sep 4-6	Cass Lake
41st Annual Muskie Inc. International Tournament	Sep 11-13	Cass Lake and Walker
Battle Point Pow-Wow	Sep 11-13	Sugar Point Community Pow-Wow grounds
Deer Archery Opener and Small Game Opener	Sep 19	Cass Lake
Grouse Season Opener	Sep 19	Cass Lake
27th Annual North Country Marathon and 10K	Sep 19	Leech Lake
Cystic Fibrosis Walleye Classic	Oct 3	Cass Lake
Pheasant Hunting Opener	Oct 10	Leech Lake area
Paul Harman MN Muskie Tournament	Oct 10-11	Cass Lake
Deer Firearm Opener	Nov 7	Leech Lake area
Deer Muzzleloader Season Opener	Nov 28	Cass Lake

Note: 1 Event dates were gathered through the Cass Lake Chamber of Commerce, Leech Lake Tourism Bureau, and Chippewa National Forest websites. Additional information was obtained from Appendix U of the Final Environmental Impact Statement for Enbridge Energy (Enbridge Energy, 2009).

3.13.1.3. Leech Lake Reservation

The Leech Lake Reservation (LLR) contains a variety of recreational resources. There are over 250 named lakes located within the LLR. The Mississippi River also passes through the Reservation (LLBO, 2009).

Trails

Within the LLR, trails often use roads, trails, and access areas for camping, fishing, hunting, hiking, and other recreational purposes; and to access areas for traditional and cultural practices and uses (USDA, 2004). The majority of trails and recreation areas located in the Study Area within the LLR are in Cass County, along Route Alternatives 1 and 2 and their associated Segment Alternatives. Trails within the Chippewa National Forest also pass through the LLR. Specific information regarding trails located solely within the LLR is not available; information about trails and specific recreational areas in Cass County and the Chippewa National Forest are discussed further in the sections below.

Hunting and Gathering

As previously indicated, another opportunity in the area is the harvesting of wild rice. Large wild rice beds are protected and actively managed by the MnDNR. Users of this resource must purchase a license to harvest wild rice. Some users consider this activity to be recreational in nature, while others harvest rice as part of their subsistence and ceremonial activities.

For example, tribal members of the Leech Lake Reservation are able to gather berries, boughs, and bark, when they are in season, from any publicly owned lands within the boundaries of the Reservation. At times, permits are required (LLDRM, 2009c). Additional detailed discussions about hunting and the gathering of wild rice and other foods is presented in Sections 3.9, Cultural Resources, and 3.12, Environmental Justice.

Fishing and Water Recreation

The Leech Lake Band of Ojibwe Division of Resource Management (LLDRM) operates the fisheries program on the LLR to protect and to enhance the fisheries and other aquatic resources on the Reservation for current and future generations of tribal members. The LLDRM conducts lake surveys, habitat improvement projects, rough fish removal, and operates a fish hatchery (CNF, 2005). There are over 50 species of fish found on the Reservation including walleye, northern pike, largemouth bass, and panfish. Tribal members hold the lake whitefish, a species found in some of the larger deeper lakes, in high regard (LLDRM, 2009a). See Sections 3.4, Water Resource, and 3.7, Biological Resources, for additional information about water resources and fish species.

Route Alternative 1 crosses to the south of a water access point for Pike Bay within the LLR boundaries (north of MP 1-22). As it travels to the east, it crosses a second water access point at Twin Lake (between MP 1-23 and 1-24) and then is located to the south of a third water access point at the southern end of the Sucker Lakes (north of MP 1-30).

Route Alternative 2 travels between two water access points within the LLR near the city of Cass Lake (MP 2-20 to 2-24). These water access points are for Pike Bay and Cass Lake. This Route Alternative also passes to the north of a water access point near Ryan Village (near MP 2-34) and to the south of one for Lake Winnibigoshish (north of MP 2-36).

Route Alternative 3 does not cross through any water access points within the Leech Lake Reservation.

Developed Recreational Activities

As shown in Table 3.13-2, a variety of recreational events, including pow-wows, hunting and fishing events, and athletic events, are held within the LLR throughout the year. For example, the Leech Lake Reservation operates several casinos in proximity to the Study Area. The Leech Lake Bingo and Palace Casino is located at Cass Lake, north of Route Alternative 2. The tribe operates two other facilities, one near Walker and one near Deer River (the White Oak Casino) (LLBO, 2009).

There are a number of community facilities located in various communities throughout the LLR, as well; facilities include four municipal tribal community centers along with 11 other tribal centers (Giese, 1997). The smaller communities often utilize their facilities for community events and services, such as medical clinics and programs for elders. In addition, the tribe operates four educational facilities, including the Bug O Nay Ge Shig School, an early childhood center, a tribal college, and a youth facility located in Cass Lake (LLBO, 2009). The Bug O Nay Ge Shig School is located to the south of Lake Winnibigoshish and to the northeast of Portage Lake near U.S. Highway 2. Route Alternative 2 is located to the north of this facility, while Route Alternative 1 is located to its south. The tribe also operates a service station, convenience store, and gift shop, known as the Che-Wa-Ka-E-Gon, which is located on U.S. Highway 2 (LLBO, 2009). Route Alternative 2 is located near this facility.

3.13.1.4. Chippewa National Forest

The CNF has developed a Land and Resource Management Plan (CNF, 2004) that provides desired resource conditions, resource management practices, levels of resource production and management, and the availability of suitable land for resource management. Land management direction through the implementation of recreation goals, objectives, standards, and guidelines are incorporated into the CNF Land and Resource Management Plan.

Trails

As shown in Table 3.13-1, the alternatives cross three CNF non-motorized trails and two CNF snowmobile/OHV trails. The CNF manages the MiGeZi Bike Trail, which is a designated bike trail. Other non-motorized uses are allowed on this trail, as well. The MiGeZi Bike Trail connects the Norway Beach Recreation Area to the city of Cass Lake (CNF, 2008a). Route Alternatives 1 and 2 cross this trail complex.

The Pipeline and Winnie Snowmobile Trails also are managed by the CNF. These trails also are designated as Cass County GIA trails and are connected to the GIA snowmobile trails network. Many of the snowmobile trails are listed under two designations. For example, a trail can be identified as a national forest snowmobile trail and GIA (Otter Tail Power et al., 2008a). The Pipeline Trail is crossed by Route Alternatives 1 and 2, while the Winnie Snowmobile Trail is only crossed by Route Alternative 2.

The CNF regulates off-highway vehicle use on National Forest System (NFS) lands (CNF, 2010). Under authority of the Act of Congress of June 4, 1897, as amended (16 USC 551), and pursuant to the Secretary of Agriculture's Regulations set forth at 36 CFR 261, Subpart B (36 CFR 261.50(a) and (b)), the following acts or omissions are prohibited on National Forest System Lands, National Forest System Roads, and Trails within the proclaimed boundaries of the CNF in Minnesota:

1. It is prohibited to possess or use a motor vehicle off National Forest System roads; including road ditches, shoulders, and cross country travel. (36 CFR 261.56).
2. It is prohibited to use an Off Road Vehicle, (ORV) or highway-legal vehicle on National Forest System roads except where and when designated. (36 CFR 261.54(a)).
3. It is prohibited to use snowmobiles on any plowed National Forest System road. (36 CFR 261.54(a)).
4. It is prohibited to use a motor vehicle on a National Forest System road or segment thereof, which has a physical barrier in place, such as: a sign, gate, post, boulder(s) and/or berm(s) to prevent such use. (36 CFR 261.54(b)).
5. It is prohibited to use a motor vehicle on a National Forest System Trail except where designated. (36 CFR 261.55(b)).

Pursuant to 36 CFR.50 (e), the following persons are exempt from this order:

1. Any Federal, Tribal, State, or local officer, or member of any organized rescue of fire fighting force in the performance of an official duty.
2. Persons with a permit specifically authorizing the otherwise prohibited act or omission.

Hunting and Gathering

As shown in this discussion, hunting is allowed on federally-owned forest parcels that are crossed by the Route Alternatives and Segment Alternatives (Otter Tail Power et al., 2008a). All of the Route Alternatives cross portions of the CNF.

Fishing and Water Recreation

The Chippewa National Forest includes Leech Lake, Cass Lake, Lake Winnibigoshish, Pike Bay, the Sucker Lakes, Portage Lake, the Twin Lakes, and Ball Club Lake. Launch services are available on each of these lakes.

The MnDNR, the LLDRM, and the Chippewa National Forest are partners in managing the fishery resources in the CNF. The MnDNR is the lead agency for surveying, stocking, removing rough fish, renovating lakes and streams, and improving lake access in Minnesota. Management by the LLDRM includes both game and non-game species. The LLDRM also conducts lake surveys, habitat improvement projects, rough fish removal, and operates a fish hatchery, which is open to the public in early spring (CNF, 2005).

Route Alternative 1 crosses to the south of a water access point near Pike Bay and through a water access point at Twin Lakes. It also crosses just to the south of the Sucker Lakes. These points are contained within the LLR, as well, as previously noted. Water access points to Lake Winnibigoshish are located north of Route Alternatives 1 and 2.

Developed Recreational Activities

The CNF has an office in Cass Lake that is an information stop for recreational users of the national forest. The office is located approximately 400 feet north of Route Alternative 2.

Passive Recreational Values

The CNF is important to many people for a variety of opportunities, benefits, and values related to cultural, spiritual, and traditional practices. For example, the CNF as a whole is important to members of the Leech Lake Band of Ojibwe (LLBO). Certain areas within the CNF support specific vegetation, wildlife, and forest settings that are important to the LLBO (USDA, 2004).

3.13.2. Direct/Indirect Effects

This section provides a discussion about the potential impacts from the Project alternatives on recreation and tourism. Potential effects for the Route and Segment Alternatives located within the Leech Lake Reservation (LLR) and CNF are consistent with the alternatives' evaluation and, therefore, are not discussed separately for recreation and tourism.

Potential direct impacts to dispersed and developed recreational and tourism resources include the following:

- Loss of scenic resources
- Loss of natural areas
- Impacts to water and forest resources used for recreation

- Impacts to resources used for recreation including, but not limited, dispersed and developed resources

Potential indirect impacts include:

- visual impacts to the scenic quality and landscape
- temporary increases in noise levels
- encouragement of OHV use by opening a new ROW

This discussion is divided into a general evaluation of all of the Route Alternatives and then is followed by specifics related to each individual alternative. The level of dispersed and developed recreational activities and how they could be affected by construction and operation of the transmission line are used to focus the evaluation of potential direct and indirect effects of each alternative.

Direct effects involve altering or physically changing recreation resources, conflicting with recreation area goals, or affecting accessibility to remote or sensitive areas. Direct effects could affect dispersed and developed recreational activities and facilities and could occur during construction and operation. Indirect effects include visual impacts to the scenic quality and natural appearance of the landscape, as viewed from the recreational use area by a recreational user. Section 3.1, Aesthetics, describes the potential for visual impacts in more detail. These types of effects also can include negative impacts to noise that would affect the recreational experience.

3.13.2.1. No-Build Alternative

The No-Build Alternative would not impact existing recreational and tourism resources directly or indirectly. This alternative would allow existing resources to be utilized in the same manner as they are currently being used. This alternative would not impact either dispersed or developed recreational activities. As such, no loss of scenic resources or natural areas would result. No impacts would be expected to water and forest resources used for recreation, as well as other types of resources used for recreation, such as, but not limited to, golf courses, public parks and their associated facilities, and school resources.

3.13.2.2. Route Alternatives and Segment Alternatives

This section identifies potential direct and indirect effects of the Route Alternatives and Segment Alternatives.

Direct Effects of All Alternatives

Constructing a transmission line adjacent to an existing linear utility corridor would not significantly change the recreational uses of the area, because the corridor was previously disturbed and the existing viewshed includes a linear type feature. However, this Project would change the vegetation within the right-of-way (ROW) in some areas from forest land to shrub land or grassland. The widened or new ROW would eliminate approximately 433 to 813 acres of forestland, depending upon the alternative selected (Table 3.15-2).

The Project transmission line generally would span trails such that a direct impact to the individual trail would be minimal. Trails, especially those for OHV use, are often located within existing ROWs. Creation of new ROW may attract OHV use, although the recreation may be prohibited on NFS lands under CNF regulations unless new OHV trails are designated.

All of the alternatives would temporarily impact hunting and gathering resources, because the alternatives would limit access and disrupt the current habitat and vegetation within the areas in which the transmission line would be located. As shown in Section 3.7, Biological Resources, the primary impact to vegetation would be the conversion of existing vegetation communities to managed grassland or shrubland within the transmission line ROW. Route Alternative 1 would cross the Ten Section area, an old growth forest managed by the CNF and within the boundaries of the LLR, which has been identified by the LLBO as an area of cultural significance. Route Alternative 2 would have greater impacts to upland shrub and conifer communities relative to Route Alternatives 1 and 3.

Potential impacts to fauna would include the direct or indirect loss or conversion of habitats, increased habitat fragmentation, and the potential risk of avian collisions, which could reduce the available hunting options. During construction, some mortality could occur to less motile or burrowing species, and abandonment of a nest site and the loss of eggs and/or young in avian species. Avian collisions with the transmission line, specifically waterfowl, may occur following construction of the Project, particularly in areas where the transmission line is between foraging or breeding areas. Clearing vegetation underneath the transmission line during construction and operation would alter the wildlife habitat within the immediate vicinity, potentially affecting wildlife viewing and hunting opportunities. Interior forest dependent wildlife may move to a different area of the forest or utilize other existing habitat. Likewise, shrub- or grassland dependent species may become more available for viewing within an opened corridor. See Sections 3.7, Biological Resources and 3.8, Species of Special Concern for additional information about the potential impacts to wildlife and vegetation.

Direct impacts to fishing and water recreation would be minimal, because the construction and operation of the transmission line would not prevent access to lakes or rivers in the long-term. No public water access points, which includes public fishing sites and boat launches, would be crossed within Beltrami County and Hubbard County by any of the Route Alternatives (see Figure 3.13-1). If a public water access point were crossed, such as in Cass County and Itasca County, the Project could potentially interfere with its use as a boating dock or fishing site by limiting access.

During construction, some access may be restricted for safety reasons, while the transmission lines are being placed. Where possible, the transmission line route would follow existing utility and roadway ROWs, thus limiting additional impacts to these resources. Once construction was complete, users would be able to access the water resources for fishing, boating, and other recreational activities.

As indicated in Section 3.4, Water Resources, direct impacts to surface water resources are unlikely to occur at PWI basins and watercourses. Route and Segment Alternatives have been located to avoid surface water features to the extent practicable. In areas where surface water features are present, it is anticipated that ROW alignments could be directed to avoid surface water or that water bodies could be spanned. Specific impacts to surface waters, such as the Mississippi River, are discussed as they pertain to the individual Route Alternatives.

Developed recreation facilities, such as golf courses and parks offices, would not be impacted directly by the construction and operation of the transmission lines.

While passive recreational resources may be impacted directly, it is difficult to determine the extent and location of these impacts, as the experience associated with these activities is primarily based on the individual.

Table 3.13.-3 provides a summary of the recreational resources that could be affected directly by each alternative.

Indirect Effects of All Alternatives

A visual impact, or indirect effect, would result from the inclusion of the poles and conductors, cleared ROW, or widened existing ROW within the viewshed of recreational users, and in particular trail users, during construction and operation. Generally, this impact would be brief because the conductors would be perpendicular to trails and, therefore, observed for only a short time (Otter Tail Power et al., 2008).

During construction, increased levels of noise and dust may also occur as machinery is moved throughout the overall Project area, resulting in an unsatisfactory visitor recreational experience. Worker conversations and movement also would contribute to this impact, although the noise associated with these activities would dissipate after the completion of construction. During operation, noise levels may increase, as compared to the existing conditions.

Impacts to recreation use from dust generation during construction are expected to be minor and temporary. A more detailed discussion is included in Section 3.2, Air Quality and Climate.

Another potential indirect impact would be the availability for a new or expanded ROW that people may use for all terrain vehicle traffic. The use of the ROW could be a negative impact in sensitive areas located along the transmission line, as OHV use could result in illegal trespassing, interference with hunting, and increased noise levels. The addition of the new ROW would allow for the possibility of creating more connections between existing trails, as well as providing new trails for users. As previously discussed, existing ROWs are used for the operation of these types of vehicles on state and county lands.

As shown in this analysis, recreational activities are not always active; and therefore, the resources within the paths of the alternatives also hold a passive use value. These resources are used as means of recreation through observation. For this Project, these areas primarily include forested lands contained within the CNF. As previously mentioned, the CNF is important to many people for a variety of opportunities, benefits, and values related to cultural, spiritual, and traditional practices (USFS, 2004).

As noted above, passive recreational use includes attendance at outdoor or forest-related events and observation of nature. In these instances, people anticipate an uninterrupted view of forest cover or other natural setting. They do not anticipate the presence of structures associated with the transmission lines. People, therefore, who prefer this type of recreation, are impacted indirectly by the addition of new transmission lines because their recreational experience is diminished.

Frequent and returning recreational users to this area would find their recreational experience diminished as a result of changed conditions to areas that they previously used or became accustomed to. Future users, who have not visited this area previously, would not be impacted to the same extent, because their recreational experiences would be informed by the conditions at the time of their visits. In another manner, some potential visitors have a "Northwoods" notion of lands north of St. Cloud, Minnesota. If this area is developed with new and expanded utility corridors, this pre-conceived notion of the pristine "Northwoods" would no longer be valid.

Table 3.13-3: Potential Direct Effects to Recreation for Route and Segment Alternatives

Resource	Route Alternatives			Segment Alternatives																			
	1	2	3	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
# of CNF bike trails crossed	5	2	3	-	5	0	2	0	1	-	-	-	-	-	-	-	0	0	0	-	0	0	0
# of snowmobile trail crossings[1]	4	9	15	2	0	0	0	4	0	0	0	0	0	1	1	1	0	0	0	0	1	0	0
# of state trails crossed[2]	3	1	1	1	0	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0
# of scenic byways crossed[3]	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
# of Mississippi River crossings	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
# of total PWI water crossings	18	13	46	3	0	1	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Temporary Impacts to Bemidji Slough WMA by right-of-way	5 ac	None	4.3 ac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-Term Impacts to Bemidji Slough WMA (within the right-of-way)	67 5 sq f	None	561 sq feet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Temporary Impacts to Bemidji State Game Refuge (within the right-of-way)	65 ac	124 ac	111 ac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-Term Impacts to Bemidji State Game Refuge (within the right-of-way)	0.2 ac	0.3 ac	0.3 ac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-Term and temporary impacts to CNF lands (within the right-of-way)[4]	543 ac	496 ac	920 acs	-	95 ac	66 ac	2 ac	104 ac	12 ac	-	-	-	-	-	-	-	57 ac	42 ac	6 ac	-	2 ac	< 1 ac	7 ac
Long-Term and temporary impacts to LLR lands (within the right-of-way)	662 ac	655 ac	4 ac	-	152 ac	60 ac	44 ac	106 ac	28 ac	-	-	-	-	29 ac	19 ac	34 ac	57 ac	42 ac	6 ac	3 ac	-	-	-

Notes:

1. Reflects the total number of snowmobile trails crossed by the Alternative, regardless of designation. Some trails are designated by two jurisdictions, but are the same trail and are therefore counted as one trail. Some trails are crossed by an Alternative in more than one location, thus the number of crossings was counted regardless of name. This number does not include State trail crossings, including the Soo Line North, which are listed separately.
2. State trails may be used for snowmobiling.
3. Includes state- and federally-designated scenic byways.
4. See the Land Use Section for a classification of long-term and temporary impacts.

Route Alternative 1

Route Alternative 1 would have minimal direct and indirect effects on dispersed recreational activities (i.e., trail activities, hunting and gathering, fishing and water recreation, and auto tours) and developed resources including local facilities and passive recreational activities.

Route Alternative 1 crosses the following trails:

- Paul Bunyan State Trail at MP 1-8;
- Heartland State Trial at MP 1-20;
- Soo Line North State Trail, located near MP 1-22 and 1-23;
- North Country Trail parallels this Route Alternative between MP 1 and 2.5; and
- Cass County Snowmobile Trail parallels U.S. Highway 2 for much of its length and could potentially parallel or cross this Route Alternative in several locations, most likely near MP 1-36 and 1-44.

Route Alternative 1 crosses local snowmobile trails to the south of Lake Irving near the city of Bemidji (Beltrami County, 2006). Route Alternative 1 crosses a snowmobile trail near the Beltrami County and Hubbard County line in Helga Township (between MP 1-9 and 1-10).

The Segment Alternatives associated with this Route Alternative interact with the following trails:

- Segment Alternative A crosses the North Country Trail, the Paul Bunyan Trail, and the Becida Snowmobile Trail;
- Segment Alternative D crosses the Heartland State Trail;
- Segment Alternative L crosses the Becida Snowmobile Trail;
- Segment Alternative N crosses the Soo Line North State Trail; and
- Segment Alternative O crosses the Soo Line North State Trail.

Route Alternative 1 crosses the Bemidji Slough WMA (near MP 1-7) and Bemidji State Game Refuge, both are areas used for dispersed recreational activities. This Route Alternative would cross approximately 1,800 feet of the Bemidji Slough WMA, thereby affecting approximately 675 square feet long-term and 5 acres of temporary impacts. The alternatives cross approximately 22,500 feet of the Game Refuge, with long-term impacts estimated to affect approximately 0.1 to 0.2 acre and 65 acres of temporary impacts.

This Route Alternative is not expected to have extensive direct effects to recreational opportunities at either the WMA or the Game Refuge, because the amount of land expected to be used is minimal in comparison to the overall area of these resources. Recreational trails, including snowmobile trails, would not be closed or altered by the construction and/or operation of this alternative. Segment Alternative J would connect this Route Alternative to Route Alternative 2, avoiding the WMA.

Route Alternative 1 may also impact the scenic quality of landscapes viewed by travelers along U.S. Highway 2, which the USFS has identified as a highly visible corridor. Portions of U.S. Highway 2 are also part of the Great River Road Scenic Byway. Because the Route Alternative would parallel or double-circuit with an existing 69 kV transmission line, the change would be incremental as viewersare accustomed to viewing a transmission line along the highway and would now be viewing taller structures.

Route Alternative 1 crosses a water access point at the north end of the Twin Lake (between MP 1-23 and 1-24). The permitting agencies could require that construction of the transmission line in this location not interfere with the overall use as an access point. However, the access to the water may be interrupted during construction because of the movement of equipment and the preparation of staging areas. Indirect impacts may be experienced by users during the operation of the transmission line, because their views would be disrupted by the presence of the new line.

In addition to this water access point, Route Alternative 1 may introduce another plane of wires across the Mississippi River near Ball Club. As discussed in Section 2.2.2.1 there are three alternatives for crossing the river at this location:

- Route Alternative 1 could cross the river and on a separate ROW parallel to the existing Great River Energy 69 kV crossing. This would result in two crossings to the Mississippi River, essentially adjacent to one another;
- Route Alternative 1 could be consolidated with Great River Energy's existing 69 kV transmission line on a new set of double circuit structures. Under this scenario, there would be one set of structures and two planes of wire crossing the river; and
- If this Route Alternative is used in conjunction with Segment Alternative C (see above), a new set of structures would replace the existing river crossing and Great River Energy's 69 kV transmission line would be relocated along a new ROW to cross the Leech Lake River.

Viewers along U.S. Highway 2 and on the Missisppi River would experience an indirect impact from taller structures, and possibly multiple planes of wires, but there would be no direct impact to water access points or the use of the Mississippi

With the following exceptions, the Segment Alternatives associated with Route Alternative 1 would not change the water crossings for this Route Alternative:

- Segment Alternative A would cross the Bungashing Creek and Necktie River, while avoiding a crossing an unnamed Necktie Tributary;
- Segment Alternative B would avoid crossing an unnamed tributary at Pike bay/Cass Lake; and

- Segment Alternative C would introduce a new crossing of the Leech Lake River; moving the existing 69 kV transmission line from its current Mississippi River Crossing near Ball Club. The existing crossing near Ball Club would be maintained, the existing 69 kV structures would be replaced with taller structures to support the new 230 kV transmission line.

Additional details are provided in Section 3.4, Water Resources.

Route Alternative 1 passes just to the north of the Hole-in-the-Bog Peatland SNA (MP 1-38 to 1-39). Because the alternative does not pass directly through the SNA, no direct impacts would likely occur. Indirect impacts may include visual disruptions, because existing recreational users would not be accustomed to these views. First-time visitors, however, would not be impacted to the same extent because their knowledge would consist only of this type of view.

No major direct or indirect impacts are expected to recreational resources such as golf courses, museums, city parks, or campgrounds within the cities of Bemidji, Cass Lake, Bena, and Deer River because of the distance from the alternatives and the use of existing ROWs.

Route Alternative 2

Route Alternative 2 would have minimal direct and indirect effects on dispersed recreational activities (i.e., trail activities, hunting and gathering, fishing and water recreation, and auto tours) and developed resources including local facilities and passive recreational activities.

Route Alternative 2 crosses the following trails:

- Heartland State Trial, located east of MP 2-19;
- Soo Line North State Trail, located near MP 2-23;
- North Country Trail parallels this Route Alternative near MP 2-1;
- Blue Ox Snowmobile Trail, near MP 2-7;
- Cass County Snowmobile Trail parallels U.S. Highway 2 for much of its length and could potentially parallel or cross this Route Alternative in several locations, most likely near MP 2-35 and 2-43; and
- Bushwacker Trail, near MP 2-58 and 2-59.

Route Alternative 2 crosses local snowmobile trails to the south of Lake Irving near the city of Bemidji (Beltrami County, 2006) and a snowmobile trail near Wolf Lake and between Farris and Cass Lake (MP 2-16 to 2-18).

The Segment Alternatives associated with this Route Alternative interact with the following trails:

- Segment Alternative F crosses the Heartland State Trail;
- Segment Alternative K crosses the Cass County Snowmobile Trail;
- Segment Alternative N crosses the Soo Line North State Trail; and
- Segment Alternative O crosses the Soo Line North State Trail.

Route Alternative 2 passes through the Bemidji State Game Refuge, impacting approximately 0.3 acre of land located within the Game Refuge long-term. Temporary impacts to the refuge from construction of this Route Alternative are estimated to be 124 acres. While these impacts would not alter the land in a manner that would directly affect the way in which the land was used for recreation, visual impacts would occur in this area. In this area, Route Alternative 2 follows the route of existing and newly-constructed Enbridge pipeline and a railroad. A telecommunications tower also is present near Madison Avenue (near MP 2-6). Therefore, the visual impact would not be reduced because of the presence of existing and other proposed infrastructure.

Route Alternative 2 would also impact the scenic quality of landscapes viewed by travelers along U.S. Highway 2, which the USFS has identified as a highly visible corridor and is part of the Great River Road Scenic Byway. Travelers accustomed to seeing the existing 69 kV transmission line on the south side of the highway would also view taller transmission structures on the north side of the highway.

Portions of the Sand Trap Golf Course are within the 1,000-foot Study Area of Route Alternative 2 (near MP 2-19). However, there is sufficient room to align the ROW to avoid directly impacting the golf course. This resource could be impacted indirectly, because the linear visual characteristics of the transmission line would differ from the existing conditions.

In addition, the following resources are located in proximity to Route Alternative 2: Roger Lehmann Park, Norway Beach Recreation Area, Norway Beach Interpretive Trail, and Stony Point Resort. These resources could be impacted indirectly, because the linear visual characteristics of the transmission line would differ from the existing conditions. The direct recreational use of these areas would not change.

Similar to Route Alternative 1, Route Alternative 2 would introduce another plane of wires across the Mississippi River near ball Club. This introduction, however, would not impact water access points in this location or recreational activities. Therefore, Route Alternative 2 would not directly or indirectly affect water access points, with the following exception:

- Segment Alternative C would introduce a new crossing of the Leech Lake River; moving the existing 69 kV transmission line from its current Mississippi River Crossing near Ball Club. The existing crossing near Ball Club would be maintained; and the existing 69 kV structures would be replaced with taller structures to support the new 230 kV transmission line.

Route Alternative 3

Route Alternative 3 would have minimal direct and indirect effects on dispersed recreational activities (i.e., trail activities, hunting and gathering, fishing and water recreation, and auto tours) and developed resources including local facilities and passive recreational activities.

Route Alternative 3 crosses the following trails:

- Soo Line North State Trail, located near MP 2-23;
- North Country Trail parallels this Route Alternative near MP 3-2.5;
- Blue Ox Snowmobile Trail, near MP 3-9;
- West Bowstring Trail, near MP 3-78;
- Marcell Trail, between MP 3-111 to 3-114; and
- Bushwacker Trail, near MP 3-91 and 3-92.

Route Alternative 3 crosses several snowmobile trails within Itasca County, including ones near Alvwood, the north end of Nature's Lake WMA, and to the southwest of Wirt. The Route Alternative then crosses another snowmobile trail near Bowstring and then to the east of Zemple near its eastern terminus.

Segment Alternative E, the only segment associated with this Route Alternative, crosses the West Bowstring Trail and the Marcell Trail.

Route Alternative 3 and its associated Segment Alternative pass through the Bemidji Slough WMA to the south of the city of Bemidji (near MP 3-7). This Route Alternative would cross approximately 1,500 feet of the Bemidji Slough WMA, thereby affecting approximately 561 square feet long-term and 4.3 acres of temporary impacts (Table 3.13-2). The alternatives cross the Game Refuge, with long-term impacts estimated to affect approximately 0.3 acres and 111 acres of temporary impacts. Indirect impacts to scenic and natural resources would likely be minimal, because the footprint of this alternative would change the overall appearance of only that portion of the WMA located near the transmission ROW.

Water resources are not expected to be impacted directly by this Route Alternative. In Section 36 of Township 149 Range 25, a water access point is located in MnDNR State Forest land, south of Forest Road 2187 (MP 3-82). The alternative is located to the east of this location. Route Alternative 3 and its Segment Alternatives cross the Bigfork/Bowstring River south of Dora Lake (MP 3-66 to 3-67). A water access point is located approximately 0.5 mile south of the crossing. As indicated in Section 3.7, Water Resources, all water crossings would be spanned by poles placed from 800 to 1,000 feet apart. Route Alternative 3 would result in 19 water basin crossings and 27 water course crossings, which include, but are not limited to the Mississippi River, the Schoolcraft River, the Necktie River, the Big Fork River, and Bowstring River. Segment Alternative E would cross Grouse Creek at several locations, while avoiding a crossing of the Deer River.

As such, the construction and operation of the transmission line would create a visual intrusion within these areas, but would not directly impact the rivers or opportunities to utilize these rivers for recreational activities. The rivers would be accessible for boat launches and fishing in the locations as currently designated and used for recreational access. In addition, the Mississippi River and the Big Fork River would not be impacted by Route Alternative 3 with regard to their Wild and Scenic River designations.

This Route Alternative would pass through only a small portion of the LLR near County Roads 11 and 234 in Itasca County. At this location, the alternative then would follow U.S. Highway 2.

3.13.2.3. Leech Lake Reservation

The types of recreational impacts within the Leech Lake Reservation are generally the same as for the overall Study Area. All Route Alternatives would result in long-term and temporary impacts to lands within the Leech Lake Reservation, ranging from 4 acres for Route Alternative 3 to 662 acres for Route Alternative 1. Route Alternatives 1 and 2 would affect a similar number of acres within the Leech Lake Reservation.

As discussed above, potential impacts include a change in viewshed in recreational areas, conversion of cover type in the ROW that could disrupt the current wildlife habitat and vegetation, limited access to areas during construction, increased noise during construction, and the increased use of OHVs in the new ROW, leading to increased noise and unauthorized access that could interfere with recreational use.

3.13.2.4. Chippewa National Forest

As with the Leech Lake Reservation, the types of recreational impacts within the CNF are generally the same as for the overall Study Area. All Route Alternatives would result in long-term and temporary impacts to lands within the CNF. However, Route Alternative 3 would affect almost double the number of acres, 920, than Route Alternatives 1 or 2, 543 and 496 acres, respectively.

As discussed above, potential impacts include a change in viewshed in recreational areas, conversion of cover type in the ROW that could disrupt the current wildlife habitat and vegetation, limited access to areas during construction, increased noise during construction, and the increased use of OHVs in the new ROW, leading to increased noise and unauthorized access that could interfere with recreational use. The CNF has delineated its lands into specific Management Areas (MAs), which is further discussed in Section 3.15, Forestry. Certain MAs have management objectives specific to providing recreational opportunities, including the General Forest MA and Recreation Use in a Scenic Landscape MA. Route Alternatives 1, 2, and 3 would require ROW within the General Forest MA. Only Route Alternative 2 would be located within a

Recreation Use in a Scenic Landscape MA. The MA is set aside as a scenic landscape for recreational activities in natural-appearing surroundings.

3.13.3. Mitigation

A variety of mitigation measures could be implemented to reduce the potential impacts to recreation and tourism resources from construction and operation of the Project. Mitigation measures that are typically included in permits are noted; cases where additional mitigation measures may be incorporated as a permit condition are also noted. Additional mitigation measures described in Section 3.1, Aesthetics, would mitigate the change in viewshed that could alter the quality of a recreational experience in the Study Area.

Mitigation to minimize the potential direct and indirect impacts to recreational and tourism resources would be similar for all Route and Segment Alternatives. Potential mitigation measures include the following:

- Constructing the Project along existing pipeline and transmission ROWs could minimize any impacts to existing recreational resources and tourism. The HVTL route permit could require the Applicants to co-locate or border existing ROWs when possible. Locating the Project ROW adjacent to other existing utility ROWs would help to minimize impacts to previously undisturbed lands. Long-term disturbance of wildlife habitat also would be minimized by co-locating within existing disturbed corridors. Therefore, impacts to hunting and wildlife could be lessened as a result of these actions. However, in locations where the corridors would be expanded, the additional acreage would be minimal and would not greatly change the existing conditions as compared to creating an entirely new corridor.
- Consultation with existing landowners and management agencies regarding structure locations, ROW, and other disturbed areas could be used to minimize impacts to individual recreational and tourism resources. The HVTL route permit could require the Applicants to work with individual landowners about pole placement.
- With landowner and/or agency consent, consideration could also be given to constructing various barriers at or near road crossings to limit unauthorized OHVs or other vehicle traffic on the Project ROW in sensitive areas. Conversely, OHV trails could be developed along the Project ROW to allow for additional recreational use in areas where such use is permitted.
- Winter construction at water access points would limit impacts to access during the construction phase of the Project, because a majority of these locations experience greater visitor usage during other seasons of the year.
- Alignment of the Project ROW perpendicular rather than parallel to existing trails to the extent practicable would further minimize impacts to recreational trail use by limiting areas where the Project was visible.

- Posting of signs during construction to inform visitors and residents of the activities associated with the Project would provide people with advance notice of what recreational activities may be affected. In this manner, people could plan for other activities or would be made aware of how their activities could be impacted by the construction of the transmission line.
- If necessary, location-specific mitigation and minimization plans could be created. These measures could include but are not limited to visual screening, established construction work schedules, temporary or long-term trail detours, and replacement of vegetation.

3.14. Agriculture

This section provides a discussion of the agricultural use and production within the Study Area, which includes 1,000-foot-wide routes for each Route Alternative and Segment Alternative (see Figure 2.2-1). The United States Department of Agriculture (USDA) agricultural census data (2007, 2002, and 1997) is used to identify agricultural production and value within Beltrami, Cass, Hubbard, and Itasca counties. In addition, the Minnesota Department of Natural Resources (MnDNR) Gap Analysis Program (GAP) Level 2 land cover data is used to identify cropland and prime farmland areas within the three Route Alternatives and their associated Segment Alternatives (see Figure 3.10-1). The Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) database also is used to identify prime farmland areas.

This section provides a discussion about the affected environment, potential direct and indirect impacts, and proposed mitigation measures to agricultural resources and prime farmland in the Study Area.

3.14.1. Affected Environment

The affected environment includes portions of Beltrami, Cass, Hubbard, and Itasca counties within northern Minnesota. This discussion provides an overview of the types of agriculture and prime farmland within these counties.

3.14.1.1. Agriculture

Table 3.14-1 includes a summary of the farmland, cropland, and agricultural production for Beltrami, Cass, Hubbard, and Itasca counties based upon the 2007 and 2002 USDA census data.

Table 3.14-1: Agricultural Census Data, 2007 and 2002

Farm Characteristic	County			
	Beltrami	Cass	Hubbard	Itasca
Number of Farms in 2007 (in 2002)[1]	674 (746)	563 (646)	468 (535)	419 (494)
Average Size of Farms in 2007 (acres) (in 2002)	313 (312)	300 (305)	270 (262)	223 (243)
Land Acreage in Farmland in 2007[2] (in 2002)	210,833 (232,735)	169,160 (197,153)	126,198 (140,004)	93,274 (120,176)
2002 Percentage of County in Farmland[2]	14.5%	15.3%	23.7%	7.0%
2002 Percentage of County in Cropland[3]	7.8%	7.8%	12.7%	3.4%
2007 Percentage of Land Acreage in Farms	13.1%	13.1%	21.4%	5.5%
Total Market Value of Agricultural Products Sold in 2007 (in 2002)	$20,972,000 ($17,314,000)	$25,631,000 ($14,327,000)	$32,621,000 ($22,958,000)	$7,419,000 ($6,440,000)
2007 Market Value of Crops Sold (in 2002)	$9,462,000 ($4,592,000)	$3,704,000 ($3,949,000)	$27,586,000 ($17,309,000)	$3,677,000 ($3,394,000)
2007 Market Value of Livestock and Other Uses Sold (in 2002)	$11,330,000 ($12,722,000)	$21,926,000 ($10,378,000)	$5,035,000 ($5,649,000)	$3,742,000 ($3,046,000)

Notes:

1. The census definition of a farm is any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year.
2. Farmland is defined as cropland, woodland, pasture, livestock, and other uses (i.e., eggs, aquaculture, etc).
3. Cropland is defined as row or small grain crop and hay.

Sources: USDA, NASS, 2007d and 2002 Census of Agriculture

Although heavily forested as a whole, the Study Area also contains agricultural areas, particularly at the western and eastern edges of all of the Route Alternatives. The majority of agricultural land in each of the four counties is located within scattered parcels. The primary agricultural uses in the Study Area are pasture, row crops, and small grains. Wild rice also is grown commercially within the Study Area.

Within Beltrami County, cultivated crop and pasturelands are concentrated in areas west and south of Lake Bemidji, across the center third of the County, and on the western edge of the northernmost part of the County. The Beltrami Soil and Water Conservation District (SWCD) provides services to assist private landowners in agricultural pursuits. The organization is charged with the protection of Beltrami County's soil and water resources. One of the primary goals of its planning efforts is to help control erosion and thus indirectly agricultural production (BSWCD, 2009). Erosion can occur as a result of unplanned development that does not adhere to standards for preservation of agricultural lands. According to the comprehensive plan for Beltrami County, rural areas are especially difficult to maintain with pressure from development (Beltrami County, 2009). This trend is noticeable in variable agricultural statistics regarding the number and size of farms.

Between 1997 and 2002, the number of farms in Beltrami County increased while the average size decreased. By 2007, however, the trend reversed, and the average number of farms decreased, while the average size increased. Despite the change in the number and size of farms over the 10-year period, of the four counties Beltrami County had the greatest market value of livestock, poultry, and similar products valued in 2002 and the second greatest valuation in 2007.

Like Beltrami County, Cass County also established a goal within its comprehensive plan to encourage and facilitate growth of agriculture in historically farmed areas (Cass County, 2009). Within Cass County, agricultural use is defined as "real or personal property used for the production of crops, tillage, husbandry, or farming, including but not limited to fruit and vegetable production, tree farming, livestock, poultry, dairy products, or poultry products, but not a facility primarily engaged in processing agricultural products" (Cass County, 2005a).

Within Cass County, the average farm size decreased between 1997 and 2002, whereas the number of full-time farms increased by 31 farms during that time (Otter Tail Power et al., 2008). In 2007, the trend was altered with both the number and size of farms decreasing. Despite these losses, Cass County had the greatest market value in livestock and other products sold in 2007.

In Hubbard County, information about agricultural policies was not readily available within a comprehensive plan or local ordinance. However, like other counties in the Study Area, the Hubbard County Soil and Water Conservation District is available to provide technical assistance to local property owners, including farmers, to help reduce the waste of soil and water resulting from soil erosion, sedimentation, pollution, and improper land use (HSWCD, 2009).

Based upon similar pressures in northern Minnesota, the number of farms and the total acreage in farmland are on the decline within Hubbard County. From 1997 to 2002, the average number of farms increased, while the average size decreased (Otter Tail Power et al., 2008a). By 2007, this trend was reversed with the average number of farms decreasing, and the average size increasing. Hubbard County had the greatest market value for crop production of the four counties included in the Study Area.

Based upon its comprehensive plan, Itasca County created a goal to encourage and to facilitate the growth of agriculture. The County recognizes the potential for additional areas for agricultural uses. The goal was to be achieved by requiring large minimum lot sizes and by creating taxing structures to encourage sustainable agricultural uses. In addition, the County encourages the conversion of marginal land to agro-forestry and to provide distinctions in the types of land available for farming through soil, slope, and native vegetation analyses (Itasca County, 2007).

Despite these goals, between 1997 and 2002, the number of farms decreased, along with the average farm size (Otter Tail Power et al., 2008a). By 2007, both of these statistics suggest a further decrease. In addition, Itasca County had the lowest market value of crop production and livestock, poultry, and similar products.

3.14.1.2. Prime Farmland

Prime farmland is defined by the NRCS as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. The NRCS has three levels for prime farmland (i.e., prime farmland, prime farmland when drained, and farmland of statewide importance), and each county NRCS department is responsible for assigning prime farmland designations to each of the soil series found in its county.

The most important class is prime farmland, which produces high yields of crops. Prime farmland when drained includes soils that have the potential to be prime farmland, but require drainage or hydrologic alteration to achieve high productivity. Farmland of statewide importance includes soils that are nearly prime, but are not as productive due to permeability, slope, erosion potential, or some other soil property.

The designation of prime farmland does not apply to land within the National Forest System; thus, there are no prime farmlands within the CNF (CNF, 2004).

3.14.2. Direct/Indirect Effects

Impacts to farmlands usually are greatest during the construction phase. During construction, utility equipment may damage crops, compact the soil, require grading and the temporary relocation of livestock fencing, and temporarily interrupt some farming activities (OES, 2009). Long-term operational impacts would include the loss of farmland once the structures, wires, and substations are in place.

This portion of the discussion provides a description and evaluation of the impacts of the alternatives on agricultural production. Potential direct impacts include the following:

- Loss of farmland and orchards due to structure placement (a direct impact, measured by total acreage)
- Degradation of farmland (e.g., compaction and disturbance of soil)

Potential indirect impacts include the following:

- Interference with agricultural activities

The discussion of potential direct and indirect impacts includes a description of the impacts from the No-Build Alternative, Route Alternatives, Segment Alternatives, the Leech Lake Reservation, and the Chippewa National Forest.

3.14.2.1. No-Build Alternative

The No-Build Alternative would not impact agricultural land directly or indirectly. Because no structure construction or expansion of rights-of-way (ROWs) would occur, this alternative would not result in the loss of farmland and orchards and would not degrade existing farmland.

3.14.2.2. Route Alternatives and Segment Alternatives

Table 3.14-2 includes an overall summary of the long-term and temporary loss of farmland resulting from the Project build alternatives. All calculations within Table 3.14-2 were completed using a geographic information systems (GIS) program and GAP data (cropland and grassland). Loss of farmland was calculated along a feasible 125-foot-wide ROW. For this analysis, grassland included hayed land; agricultural land was identified as "cultivated agricultural land" per Minn. Stat. § 216B.243, subd. 7(b); and prime farmland included soil designated as prime farmland, prime farmland when drained, and farmland of statewide importance.

This analysis assumed that H-frame structures would be used along the entire length of each route. Long-term loss of farmland was estimated to be 300 square feet for each structure. Temporary loss of farmland was assumed to occur for construction access and included a 30-foot-wide area within the ROW (Otter Tail Power et al., 2008). This analysis also assumes that all substation improvements or expansions would not result in a loss of agricultural land. The acreage associated with the proposed new substation in Cass Lake and the substation at Nary Junction is forested land. The area designated for expansion of the existing Cass Lake substation is owned by Otter Tail Power Company.

Table 3.14-2: Agricultural Production Effects for a Feasible 125-foot-wide Right-of-Way

Route and Segment Alternatives	Associated Route Alternatives	Agricultural Uses % of ROW	Prime Farmland % of ROW	Long-Term Impacts to Agricultural Uses (acres)	Long-Term Impacts to Prime Farmland (acres)	Temporary Impacts to Agricultural and Farmland Uses (acres)
Route Alternatives						
1		21	40	0.7	1.3	52
2		13	24	0.3	0.7	31
3		28	67	2.0	3.6	119
Segment Alternatives						
A	1	31	80	<1	<1	18
B	1	4	51	0	<1	2
C	1, 2	0	0	0	0	0
D	1	47	77	<1	<1	9
E	3	34	75	<1	<1	13

F	2	13	0	0	0	1
G	2	49	0	0	0	3
H	2	27	0	0	0	1
I	2	49	0	0	0	1
J	1, 2	77	64	0	0	1
K	1, 2	27	74	<1	<1	6
L	1	38	90	0	<1	4
M	1, 2	10	50	0	<1	1
N	1, 2	0	85	0	<1	0
O	1, 2	0	90	0	<1	0
P	1, 2	<1	100	<1	<1	1
Q	1, 2	40	71	0	0	<1
R	3	70	85	<1	<1	5
S	3	73	100	<1	<1	4
T	3	45	92	<1	<1	5

As shown in Table 3.14-2 above, all Route Alternatives would result in long-term and temporary loss of agricultural use. Long-term loss of land use would occur as a result of structure placement. The estimated long-term loss of agricultural uses range from approximately 0.3 to 2.0 acres. Long-term loss of prime farmlands would range from 0.7 to 3.6 acres. Temporary construction impacts for agricultural uses would range from 31 to 119 acres. The greatest potential loss of land currently used for agricultural purposes and for prime farmland would occur for Route Alternative 3 because of its greater length and greater percentage of agricultural land uses than Route Alternatives 1 and 2.

During construction, temporary impacts within the ROWs may occur such as soil compaction and crop damages, depending upon the time of construction. Construction activities that may disturb surface soils include site clearing, grading, and excavation activities at structure locations, pulling and tensioning sites, setup areas, and the transport of crews, machinery, materials, and equipment over access routes. This analysis assumes that previously disturbed sites would be used for staging and stringing set up areas. (General potential land use impacts for the Project are described in more detail in Section 3.10, Land Use.)

For lands currently used for agricultural purposes, land owners may conduct aerial spraying for the application of pesticides, fungicides, and fertilizers. Aerial spraying is typically conducted by small aircraft with low flying altitudes. If the Project is constructed on agricultural land, aerial spraying operations may be limited by the placement of transmission line structures. After the Project is constructed, aerial sprayers would need to fly parallel to transmission lines and aerial application of products directly below the transmission line within the easement may be limited.

Removal from agricultural use of the small amount of prime farmland, as shown in Table 3.14-2, is not expected to negatively affect the general farm community in the Study Area. Similar to other agricultural areas, relatively small amounts of prime farmland would be temporarily impacted by soil compaction and crop damage. Once the construction is complete, landowners would be able to resume farming activities around the structures associated with the Project. The presence of the easement would not restrict farming operations, although the presence of H-frame pole structures could increase the time required to maneuver farm equipment around the structures. Long-term interference with agricultural activities would occur only on the land used for structure placement. Because the area of damage would be limited for both temporary and long-term impacts, as previously discussed, the overall degradation of farmland is not anticipated within the Study Area under any of the Route or Segment Alternatives.

Stray voltage has been raised as a concern for some dairy farms because it may impact operations and milk production. In rural areas, livestock could receive electrical shocks from milking equipment affected by stray voltage (WPSC, 2009). Stray voltage is further discussed in Section 3.20, Safety and Health.

3.14.2.3. Route Alternative 1

As shown in Table 3.14-2, approximately 21 percent of the land within the feasible 125-foot ROW evaluated for Route Alternative 1 is used for agriculture and approximately 40 percent of the soils within the feasible ROW are classified as prime farmland.

Route Alternative 1 would results in a long-term loss of approximately 0.7 acre of agricultural land and 1.3 acres of prime farmland. Temporary loss of agricultural land use and prime farmland from construction activities are estimated to be approximately 52 acres, less than half of the estimated impacts from Route Alternative 3. This Route Alternative contains a large commercial wild rice farm near Deer River.

Most of the Segment Alternatives associated with Route Alternative 1 would also result in long-term and temporary loss of agricultural land or prime farmland (see Figure 3.10-1). Long-term, direct impacts from placement of Project structures on farmland would result in the loss of farmland for current and future uses; temporary, direct impacts from construction equipment and staging would impede the use of farmland for only a short-term basis. In all cases, long-term loss of farmland from these Segment Alternatives would be less than 1 acre. Segment Alternatives A, D, K, L, and M would have long-term impacts to agricultural lands of 0.2 acre or less. Temporary, direct impacts to agricultural land from construction would be greater, including:

- Segment Alternative A - approximately 18 acres;
- Segment Alternative B - 2 acres;
- Segment Alternative D - 9 acres;
- Segment Alternative K - 6 acres;
- Segment Alternative L - 4 acres; and
- Segment Alternatives M, P, and Q - 1 acre or less for each.

3.14.2.4. Route Alternative 2

Route Alternative 2 has the lowest percentage and total acreage of agricultural use of all of the Route Alternatives. Approximately 13 percent of the feasible ROW evaluated for Route Alternative 2 is used for agricultural purposes and 24 percent of the ROW is considered to be prime farmland.

Route Alternative 2 would result in a long-term loss of approximately 0.3 acre of agricultural land and 0.7 acre of prime farmland. Temporary loss of agricultural land use and prime farmland from construction activities are estimated to be approximately 31 acres. Long-term, direct impacts from placement of Project structures on farmland would result in the loss of farmland for current and future uses; temporary, direct impacts from construction equipment and staging areas would impede the use of farmland only on a short-term basis.

Most of the Segment Alternatives associated with Route Alternative 2 would result in long-term and temporary loss of agricultural land or prime farmland (see Figure 3.10-1). In all cases, long-term, direct impacts resulting from placement of Project structures within these Segment Alternatives would be less than 1 acre. Segment Alternative F would result in a loss of approximately 1 acre of agricultural land and Segment Alternative K would have long-term loss of 0.1 acre or less of agricultural lands. Temporary, direct impacts to agricultural land from construction would be greater, including:

- Segment Alternative K - approximately 6 acres;
- Segment Alternatives G and L - less than 5 acres for each; and
- Segment Alternatives F, M, P, and Q - 1 acre or less for each.

3.14.2.5. Route Alternative 3

Route Alternative 3 would have the greatest potential to result in a long-term and temporary loss of agricultural land, in terms of total acreage, of the three Route Alternatives evaluated. Approximately 28 percent of the feasible ROW evaluated for Route Alternative 3 is used for agricultural purposes and 67 percent of the ROW is considered to be prime farmland.

Route Alternative 3 would result in the long-term loss of approximately 2 acres of agricultural land and 3.6 acres of prime farmland. Temporary loss of agricultural land use from construction activities is estimated to be approximately 119 acres. Long-term, direct impacts from placement of Project structures would result in the loss of farmland for current and future uses; temporary, direct impacts from construction equipment and staging areas would impede the use of farmland only on a short-term basis.

Segment Alternatives E, R, S, and T, associated with Route Alternative 3, would also result in long-term and temporary loss of agricultural land, although long-term loss of agricultural land use and prime farmland would be less than 1 acre for all Segment Alternatives. Temporary loss of farmland during construction would be 13 acres for Segment Alternative E and between 4 and 5 acres for Segment Alternatives R, S, and T.

3.14.2.6. Leech Lake Reservation

The types of potential agricultural impacts to land located within the Leech Lake Reservation (LLR) are generally the same as those for the overall Study Area, as shown in Table 3.14-3.

Table 3.14-3: Agricultural Production Effects on a Feasible 125-foot-wide Right-of-Way within the LLR

Route and Segment Alternatives	Associated Route Alternatives	Ag Uses % of ROW	Prime Farmland % of ROW	Long-Term Impacts to Agricultural Uses (acres)	Long-Term Impacts to Prime Farmland (acres)	Temporary Impacts to Agricultural Uses (acres)
Route Alternatives						
1		8	39	0.2	0.8	13
2		5	19	0.1	0.4	8
3		0	0	0	0	0
Segment Alternatives						
A	1	N/A				
B	1	4	51	0	<1	2
C	1, 2	0	0	0	0	0
D	1	47	77	<1	<1	9
E	3	35	78	<1	<1	11
F	2	13	0	0	0	1
G	2	N/A				
H	2	N/A				
I	2	N/A				
J	1, 2	N/A				
K	1, 2	22	54	<1	<1	2
L	1	38	90	0	<1	4
M	1, 2	10	50	0	<1	1
N	1, 2	0	85	0	<1	0
O	1, 2	0	90	0	<1	0
P	1, 2	<1	100	<1	<1	1
Q	1, 2	40	71	0	0	<1
R	3	N/A				
S	3	N/A				
T	3	N/A				

Route Alternative 1 would result in the largest long-term loss of agricultural land use and prime farmland within the LLR, approximately 0.2 and 0.8 acre, respectively. Temporary, direct effects to agricultural land are estimated to be approximately 13 acres.

Route Alternative 2 would result in the long-term loss of approximately 0.1 acre of agricultural land and 0.4 acre of prime farmland within the LLR. Temporary loss of agricultural land is estimated to be approximately 8 acres.

Route Alternative 3 would not pass through agricultural land within the Leech Lake Reservation and, as such, no agricultural uses or prime farmland are affected by Route Alternative 3. Segment Alternative E crosses into the LLR along MN Highway 6, north of Deer River. In this segment in the LLR, Segment Alternative E would result in a long-term loss of less than 1 acre of agricultural land and prime farmland. Temporary loss of agricultural land use along Segment Alternative E would be approximately 11 acres.

Additional discussion about potential impacts to the LLR, including a description of the potential effect of the Project on subsistence activities (e.g., hunting and gathering), is provided in Section 3.12, Environmental Justice.

3.14.2.7. Chippewa National Forest

The designation of prime farmland does not apply to land within the National Forest System; thus, there are no prime farmlands within the CNF (CNF, 2004).

3.14.3. Mitigation

A variety of mitigation measures could be implemented to reduce the potential impacts to agricultural land use from construction and operation of the Project. Mitigation measures that are typically included in permits are noted. Cases where additional mitigation measures may be incorporated as a permit condition are also noted.

The HVTL Route Permit could contain an Agricultural Mitigation Plan. The Applicants could be required to work with landowners to minimize impacts to farming operations along the final route permitted by the Commission. Impacts could be minimized by aligning the Project along existing transmission lines; consolidating transmission structures with one set of structures, pipeline, and roadway ROWs to the extent practicable; and using single pole structures in some areas.

Because potential agricultural impacts would already be limited in extent, the degree of potential available mitigation is likely small. The easement area between structures would be available for crop production. Although the existence of the Project's H-frame structures could increase the time required to maneuver farm equipment around the structures, the easements would not restrict farming operations once construction was completed. The Applicants would work with landowners to determine a structure placement that would minimize impacts to farming. The Applicants have agreed to compensate landowners for any crop damage or soil compaction that may occur during Project construction (Otter Tail Power et al., 2008a).

The HVTL permit would require the Applicants to restore the ROW, temporary work access spaces, access roads, abandoned ROW, and other public and private lands affected by the construction of the Project. Compacted soils would be restored to their native state through tillage operations, using a subsoiler. In addition, all disturbed areas would be re-vegetated once construction was complete. Seed mixes would be specified based upon site characteristics and in accordance with regulatory permits. Additional mitigation measures for addressing compacted soils are included in Section 3.3, Geology and Soils.

3.15. Forestry

This section describes managed forestry resources in the Study Area, which is defined as the 1,000-foot-wide route developed for each Route Alternative and Segment Alternative. The major forest resource development areas within the Study Area include the Chippewa National Forest (CNF); the Leech Lake Band of Ojibwe (LLBO) Reservation in portions of Beltrami, Cass, and Itasca counties; and, to a lesser extent, state-owned lands including the Bowstring State Forest in Itasca County and the Blackduck/Buena Vista State Forests in Beltrami County. A detailed description about vegetative communities, including dominant tree cover, is discussed in Section 3.7, Biological Resources. The primary focus of this section is the potential impacts to managed forestry resources, forestry activities, and management trends from the various alternative routes.

Minnesota Department of Natural Resources (MnDNR) Geographical Analysis Program (GAP) Level 1 land cover data were used to identify broad forest types within the Study Area. CNF's *Fiscal Year 2007 Monitoring and Evaluation Report* (USDA, 2008), *MnDNR's Chippewa Plains/Pine Moraines and Outwash Plains Subsection Forest Resource Management Plan Assessment* (MnDNR, 2009b), and CNF's *2004 Land and Resource Management Plan* (USDA, 2004) were used to identify current forest management trends within the Study Area. Information from the unpublished CNF *Fiscal Year 2009 Monitoring and Evaluation Report* was provided by representatives of the CNF.

3.15.1. Affected Environment

The Project is located in a part of Minnesota that contains economically important forestlands. According to representatives of the CNF (CNF, 2010), the CNF *Fiscal Year 2009 Monitoring and Evaluation Report* states that the CNF harvested timber on 3,615 acres of land in FY 2009. Of the areas harvested, 49 percent of the stands were thinned, 24 percent were clearcut, 10 percent were shelterwood/partial cut, and 17 percent were uneven-aged harvest treatments. In FY 2009, 25.6 million board feet (MMBF) of timber was harvested and 35.4 MMBF of timber was sold. This timber sold at an average bid price of $44.42 per thousand board feet and represented approximately $1.6 million in harvested timber sales during FY 2009 (CNF, 2010).

As part of their 2004 *Land and Resource Management Plan* (USDA, 2004), the CNF delineated its lands into specific Management Areas with management directions that identified suitability for timber production. The alternatives included six different Management Areas. Areas classified as General Forest or General Forest-Longer Rotation offer the most opportunity for timber production. On average about 66 percent of the land classified as "Recreation Use in a Scenic Landscape" and 50 percent of "Riparian Emphasis" management areas were considered suitable for timber management. "Experimental Forest" and "Unique Biological, Aquatic, Geological, or

Historical Areas" management areas were not considered suitable for timber management.

The Study Area includes numerous blocks of state-owned forestland, including portions of the Bowstring, Blackduck, Battleground, Buena Vista, and Welch Lake state forests. According to the MnDNR's *Chippewa Plains/Pine Moraines and Outwash Plains Subsection Forest Resource Management Plan Assessment* (MnDNR, 2009b), about $1.5 million of timber was sold from MnDNR lands within the Chippewa Plains Subsection in the 2004 fiscal year. The Chippewa Plains Area includes large sections of the Study Area counties, as well as smaller parts of Clearwater, Mahnomen, and Koochiching counties. The most commonly harvested timber (in order of prevalence) included aspen, jack pine, balsam fir, tamarack, and paper birch. The MnDNR identifies approximately 9 percent of the state-owned land in the Chippewa Plains Subsections as timberland.

Private forest lands are also located within Route Alternatives 1, 2, and 3. While data are not readily available regarding the management practices of private lands, it is likely that some of these areas are also managed for timber production, especially those enrolled in the Sustainable Forest Incentive Act (SFIA), which provides annual payments to private owners of forested land as an incentive to practice sustainable forest management.

Figure 3.15-1 displays the location of federal and state forestland near the Project; general forest cover types are discussed in Section 3.7, Biological Resources. Tables 3.15-1 and 3.15-2 summarize the approximate acreages of forestland within the 1,000-foot-wide routes for Route Alternatives 1, 2, 3, and Segment Alternatives A through T. Route Alternative 2 contains the least amount of forested acreage, while Route Alternative 3 contains the greatest amount of forested acreage.

Deciduous forest is the primary forest type for all Route Alternatives, ranging from 2,453 acres for Route Alternative 2 to 6,002 acres for Route Alternative 3. The second most common is conifer forest, ranging from approximately 1,200 to 1,400 acres for each Route Alternative. Mixed forests make up very little of the cover types for any of the Route Alternatives or Segment Alternatives.

Table 3.15-1: Forest Cover Types within Each Route Alternative (in acres)

Location	Type	Route Alternative 1	Route Alternative 2	Route Alternative 3
Entire Route	**Conifer Forest**	1,200	1,278	1,382
	Conifer-Deciduous Forest	140	114	215
	Deciduous Forest	3,516	2,453	6,002
	Total	**4,856**	**3,845**	**7,599**
Leech Lake Reservation	**Conifer Forest**	1,002	964	0
	Conifer-Deciduous Forest	109	76	8
	Deciduous Forest	2,462	1,807	19
	Total	**3,573**	**2,847**	**27**
Chippewa National Forest Managed Lands	**Conifer Forest**	708	580	1,056
	Conifer-Deciduous Forest	48	30	129
	Deciduous Forest	1,617	1,095	3,910
	Total	**2,373**	**1,705**	**5,095**

Table 3.15-2: Forest Cover Types within Each Segment Alternative (in acres)

	Type	Segment Alternatives																			
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Entire Route	**Conifer Forest**	87	179	113	20	186	50	40	24	<1	0	168	0	59	83	58	15	2	16	0	11
	Conifer-Deciduous Forest	10	26	8	2	19	<1	9	3	0	0	14	0	0	9	0	0	<1	3	0	0
	Deciduous Forest	940	855	336	193	431	42	21	6	8	0	120	151	149	321	254	10	33	44	32	101
	Total	**1,037**	**1,060**	**457**	**215**	**636**	**93**	**70**	**33**	**8**	**0**	**302**	**151**	**208**	**413**	**312**	**25**	**36**	**63**	**32**	**112**
LLR	**Conifer Forest**	N/A	179	112	19	181	50	N/A	N/A	N/A	N/A	42	0	59	83	58	15	2	N/A	N/A	N/A
	Conifer-Deciduous Forest	N/A	26	8	2	19	<1	N/A	N/A	N/A	N/A	3	0	0	9	0	0	<1	N/A	N/A	N/A
	Deciduous Forest	N/A	855	320	175	370	42	N/A	N/A	N/A	N/A	47	110	149	321	254	10	33	N/A	N/A	N/A
	Total	**N/A**	**1,060**	**440**	**196**	**570**	**93**	**N/A**	**N/A**	**N/A**	**N/A**	**92**	**110**	**208**	**413**	**312**	**25**	**36**	**N/A**	**N/A**	**N/A**
CNF	**Conifer Forest**	N/A	59	78	12	161	N48	N/A	N/A	N/A	N/A	N/A	N/A	N/A	83	58	15	N/A	11	0	5
	Conifer-Deciduous Forest	N/A	5	4	0	19	<1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9	0	0	N/A	2	0	0
	Deciduous Forest	N/A	511	222	8	376	36	N/A	N/A	N/A	N/A	N/A	N/A	N/A	321	254	10	N/A	24	<1	38
	Total	**N/A**	**575**	**304**	**20**	**556**	**84**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**413**	**312**	**25**	**N/A**	**37**	**<1**	**43**
State Lands	**Conifer Forest**	1	38	32	1	86	N/A	N/A	N/A	N/A	N/A	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
	Conifer-Deciduous Forest	<1	14	4	0	14	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
	Deciduous Forest	10	123	58	16	42	N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15
	Total	**11**	**175**	**94**	**17**	**142**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**8**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**16**

3.15.1.1. Leech Lake Reservation

Acreage of forestland in the 1,000-foot-wide Route and Segment Alternatives within the Leech Lake Reservation vary from the acreage comparisons made for the entire length of the Project alternatives. As shown in Table 3.15-1, Route Alternative 3 contains the least amount of forested acreage in the Leech Lake Reservation (27 acres), while Route Alternative 1 contains the greatest amount of forested acreage (3,573 acres) in the LLR. The greatest amount of forest cover type for each of the Route Alternatives is deciduous forest, ranging from 19 acres for Route Alternative 3 to 2,462 acres for Route Alternative 1. The second most common is conifer forest, ranging from 0 acres for Route Alternative 3 to 1,002 acres for Route Alternative 1.

Segment Alternatives B, C, D, E, F, K, L, M, N, O, P, and Q also cross the Leech Lake Reservation. For the most part, these Segment Alternatives are forested with cover similar to that seen along the Route Alternatives located within the Leech Lake Reservation.

3.15.1.2. Chippewa National Forest

Acreage of forestland in the 1,000-foot-wide Route and Segment Alternatives within the Chippewa National Forest exhibit the same pattern as the entire length of the Route and Segment Alternatives, but the acreages are significantly less (as much as 50 percent less for most alternatives). As shown in Table 3.15-1, Route Alternative 2 contains the least amount of forested acreage (1,705 acres) in the Chippewa National Forest, while Route Alternative 3 contains the greatest amount of forested acreage (5,095 acres) in the Forest. The greatest amount of forest cover type for each of the Route Alternatives is deciduous forest, ranging from 1,095 acres for Route Alternative 2 to 3,910 acres for Route Alternative 3. The second most common is conifer forest, ranging from 708 acres for Route Alternative 1 to 1,056 acres for Route Alternative 3.

Segment Alternatives B, C, D, E, F, K, N, O, P, R, S, and T also cross Chippewa National Forest managed areas. For the most part, these Segment Alternatives are forested with cover similar to that seen along the Route Alternatives located within the Chippewa National Forest managed areas.

3.15.2. Direct/Indirect Effects

This section addresses potential direct and indirect impacts from the Project and alternatives to forest resources and production. Potential direct impacts could include:

- Loss of forest resources due to long-term structure placement
- Degradation of forest resources; change in forest types and uses due to ROW clearing

- Interference with forestry/logging activities

Potential indirect impacts could include:

- Loss or change in wildlife habitat
- Change in recreational uses

With the exception of the No-Build Alternative, each Project alternative would convert forestlands within rights-of-way (ROWs) to managed shrub and grasslands. The majority of the forest impacts within the ROW would occur to deciduous forest communities, with lesser impacts occurring to coniferous forest communities, and relatively minimal impacts occurring to mixed conifer-deciduous forest communities.

Table 3.15-3 summarizes the estimated acreage of converted forest lands, to managed shrub and grasslands, within a feasible 125-foot-wide ROW for each Route Alternative and Segment Alternative.

The Geographic Analysis Program (GAP) was used to classify the primary forest cover types within the Study Area. The Geographic Analysis Program maps land cover types from satellite imagery; land-based surveys are used to supplement data as needed.

Table 3.15-3: Forest Cover Types within Feasible 125-foot Rights-of-Way (in acres)

Route and Segment Alternatives	Associated Route Alternatives	Conifer Forest	Conifer Deciduous Forest	Deciduous Forest	Total Forested Area
Route Alternatives					
1		118	9	452	579
2		152	11	276	439
3		120	15	638	813
Segment Alternatives					
A	1	6	<1	89	95
B	1	18	5	103	126
C	1, 2	14	0	46	60
D	1	2	0	20	22
E	3	25	1	43	69
F	2	7	0	5	12
G	2	2	1	<1	3
H	2	2	0	1	3
I	2	0	0	1	1
J	1, 2	0	0	0	0
K	1, 2	28	2	18	48
L	1	0	0	17	17
M	1, 2	5	0	17	22
N	1, 2	11	<1	38	49
O	1, 2	5	0	34	39
P	1, 2	2	0	1	3
Q	1, 2	0	0	3	3
R	3	3	0	2	5
S	3	1	0	2	2
T	3	1	0	12	13

Actual acreage of forest impacts could vary depending upon the width and placement of ROW within the wider route.

3.15.2.1. No-Build Alternative

The No-Build Alternative would not impact forested land directly or indirectly. Because no structure construction or expansion of ROWs would occur, this alternative would not result in the loss or conversion of any forested lands.

3.15.2.2. Route Alternative 1

Construction of Route Alternative 1 would convert an estimated 579 acres of forested area. Impacts would occur primarily to deciduous forest (approximately 78 percent of total forest conversion). Within these broad forest types, GAP level 4 land cover data indicate that aspen/white birch and upland deciduous forest are the most common cover types within the alternatives (see Section 3.7, Biological Resources). Red/white pine, lowland deciduous, and lowland black spruce are also common forest communities.

Additional impacts to forestlands are likely in the event that new substations are required. The potential impact on forest for new substation construction is not included in Table 3.15-3. Under Route Alternative 1 a new substation is proposed in the vicinity of Cass Lake. Approximately 4 acres of forest would be affected for substation construction.

Segment Alternatives A, B, C, D, J, K, L, M, N, O, P, and Q are potentially associated with this Route Alternative. Most of these Segment Alternatives are relatively short crossover segments between this Route Alternative and Route Alternative 2. Three Segment Alternatives associated with Route Alternative 1 would result in the additional conversion of greater than 20 acres of forested land:

- Segment Alternative A would add approximately 20 additional acres of forest conversion; most of this would convert deciduous forested areas. If this Segment Alternative is used in combination with Segment Alternative L, then a new breaker station is proposed at the existing Nary Junction. Approximately 5 acres of forest would be converted for station construction.
- Segment Alternative B would add approximately 60 acres of additional forest conversion; most of this would convert deciduous forested areas.
- Segment Alternative C would add approximately 60 acres of additional forest conversion; most of this would convert deciduous forested areas.

3.15.2.3. Route Alternative 2

Construction of Route Alternative 2 would convert an estimated 439 acres of forested area, the least of the Route Alternatives evaluated. The total impact acreage by forest type for this alternative is shown in Table 3.15-3. Similar to Route Alternative 1, the largest percentage of conversion would occur to deciduous forest (approximately 63 percent). Substation expansion associated with Route Alternative 2 would likely result in an additional 4 acres of forest conversion. These impacts are not included in the total impacts calculated for Route Alternative 2 in Table 3.15-3.

Segment Alternatives associated with this Route Alternative are C, F, G, H, I, J, K, M, N, O, P, and Q. Most of these Segment Alternatives are relatively short crossover segments between this Route Alternative and Route Alternative 2. Only Segment Alternative C would result in the conversion of greater than 20 additional forested acres. Segment Alternative C would add approximately 60 acres of additional forest conversion in deciduous forest.

3.15.2.4. Route Alternative 3

Construction of Route Alternative 3 would convert approximately 813 acres of forested area, the most of the Route Alternatives reviewed. The total impact acreage by forest type for this alternative is shown in Table 3.15-3. Similar to the other Route Alternatives, the majority of forest conversion, approximately 79 percent, would occur to deciduous forest. Route Alternative 3 does not include any addition or expansion of substations.

Segment Alternative E would reduce forest conversion by approximately 20 acres, compared with Route Alternative 3.

3.15.2.5. Leech Lake Reservation

Route Alternative 1 would convert approximately 433 acres of forested area in the LLR under the feasible 125-foot ROW used in this analysis. Route Alternative 2 would convert approximately 335 of forested area in the LLR. Route Alternative 3 generally avoids crossing into the LLR, and would convert only about 1 acre of forested land. Alternative 3 would convert about 1 acre of forested area within the LLR. Impacts to forest type in the LLR would be similar to those discussed for Route Alternatives 1, 2, and 3 above.

Table 3.15-4: Forest Cover Types within Feasible 125-foot Rights-of-Way (in acres) within the LLR

Route and Segment Alternatives	Associated Route Alternatives	Conifer Forest	Conifer Deciduous Forest	Deciduous Forest	Total Forested Area
Route Alternatives					
1		97	7	329	433
2		129	7	200	335
3		0	0	1	1
Segment Alternatives					
A	1	N/A			
B	1	18	5	103	126
C	1, 2	14	0	44	58
D	1	2	0	19	21
E	3	24	1	37	62
F	2	7	0	5	12
G	2	N/A			
H	2	N/A			
I	2	N/A			
J	1, 2	N/A			
K	1, 2	6	0	0	12
L	1	0	0	14	14
M	1, 2	5	0	12	17
N	1, 2	11	<1	38	49
O	1, 2	5	0	34	39
P	1, 2	2	0	1	3
Q	1, 2	0	0	3	3
R	3	N/A			
S	3	N/A			
T	3	N/A			

Within these broad forest types, GAP level 4 land cover data indicate that aspen/white birch and upland deciduous forest are the most common cover types within the Route and Segment Alternatives (see Section 4.7, Biological Resources). Red/white pine, lowland deciduous, jack pine, and maple/basswood are also common forest communities.

The Leech Lake Band has identified the Ten Sections Area, as well as neighboring Guthrie Till Plain and Cuba Hill as unique forest communities. These unique forest communities support rare species as well as areas of cultural importance to the Band. Route Alternative 3 avoids these areas. Route Alternative 1 would impact these areas to a greater extent than Route Alternative 2.

Segment Alternatives B, C, D, K, L, M, N, O, P, and Q are all located within the Leech Lake Reservation. Most of these Segment Alternatives are relatively short crossover segments between Route Alternatives 1 and 2. Three Segment Alternatives located within the LLR would result in the additional conversion of greater than 20 acres of forested land:

- Segment Alternative B would increase total impacts to forested lands by approximately 126 acres, most of the forested communities converted would be deciduous forest.
- Segment Alternative C would increase total conversion of forested lands by approximately 58 acres, most of the converted communities would be deciduous forest.
- Segment Alternative E would convert about 62 forested acres within the LLR.

3.15.2.6. Chippewa National Forest

This section discusses forest types and potential impacts to forest management areas within the CNF.

Forest Types

GAP data analysis of a feasible 125-foot ROW along Route Alternative 1 indicates that about 294 acres of forested area within the CNF would experience long-term conversion (Table 3.15-5). Route Alternative 2 would convert approximately 202 acres of forested area within the CNF. Route Alternative 3 would convert the greatest acreage of forest within the CNF, approximately 584 acres.

Table 3.15-5: Forest Cover Types within Feasible 125-foot Rights-of-Way (in acres) within the CNF

Route and Segment Alternatives	Associated Route Alternatives	Conifer Forest	Conifer Deciduous Forest	Deciduous Forest	Total Forested Area
Route Alternatives					
1		69	3	222	294
2		75	3	124	202
3		94	10	480	584
Segment Alternatives					
A	1	N/A			
B	1	7	1	62	70
C	1, 2	9	0	30	39
D	1	<1	0	1	1
E	3	19	1	40	60
F	2	7	0	4	11
G	2	N/A			
H	2	N/A			
I	2	N/A			
J	1,2	N/A			
K	1,2	N/A			
L	1	N/A			
M	1,2	N/A			
N	1, 2	11	<1	38	49
O	1, 2	5	0	34	39
P	1, 2	2	0	1	3
Q	N/A	N/A			
R	3	1	0	1	2
S	3	0	0	<1	<1
T	3	<1	0	6	6

Within these broad forest community types, forest stand information provided by the CNF indicates that quaking aspen is the most common species within the ROWs, with red pine and maple/basswood forest also being dominant forest communities (see Section 3.7, Biological Resources). Lesser areas of jack pine, paper birch, balsam fir, bigtooth aspen, tamarack, white pine, white cedar, and black spruce also occur within the ROW.

Segment Alternative B would affect approximately 70 acres of forested land within the feasible 125-foot-wide ROW on the CNF; most communities converted would be deciduous forest.

Segment Alternative C would affect approximately 39 acres of forested land within the feasible 125-foot-wide ROW on the CNF; most of the converted communities would be deciduous forest.

CNF Management Areas

As noted above, the CNF has delineated its lands into specific Management Areas. Table 3.15-6 presents a breakdown of ROW impacts by CNF Management Area. A discussion about each Management Area is provided below.

Table 3.15-6: CNF Management Areas within the 125-foot Right-of-Way (in acres)

CNF Management Area	Route Alternatives			Segment Alternatives										
	1	2	3	B	C	D	E	F	N	O	P	R	S	T
Experimental Forest (Pike Bay)	32	0.0	0	0	0	0	0	0	0	0	0	0	0	0
General Forest	303	384	538	5	36	0	0	0	22	29	6	7	<1	9
General Forest - Longer Rotation	105	29	191	69	0	0	50	0	33	12	0	0	0	0
Rec Use - Scenic Landscape	0	30	0	0	0	0	0	0	0	0	0	0	0	0
Riparian Emphasis	34	0	190	0	0	0	93	0	0	0	0	0	0	0
Unique Biol/Aquatic/Geol/Hist	66	52	0	1	5	1	0	12	0	0	0	0	0	0
Water	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Total	**541**	**496**	**920**	**75**	**41**	**1**	**143**	**12**	**55**	**41**	**6**	**7**	**<1**	**9**

General Forest Management Area

The majority of the CNF impacts fall within the General Forest MA for all alternatives. Forest resource management within the General Forest MA emphasizes land and resource conditions that provide a wide variety of goods, uses, and services, including wood products, other commercial products, scenic quality, developed and dispersed recreation opportunities, and habitat for a diversity of terrestrial and aquatic wildlife and fish. The numerous roads that are open to public travel provide access to resources and roaded recreation opportunities. Non-motorized recreation opportunities are also available on the forest (USDA, 2004).

Route Alternatives 1, 2, and 3 would cross about 303 to 538 acres of General Forest MA. All construction activities within the CNF would be conducted and monitored in accordance with objectives, standards, and guidelines of the Forest-Wide Management Directions for the General Forest MA, as provided in the 2004 Final Forest Plan. In the event that construction would fall within one of the other MAs, activities within these areas would adhere to MA-specific objectives, standards, and guidelines. Operation of the transmission ROW would require active maintenance to discourage re-growth of trees. Reforestation would not occur within the ROW.

Placement of Project structures within the General Forest MA would result in long-term loss of forest in the specific location of structure placement. Conversion of General

Forest MA in the ROW could result in fragmentation of habitat (as discussed in Sections 3.7, Biological Resources, and 3.8, Species of Special Concern) and increased access to the forest through ROWs, which could lead to increased recreational activity. Additionally, conversion of General Forest MA could interfere with logging activities, if timber production is conducted in the MA.

General Forest – Longer Rotation Management Area

Compared to the General Forest MA, this area, while still having timber production as a key emphasis, would generally have longer rotations and more uneven-aged and partial cut harvests. Route Alternatives 1, 2, and 3 would all cross land (about 29 to 191 acres) managed as General Forest - Longer Rotation. Route Alternatives 1 and 2 would affect the Longer Rotation MA in the southeastern vicinity of Cass Lake on both sides of the existing U.S. Highway 2 corridor. Potential effects and forest management considerations for the Longer Rotation MAs are similar to those identified for the General Forest MAs.

Pike Bay Experimental Forest Management Area

Route Alternative 1 would convert approximately 32 acres of the Pike Bay Experimental Forest (EF), which is located from MP 1-24 to 1-27. If Segment Alternative B is used with Route Alternative 1 in this area, the Pike Bay Experimental Forest can be avoided. The other Route Alternatives avoid the Pike Bar EF. Pike Bay EF is primarily managed for silviculture research and experimentation purposes. Much of this experimental forest is dominated by mature aspen and paper birch (60 to 80 years old) and mixed hardwood forest (maple, elm, and basswood).

A conversion would result in lost opportunity for silvicultural research on these acres. Indirect effects would include changes in vegetation along the edge of the cleared ROW as changes in light and microclimate due to clearing occurs. Potential for tree blowdown is also increased along edges. These changes in adjacent forest land may render these lands also unavailable for research purposes.

Currently, the Great Lakes Gas Pipeline 75-foot-wide ROW bisects an approximately 2-mile stretch of the Pike Bay EF. The gas pipeline is located in a study area used to test methods for the establishment and control of aspen suckers with prescribed fire. The northern boundary of the aspen sucker study area is located 184 feet south of the southern boundary of the existing pipeline ROW. Placement of a ROW between the existing gas pipeline and aspen sucker study area could affect the study by increasing the potential for tree blow-down, sunlight, and microclimate changes associated with the required forest clearing for the Project ROW (Palik, 2008).

Ten Section Unique Biological, Aquatic, Geological, or Historical Management Area (UB)

Route Alternatives 1 and 2 would affect some part of the Ten Section Area UB, located from MP 1-21 to 1-24 and MP 2-20 to 2-24. Route Alternative 3 would avoid the Ten Section Area. Route Alternative 1 would cross through the Ten Section area along the south side of Pike Bay, converting approximately 31 acres. The use of Segment Alternative B would deviate to the south side of the Ten Section Area, reducing direct impacts to 9 acres in the MA. Route Alternative 2 would cross through the Ten Section area along the north side of Pike Bay, converting about 27 acres. Route Alternative 3 does not cross the Ten Section MA.

The Ten Section Area was protected from timber cutting in the early 1900s, and is now used primarily for recreation and interpretive purposes. Stand data provided by the CNF indicates that small areas of mature red pine dating from the 1800s and early 1900s would be converted by the alternatives, with the exception of the use of Segment Alternative B, which would not impact the mature red pine forest. Route Alternatives 1 and 2 would convert an estimated 2.1 and 3.4 acres, respectively, of mature red pine within the Ten Section MA.

Placement of Project structures within the Ten Section UB would result in the loss of old growth, specifically mature red pines dating from the 1800s and early 1900s. Conversion of these resources within the Ten Section UB would not be in accordance with the Forest Plan. The LLBO has identified the Ten Section UB as an area of cultural significance and location for subsistence activities. Conversion of the Ten Section UB would result in fragmentation of wildlife habitat and changes in vegetation that could affect subsistence activities.

Recreation Use in a Scenic Landscape Management Area

Recreation Use in a Scenic Landscape Management Area (RU) is suitable for most forest management activities, but is generally set aside as a scenic landscape for recreational activities in natural-appearing surroundings. Route Alternatives 1 and 3, would not affect the RU management area. Route Alternative 2 would convert approximately 26 acres of a RU MA located along the southeastern shore of Cass Lake (MP 2-23 to 2-25). Because the RU is managed as scenic landscape, potential direct and indirect effects of the Project are addressed in Section 4.1, Aesthetics and 4.13, Recreation and Tourism.

Eligible Scenic River Management Area

Route Alternative 3 would cross the Big Fork River within the Eligible Scenic River (WSR) Management Area. Route Alternatives 1 and 2 do not cross the Eligible Scenic River Management Area. This part of the Big Fork River corridor meets the eligibility criteria specified in section 1(b) and 2(b) of the Wild and Scenic Rivers Act. This management area applies to land 0.25 mile on each side of the Big Fork River. The Boreal Hardwood/Conifer Landscape Ecosystem dominates this MA. Although the WSR MA is considered suitable for timber management, forest management activities in the river corridor protect the river's free-flowing condition.

Conversion of Eligible Scenic River MA could interfere with logging activities, if timber production is conducted in the MA. Placement of the Project structures in proximity to the Big Fork River would result in a change in viewshed. Potential effects of the Project on aesthetics are discussed in Section 3.1, Aesthetics.

Unique Biological, Aquatic, Geologic, or Historical Areas

Route Alternatives 1 and 2 would convert part of the Mississippi River MA (UB). Route Alternative 3 does not affect this management area. The UB MAs contain biological, aquatic, geological, historical, and other special values. The UB areas are primarily managed for interpretive purposes, and none of the UB management area is considered suitable for timber management.

Conversion of the Mississippi River UB would result in a loss of land use for interpretive purposes. Placement of the Project structures in proximity to the Mississippi River would result in a change in viewshed. Potential effects of the Project on aesthetics are discussed in Section 3.1, Aesthetics.

Riparian Emphasis Areas

Route Alternative 1 would convert about 34 acres of management areas designated as Riparian Emphasis Areas (RE) (MP 1-37 to 1-38). Segment Alternative C would convert an additional 4 acres of RE. Route Alternative 3 would convert about 190 acres, while Segment Alternative E would reduce this to approximately 153 acres. Riparian Emphasis Areas are located along major rivers and lakes that receive varying levels of public use for recreational purposes. Also included are selected large areas of relatively contiguous wetland. Development ranges from some of the most heavily used recreational areas of the Forest to some of the more remote areas of the Forest. Roughly half of the Riparian Emphasis Areas MA is suitable for timber management. The Dry Mesic Pine/Oak and Tamarack Swamp Landscape ecosystems cover more than half of this MA.

Conversion of Riparian Emphasis Areas could interfere with logging activities, if timber production is conducted in the MA. Placement of the Project structures in proximity to major rivers and lakes used for recreational purposes would result in a change in viewshed. Potential effects of the Project on aesthetics are discussed in Section 3.1, Aesthetics. Conversion of Riparian Emphasis Areas could allow for increased access to the MA, which could lead to increased recreational activity.

Potential Economic Effects of the Alternatives

Development of any alternative would result in the long-term loss of timber resources within the affected areas. The loss of forest resources represents a long-term loss of revenues derived from future timber sales for those forest types and MAs that allow timber production. The potential value of timber resources in managed forests affected by Project construction activities can be estimated from recent timber sales and market conditions.

A representation of estimated revenues from timber harvests within the CNF is provided in Table 3.15-7. As shown in the table, the value of harvestable timber is calculated in million board-feet (MMBF). To determine the actual value of timber resources for each of the alternatives, a final ROW alignment would be required, along with a re-calculation of the acreage, stand density, age class, and condition by forest type. Future lost revenues would be dependent upon the optimal harvest rotation for each forest type, along with an estimate of future prices per MMBF.

Table 3.15-7: Estimated Revenues from Timber Production in FY 2007
Species Product 1996-1998 Average Price/MMBF

Forest Type	2007 Average Price/MMBF	Estimated Present Value/MMBF
Aspen Pulpwood	$58.13	$44.48
Mixed Hardwood Pulpwood	$44.73	$23.93
Mixed Hardwood Sawtimber	$52.22	$37.05
Balsam Fir Pulpwood	$59.85	$54.77
Spruce Pulpwood	$50.50	$43.96
Spruce Sawtimber	$102.69	$70.77
Pine Pulpwood	$66.32	$59.52
Jack Pine Sawtimber	$105.96	$97.97
Red/White Pine Sawtimber	$115.57	$109.62

In addition, a small fraction of the Payments in Lieu of Taxes (PILT) funds provided to Beltrami, Cass, and Itasca counties would also be lost. In 2007, payments per acre to the three counties were $2.01, $2.60, and $2.61, respectively (USDA, 2008).

3.15.2.7. State Forests

Route Alternative 3 crosses the Bowstring State Forest over an approximate distance of 7 miles as it parallels MN Highway 6 (MP 3-94 to 3-101). Although Segment Alternative E avoids much of the forest, it crosses into the Bowstring State Forest between MP E-4 and E-5. The Bowstring State Forest is part of the Chippewa Plains Subsection, which is administered under the Chippewa Plains/Pine Moraines and Outwash Plains Subsection of the *2004 Final Forest Plan* (USDA, 2004). The Bowstring State Forest is managed by the MnDNR. Route Alternative 3 traverses wetlands dominated by lowland hardwood forest in the Bowstring State Forest. Approximately 106 acres of vegetation would be removed during construction. Operation of the transmission ROW would require active maintenance to discourage the re-growth of trees. Reforestation would not occur within the ROW.

Route Alternative 3 is also near portions of the Buena Vista State Forest (MP 3-23 to 3-27). The Big Fork State Forest, is located to the northeast of the Study Area, southwest of the city of Bigfork. Potential impacts on state forests are dependent on the final alignment of the ROW within the each route.

Potential impacts from the Project on state forests are similar to those identified for the CNF and may include: long-term loss of forest in the location of structure placement; conversation of forested land cover; interference with logging activities; increased access to forests through ROWs that could result in increased recreational use; and increased fragmentation that could result in adverse affects to vegetation or wildlife habitat.

3.15.3. Mitigation

A variety of mitigation measures could be implemented to reduce the potential impacts to forestry resources from construction and operation of the Project.

Construction of the Project would result in a conversion of forestland to non-forest use. Long-term impacts to forested land could be minimized through permit conditions of the HVTL permit through location and width of a final right-of-way to minimize the number of trees removed for the Project.

In addition, the HVTL permit could limit the creation of temporary easements to special construction and access needs and additional staging or lay-down areas required outside of the authorized ROW. The HVTL permit could require that these areas be selected to minimize tree removal. Construction staging areas would be located and arranged to preserve trees and vegetation to the maximum practicable extent. The preferred locations are previously disturbed areas. Unless otherwise agreed to by the landowner, all storage and construction buildings, including concrete footings and slabs, and all construction materials and debris would be removed from the site once construction was completed. To the extent practicable, staging areas would be restored to preconstruction conditions.

The HVTL permit could require the Applicants to restore the ROW to a functional habitat for vegetation and wildlife following construction. Restoration activities would be conducted in accordance with the developed vegetation management plan. Seedlings would be planted in temporary work areas. The ROW could be allowed to naturally regenerate with local species. Long-term management would promote the establishment of forbs and grasses. Shrubs would be allowed to regenerate within the ROW as long as they do not interfere with maintenance, access, and the safe operation of the Project.

Construction activities carried out on CNF lands would be conducted and monitored in accordance with objectives, standards, and guidelines of the Forest-Wide Management Directions, as provided in the *2004 Final Forest Plan*. As a best management practice, the standards used to guide construction in the CNF could also be applied for Project construction on LLR, state, and private forests.

3.16. Mining

This section provides a description of mining resources within the Study Area. In particular, information about aggregate mining operations from the Minnesota Department of Transportation (MnDOT) was analyzed to determine the Study Area's existing conditions and potential effects on those conditions. The Study Area consists of the 1,000-foot-wide routes for Route Alternatives 1, 2, and 3 and Segment Alternatives A through T.

3.16.1. Affected Environment

Large deposits of glacially derived sediments are present within the Study Area (see Section 3.3, Geology and Soils, for a more detailed description of the geomorphic and physiographic environment). Due to the presence of these materials, mining operations are located throughout the vicinity of the Study Area and within the 1,000-foot routes identified for all three Route Alternatives and two of the Segment Alternatives.

Minerals of economic significance found in Minnesota can be divided into two broad classes, consisting of metallic minerals and industrial minerals. Metallic minerals include both ferrous minerals, which primarily contain iron, and non-ferrous minerals. In Minnesota, iron ore and taconite are the most abundant ferrous minerals, although the latter occurs only in the Mesabi iron range in northeastern Minnesota. Non-ferrous minerals include manganese, copper, nickel, and titanium. Smaller quantities of gold, platinum, diamond, zinc, and lead are present, but the locations are not well-known (MnDNR, 2009h). There are no metallic mining operations located within the Study Area.

Industrial minerals include aggregate, peat, kaolin clay, dimension stone, and silica sand. Among these minerals, aggregate is the most common and is found within all counties of Minnesota (MnDNR, 2009h). Construction aggregate production in Minnesota includes three general categories of material, which are sand and gravel mined from glacial deposits or alluvial deposits; crushed dolomite or limestone mined from bedrock in southeastern Minnesota; and crushed rock mined elsewhere from diabase, gabbro, gneiss, granite, quartzite, rhyolite, taconite, and trap rock (USGS, 2005). Within Minnesota, aggregate operations fall primarily under the jurisdiction of the local government (MnDNR, 2009h).

In 2005, Minnesota's nonfuel raw mineral production was valued at $2.19 billion. The State also was the national leader in iron ore production (USGS, 2005). While the four counties included within the Study Area were contributors to this overall valuation, the major production was of industrial minerals in these counties. Beltrami, Cass, and Hubbard counties are listed as major producing areas of construction sand and gravel. Additionally, Itasca County contains crushed stone, construction sand and gravel, and iron ore deposits (USGS, 2005).

According to data produced by MnDOT's Aggregate Source Information, 26 areas containing active and inactive aggregate resources are located within a 1-mile radius of the Study Area (

Table 3.16-1). For this analysis, aggregate source information, which was obtained from MnDOT, was downloaded into a geographic information system (GIS) program, and the location of aggregate mining operations was verified with aerial photographs. The information provided in Table 3.16-2 includes the location of aggregate mining operations and indicates whether they are active or inactive (Otter Tail Power et al., 2008a and 2008b).

Many of the aggregate mining sites are located between Bemidji and Cass Lake. The most notable concentration of such mining operations within the Study Area is located along the south side of U.S. Highway 2, near the junction of U.S. Highway 2 and County Road 45 in Hubbard County.

Table 3.16-1: Aggregate Resource Locations

County	Township	Range	Section	Status
Beltrami				
	146N	33W	20	Inactive
	146N	33W	27	Active
	146N	33W	29	Inactive
	146N	34W	13	Inactive
	146N	34W	24	Active
Cass				
	144 N	31W	8	Inactive (2 sites)
	144N	31W	17	Active
	144N	29W	2	Inactive (2 sites)
	144N	29W	11	Active
	144N	25W	17	Active
	145N	29W	29	Active
Hubbard				
	145N	33W	1	Active (2 sites)
	145N	32W	7	Active (2 sites)
	145N	32W	8	Active (2 sites); Inactive (1 site)
	145N	32W	9	Active (3 sites); Inactive (1 site)
	145N	32W	11	Active
Itasca				
	56N	26W	33	Active
	55N	26W	1	Active (2 sites)
	55N	26W	3	Active (2 sites)
	145N	25W	2	Inactive
	145N	25W	10	Inactive
	145N	25W	11	Active
	145N	25W	14	Active
	145N	25W	21	Active (2 sites); Inactive (1 site)
	145N	25W	35	Active
	146N	25W	2	Active (2 sites)

Other than the aggregate mining sites, no additional mineral based mining operations occur in or near the Study Area (Otter Tail Power et al., 2008a).

Aggregate resources identified within the 1,000-foot routes for Route Alternatives 1, 2, and 3 and Segment Alternatives A and E are listed in Table 3.16-2 and Sections 3.16.1.1 through 3.16.1.3. With the exception of Segment Alternatives A and E, there are no known aggregate resources located within any of the Segment Alternatives.

Table 3.16-2: Aggregate Resources Located in Route & Segment Alternatives

Route and Segment Alternatives	County	Township	Range	Section	Status
Route Alternatives					
1	Beltrami	Bemidji 146 N	33 W	20	Inactive
	Hubbard	Helga 145 N	33 W	1	Active (2 sites)
		Helga 145 N	33 W	12	
2	Hubbard	Farden 145N	32W	7	Active
		Farden 145 N	32W	8	
		Farden 145 N	32W	9	
3	Beltrami	Bemidji 146 N	33W	20	Inactive
		Grant 146 N	34W	24	
	Itasca	Deer River 146 N	27W	16	
		Morse 145 N	25W	2	
		Oteneagen 146N	25W	35	
		Oteneagen 146N	25W	35	
Segment Alternatives					
A	Beltrami	Bemidji 146 N	33 W	29	Inactive
E	Itasca	Morse 145 N	25W	2	
		Oteneagen 146N	25W	35	

3.16.1.1. Route Alternative 1

The 1,000-foot-wide route for Route Alternative 1 contains three gravel pits, as identified by the MnDOT analysis (see Figure 3.16-1), at the following locations:

- Bemidji Township, Township 146 North, Range 33 West, Section 20 (between mileposts [MP] 1-5 and 1-6)
- Helga Township, Township 145 North, Range 33 West, Sections 1 and 12 (between MP 1-9 and 1-11)

Another gravel pit is located just to the east of the Alternative in Grant Valley Township (Township 146 North, Range 34 West, Section 24; between MP 1-1 and 1-2).

Segment Alternatives associated with this Route Alternative do not cross any gravel pits, with the exception of Segment Alternative A, which contains an inactive gravel pit in Section 29 of Bemidji Township (Township 146 North, Range 33 West), north of Oak Hills Road SE and west of Monroe Avenue SW, within the first mile of this Segment Alternative.

3.16.1.2. Route Alternative 2

The 1,000-foot-wide route for Route Alternative 2 crosses active aggregate mining operations that are located in Sections 7, 8, and 9 of Farden Township (T145, R32) in Hubbard County (between MP 2-10 and 2-13)(Otter Tail Power et al., 2008a). Another gravel pit is located just outside of the Study Area in Section 11 of the same township (near MP 2-15).

Segment Alternatives associated with this Route Alternative do not cross any known aggregate resources.

3.16.1.3. Route Alternative 3

Route Alternative 3 intersects a peat deposit approximately 12 miles north-northwest of Grand Rapids (Hobbs and Goebel, 1982 as cited in Otter Tail Power et al., 2008b). This deposit covers approximately 8 miles of the 1,000-foot-wide Route Alternative, but is not mined (Otter Tail Power et al., 2008b).

Route Alternative 3 also crosses three gravel pits, as identified by MnDOT, including the following:

- Bemidji Township, Township 146 North, Range 33 West, Section 20 (near MP 3-5)
- Grant Valley Township, Township 146 North, Range 34 West, Section 24 (between MP 3-3 and 3-4)
- Deer River Township, Township 56 North, Range 27 West, Section 16 (near MP 3-107)

Segment Alternative E contains an additional three gravel pits located adjacent to the east of MN Highway 6, as identified by MnDOT, including:

- Morse Township, Township 145 North, Range 25 West, Section 2 (between MP E-9 and E-10)
- Oteneagen Township, Township 146 North, Range 25 West, Section 35 (two sites, between MP E-9 and E-10)

Three additional gravel pits are located within 1/4 mile of Route Alternative 3. These, however, are outside the 1,000-foot-wide route.

3.16.2. Direct/Indirect Effects

This section provides a discussion of the potential direct impacts from the alternatives on mining resources and production, if the 125-foot ROW for the Route or Segment Alternatives were to travel through a mining resource. Potential direct impacts include the following:

- Loss of mining resources
- Interference with mining activities

There are no anticipated potential indirect effects from the Project on mining resources and production; thus, indirect effects are not discussed herein.

3.16.2.1. No-Build Alternative

Because no structures would be installed and no existing rights-of-way (ROW) would be expanded or new ROW would be created, the No-Build Alternative would not impact mining resources or activities directly or indirectly.

3.16.2.2. Route Alternatives and Segment Alternatives

The construction of a transmission structure within an aggregate resource, potential quarry, or mining area can reduce the development potential of these resources by limiting access to the underground mining resource and limiting use of heavy mining equipment near transmission lines. Because of this conflict, transmission line routes generally avoid aggregate resources and mining areas. Although mining resources are located within the 1,000-foot routes for Route Alternatives 1, 2, and 3 and Segment Alternatives A and E, none of the 125-foot feasible ROW alignments evaluated for the Route Alternatives and Segment Alternatives cross aggregate resources and mining areas. Even if a final route were to be located outside of the feasible ROW alignments evaluated in proximity to a mining resource, there is sufficient room within the Study Area to avoid aggregate resources and mining areas. Detailed ROW planning within the routes would provide the opportunity to refine the position of the transmission line and avoid existing gravel pit operations and resources. Therefore, no direct impacts to mining resources are anticipated to occur due to construction and operation of the Project.

3.16.3. Mitigation

The primary mitigation strategy to reduce the potential impacts to mining resources from construction and operation of the Project is to avoid routing the Project through known mining resources. For all Route Alternatives, the 1,000-foot-wide routes provide sufficient width to avoid locating the transmission line ROW in a way that disrupts aggregate mining features.

3.17. Community Services

This section provides a discussion of community services within the vicinity of the Study Area, including hospitals, emergency medical services, police departments, fire departments, and other emergency services. The affected environment, direct and indirect effects, and mitigation associated with the Project alternatives are presented.

3.17.1. Affected Environment

Community services generally refer to services provided by government entities to its citizens. Community services in a broad sense can include emergency services, education, parks and recreation facilities, water and sewer service, communication networks, and utilities. Community services as discussed in this section include those emergency services that are used to benefit public health and safety, including but not limited to hospitals, emergency medical services, police departments, sheriffs' offices, and fire departments. Parks and recreation are discussed in Section 3.13, Recreation and Tourism, while a discussion of electric, natural gas, and communication networks in the vicinity of the Study Area is presented in Section 3.18, Utility Systems.

Most of the community services available within the vicinity of Route Alternatives 1, 2, and 3 and Segment Alternatives A through T are located in urban areas, including the cities of Bemidji, Bigfork, Blackduck, Cass Lake, and Deer River, and within the counties of Beltrami, Cass, Hubbard, and Itasca. Table 3.17-1 provides a summary of community services available within the vicinity of Route Alternatives 1, 2, and 3.

Table 3.17-1: Community Services Located in Proximity to Route Alternatives 1, 2, and 3

Community Service Type	Address	Route Alternatives in Vicinity
Hospitals		
North Country Regional Hospital	1300 Anne Street NW Bemidji, MN 56601	1, 2, 3
PHS Indian Hospital	3rd Avenue W and 7th Street Cass Lake, MN 56633	1, 2
Deer River Health Care Center	1002 Comstock Drive Deer River, MN 56636	1, 2, 3
Bigfork Valley Hospital	258 Pine Tree Drive Bigfork, MN 56628	3
Fire Services		
Bemidji Fire Department	316 5th Street NW Bemidji, MN 56601	1, 2, 3
Cass Lake Volunteer Fire Department	213 Cedar Avenue NW Cass Lake, MN 56633	1, 2
Deer River Fire Department	Highway 6 N Deer River, MN 56636	1, 2, 3
Blackduck/Hines City Fire Department	33 Margaret Avenue NW Blackduck, MN 56630	3
Bigfork Volunteer Fire Department	101 Highway 38 S Bigfork, MN 56628	3
Police Departments		
Bemidji Police	613 Minnesota Avenue NW Bemidji, MN 56601	1, 2, 3
Leech Lake Tribal Police	6530 Highway 2 NW Cass Lake, MN 56633	1, 2
Deer River Police	208 2nd Street SE Deer River, MN 56636	1, 2, 3
Blackduck Police	8 Summit Avenue Blackduck, MN 56630	3
Bigfork City Police	PO Box 196 Bigfork, MN 56628	3
Sheriffs' Offices		
Beltrami County Sheriff	613 Minnesota Avenue NW Bemidji, MN 56601	1, 2, 3
Hubbard County Sheriff	301 Court Avenue Park Rapids, MN 56470	1, 2, 3
Cass County Sheriff	302 Minnesota Avenue W Walker, MN 56484	1, 2
Itasca County Sheriff	440 NE 1st Avenue Grand Rapids, MN 55744	1, 2, 3

Sources: Otter Tail Power et al., 2008a and Internet search performed on July 1, 2009.

Beltrami County/Bemidji/Blackduck

Public safety in Beltrami County is overseen by the Beltrami County Sheriff's Office, which is located in Bemidji. Calls to 9-1-1 and a non-emergency hotline for the County are directed to emergency services dispatchers employed by both the Beltrami County Sheriff's Office and the Bemidji Police Department (Beltrami County Sheriff, 2009). The city of Blackduck maintains its own police department. Blackduck also maintains a volunteer fire department with 25 firefighters, which is shared with the neighboring city of Hines (Blackduck, 2009). The Bemidji Fire Department includes one fire chief, seven professional firefighters, six resident firefighters, and 40 volunteer firefighters (Bemidji, 2009). Medical services are provided by the North Country Regional Hospital in Bemidji. The hospital has approximately 120 beds, 10 percent of which are dedicated to intensive care (North Country Regional Hospital, 2009). The hospital maintains a dedicated emergency room, which is open 24 hours a day, seven days a week.

Cass County/Cass Lake/Leech Lake Reservation

Public safety in Cass County is overseen by the Cass County Sheriff's Office. The County is divided into three enforcement/patrol areas, each staffed with one patrol sergeant, four full-time deputies, and at least one part-time officer (Cass County Sheriff, 2009). In August 2008, the former Cass Lake Police Department was disbanded; law enforcement in the city is now the jurisdiction of the Cass County Sheriff's Office. The LLBO Department of Public Safety operates within the reservation proclamation boundaries. Eight individuals are employed by the LLBO Department of Public Safety (LLBO, 2009b). The Leech Lake Tribal Police employs 15 patrol officers and four patrol sergeants (LLBO, 2009b). The department assists the Cass County Sheriff's Office and surrounding county safety officers as needed.

The city of Cass Lake and the LLBO maintain ambulance services. Fire protection for the Leech Lake Reservation is provided by surrounding municipalities. The city of Cass Lake maintains a volunteer fire department with one full-time employee and 19 volunteer firefighters. Medical services are provided by the PHS Indian Hospital, located within the city of Cass Lake. PHS Indian Hospital maintains 13 inpatient beds and one emergency room that is open 24 hours a day, seven days a week (LLBO, 2009).

Hubbard County

Public safety in Hubbard County is overseen by the Hubbard County Sheriff's Office. All 9-1-1 calls made in the County are directed to the Sheriff's Office Communication Center. The Sheriff's Office is responsible for dispatching all emergency response services, including police, fire, and ambulance services to the County (Hubbard County Sheriff, 2009). Approximately 20 full-time police officers are employed by the Hubbard County Sheriff's Office. The County does not maintain a fire department; municipal fire departments are contacted by Hubbard County to respond to fire-related emergencies, as needed. The North Country Regional Hospital and PHS Indian Hospital are the closest hospitals located in proximity to the northeast portion of Hubbard County that would be developed with the Project.

Itasca County/Bigfork/Deer River

Public Safety in Itasca County is overseen by the Itasca County Sheriff's Office. The Office employs 64 individuals and is divided into five patrol districts (Itasca County Sheriff, 2009). The cities of Deer River and Bigfork maintain their own police departments and volunteer fire departments. The Deer River Fire Department has 25 volunteer firefighters. The Bigfork Fire Department has 20 volunteer firefighters. The Deer River Police Department employs a total of 10 officers, four of which are full-time. At least one officer is on duty 24 hours a day during the summer; two officers are on duty 24 hours a day during the school year. The Bigfork Police Department consists of two part-time officers. Medical services are provided by the Bigfork Valley Hospital and Deer River Health Care Center. The Bigfork Valley Hospital is a 20-bed hospital equipped to provide emergency services in two trauma rooms and two emergency treatment rooms (Bigfork Valley Hospital, 2009). Two ambulances that serve the hospital are maintained by the Bigfork Ambulance Service Association. The Deer River Health Care Center is a 20-bed hospital equipped with an emergency room and dedicated ambulance service (Deer River Health Care Center, 2009). Emergency ambulance and medical services associated with each facility are open 24 hours a day, seven days a week.

3.17.2. Direct/Indirect Effects

This section discusses potential direct and indirect effects from the Project on community services and resources. Potential direct effects include:

- Interference with community services (i.e., road closures affecting access to service)
- Change in demand for service either to accommodate construction personnel or during the operations phase of the Project

Potential indirect effects include:

- Increase in traffic and re-routing of roadways during Project construction, resulting in increased response times for emergency services

3.17.2.1. No-Build Alternative

Because no structures would be installed and no existing ROWs would be expanded or new ROWs would be created, the No-Build Alternative would not impact community resources or activities directly or indirectly.

3.17.2.2. Route Alternatives 1, 2, and 3

This section discusses the potential for direct and indirect effects on community services from construction and operation of the Project, which are not expected to vary greatly based on the placement of the Project along Route Alternatives 1, 2, or 3. Potential impacts for Segment Alternatives are the same as those identified for the Route Alternatives. As such, potential impacts along specific Segment Alternatives are not discussed herein.

Impacts of Construction on Demand for Community Services

Construction–related incidents and injuries that require use of community services may occur during construction of the Project. Construction workers could be subject to typical construction-related injuries, including slips, trips, falls, wounds, and electrocution from energized equipment. This could result in temporary increased demand for emergency services, including responses from local sheriff, police, and fire departments and emergency medical services to respond to potential construction-related incidents and injuries. Compliance with NESC and OSHA regulations, as required by federal law, would minimize the potential for construction-related injuries. Community services available to respond to construction-related incidents and injuries are listed in Table 3.17-1.

As discussed in Section 3.11, Socioeconomics, construction of the Project would require approximately 75 employees and additional workers would be required for substation modifications (Otter Tail Power et al., 2008a). Job creation related to construction of the Project would be temporary and there would be no anticipated related increase in population for the Study Area (see Section 3.11, Socioeconomics). Operation of the Project would require a smaller number of maintenance personnel, which is not expected to increase population in the Study Area. Therefore, there would be no anticipated Project-related long-term increase in the demand on emergency services in the Study Area beyond the currently available capacities of the facilities.

The increased length of Route Alternative 3 relative to the other alternatives would be expected to result in either a longer construction period or more construction personnel, slightly increasing the number of potential construction-related injuries. However, no long-term changes on the demand for community services in the Study Area would be expected to result.

Impacts of Construction and Operation on Community Service Access and Response Times

During construction of the Project, traffic delays caused by construction activities have the potential to result in temporary increased response times from emergency service providers. According to the Applicants' *Application for a Route Permit*, construction activities would be staged such that public roads would not be closed for any substantial period.

If emergency services are required at a local residence or business where access is disrupted, construction activities would be halted and equipment relocated such that emergency vehicles could access the location of the emergency (Otter Tail Power et al., 2008a). Therefore, emergency services (e.g., ambulance, fire, and police responders) would not need to be re-routed to avoid road closures or construction delays and the affect on response times would be negligible.

With the exception of Deer River Health Care Center, no hospitals are located within the 1,000-foot routes developed for the Route and Segment Alternatives. As such, access to these facilities would not be restricted during construction of the Project. Deer River Health Care Center is located within the 1,000-foot route for Route Alternative 3, north of Deer River. In this location, the feasible 125-foot ROW identified by the Applicants would be located to the east of the hospital; the hospital entrance is accessible from the west. Access to the hospital would not be restricted under the feasible 125-foot ROW location identified by the Applicants; however, restricted access could occur if the ROW were located to the west of the hospital.

When completed, the Project would span all roads such that there would be no direct or indirect effects on community service response times.

3.17.2.3. Leech Lake Reservation

Potential direct and indirect effects of the Project on community services in the Leech Lake Reservation are consistent with those identified above. It is expected that the LLBO Department of Public Safety and Leech Lake Tribal Police may respond to emergency incidents or injuries and traffic calls resulting from construction activities. In addition, emergency medical services, if required in the Leech Lake Reservation, may be provided at the PHS Indian Hospital. As described for Route Alternatives 1, 2, and 3, no long-term impacts on community services are expected to result.

3.17.2.4. Chippewa National Forest

It is not expected that community services available through the U.S. Forest Service in the Chippewa National Forest would be utilized during Project construction or operation.

3.17.3. Mitigation

Mitigation measures for reducing traffic delays are discussed in Section 3.19, Traffic and Transportation. No long-term direct or indirect effects to community services from the Project are anticipated; therefore no mitigation is proposed.

3.18. Utility Systems

This section identifies utility systems in the Study Area, including communications networks, oil and natural gas pipelines, and transmission lines. The Study Area is defined as the 1,000-foot-wide route developed for each Route Alternative and Segment Alternative. Potential effects of the Project on existing utility systems are discussed, as well as potential mitigation measures to reduce disruption or interference in utility services from Project construction and operation.

Generally, existing rights-of-way (ROWs) for transmission line and pipelines would not overlap with the Project ROW. In cases where the Project would be double-circuited with existing transmission lines or distribution lines, existing ROW could be shared with the Project. Where this section identifies existing ROWs in the Study Area that could be “followed” or “paralleled” by the Project ROW, it is assumed that the Project ROW would not overlap the identified existing ROWs, but would instead be located adjacent to the existing ROWs.

3.18.1. Affected Environment

This section provides an overview of existing communications networks, oil and gas pipelines, and electric transmission lines in the Study Area. Communications networks in the Study Area were identified by the Applicants in the Application for a Route Permit (Otter Tail Power et al., 2008a) and confirmed through a search of current antenna licenses with the Federal Communications Commission (FCC). Existing transmission lines in the Study Area, many of which are owned by the Applicants, were identified by the Applicants in the Application for a Route Permit. Existing oil and gas pipelines were identified by the Applicants and confirmed through a review of pipeline maps obtained from pipeline owners and operators as needed.

3.18.1.1. Communications Networks

Communications network technologies present within the Study Area are divided into the following general categories: omnidirectional, unidirectional, and landlines. Omnidirectional is defined as those antennae that transmit or receive signals in any direction at the same time. Telecommunications signals for radio, television, and cellular phones are typically omnidirectional. Unidirectional is defined as those antennae that transmit or receive signals in a single direction. Microwave signals are unidirectional. Omnidirectional antenna towers and unidirectional microwave antenna towers are located within the Study Area for the three Project Route Alternatives, as discussed below. Landlines that provide telephone service are located within the Study Area. Landlines are installed on existing transmission line and distribution line structures.

Existing registered communications towers located within the Study Area were identified in the Application for a Route Permit and in GIS maps of Route Alternatives and Segment Alternatives. Information was confirmed through a search of communications towers registered with the FCC. Communications towers are primarily clustered within or in proximity to urban areas in the Study Area, including the cities of Bemidji, Bena, Bigfork, Blackduck, Cass Lake, Cohasset, Deer River, and Tenstrike. A total of 55 Antenna Structure Registration (ASR) towers registered with the FCC were identified within these cities. Those ASR towers that are located within the Study Area are discussed by Route Alternative in Sections 3.18.2.3 through 3.18.2.5.

3.18.1.2. Existing Oil and Natural Gas Pipelines

Route Alternative 1 would generally follow or parallel the existing Great Lakes Gas pipeline ROW from the Wilton Substation to the east of Deer River for a total of 61.4 miles. The Great Lakes Gas pipeline, owned by the Great Lakes Gas Transmission Company, transports natural gas under high pressure from the Minnesota-Canada border at Emerson, Manitoba to the Michigan-Canada border at St. Clair, Ontario. The pipeline is regulated by the Federal Energy Regulatory Commission. Pipeline safety is overseen by the U.S. Department of Transportation (Otter Tail Power et al., 2008a).

Route Alternative 2 would generally follow the existing U.S. Highway 2 ROW. From Cass Lake to the east, this Route Alternative would parallel the ROWs of four existing and two permitted Enbridge pipelines from Cass Lake to the Boswell Substation for a total of 48.1 miles. The existing Enbridge ROWs vary in width up to 125 feet. The two permitted Enbridge pipelines would parallel the existing ROWs. New ROW required by Enbridge would be up to 75 feet wide. This would result in a total Enbridge ROW of 200 feet.

The Enbridge pipelines are part of a network of Enbridge lines totaling 5,000 miles, which transport crude oil from western Canada to eastern Canada and the Great Lakes Region. Environmental review and routing of the Enbridge pipeline segments located in the Study Area are subject to Commission jurisdiction in accordance with Minnesota Statute 216G and implemented by Minnesota Rules, Chapter 7852. Once the pipelines are constructed, the Office of Pipeline Safety is responsible for ensuring pipeline safety.

Route Alternative 3 would not follow oil or gas pipeline ROWs for a significant distance, except after exiting the Wilton Substation and prior to terminating at the Boswell Substation, for a total of 8.1 miles.

3.18.1.3. Existing Electric Transmission Lines

Numerous existing 69 kV, 115 kV, and 230 kV transmission lines are located in the Study Area. Many of the existing transmission lines are owned by the Applicants. All three

Route Alternatives would follow existing transmission line for a distance, as shown in Table 3.18-1.

3.18.2. Direct/Indirect Effects

This section identifies potential direct and indirect effects of the Project on utility systems. Potential direct effects include interference with the following:

- Communication networks
- Oil and gas pipelines
- Existing transmission lines

Potential indirect effects include the following:

- Damage to existing utility systems during construction
- Temporary disruptions in service during construction

Existing utility systems are located within the Study Area for Route Alternatives 1, 2, and 3. Thus, potential effects are present for all three Route Alternatives and associated Segment Alternatives A through T.

Table 3.18-1 provides the total miles that Route and Segment Alternatives could follow or parallel adjacent to existing pipeline and existing transmission line ROWs. All segments of the Route and Segment Alternatives that contain existing transmission lines or pipelines were included in the calculations for Table 3.18-1. Generally, existing rights-of-way (ROWs) for transmission line and pipelines would not overlap with the Project ROW. In cases where the Project would be double-circuited with existing transmission lines or distribution lines, existing ROW could be shared with the Project. Where this section identifies existing ROWs in the Study Area that could be "followed" or "paralleled" by the Project ROW, it is assumed that the Project ROW would not overlap the identified existing ROWs, but would instead be located adjacent to the existing ROWs. It is noted that the actual location of ROW required for the Project could be located anywhere within the identified wider routes and would not necessarily border existing pipeline or transmission line ROWs.

Table 3.18-1: Length of Alternative that Could Follow Existing Transmission Line and Pipeline Rights-of-Way

Route and Segment Alternatives	Total Length (miles)	Follows Existing Transmission ROW (miles)	Percentage of Alternative that follows existing transmission line ROW	Follows existing pipeline ROW (miles)	Percentage of Alternative that follows existing pipeline ROW
Route Alternatives					
1	69	18	26	61	89
2	68	9	14	48	71
3	116	91	79	8	7
Segment Alternatives					
A	15.7	15.7	100	0	0
B	10.5	0	0	0	0
C	4.4	0	0	0	0
D	5.0	0	0	0	0
E	10.6	0	0	0	0
F	1.3	0	0	0	0
G	1.6	1.6	100	1.6	100
H	1.0	1.0	100	0	0
I	0.5	0	0	0.5	100
J	0.4	0	0	0	0
K	5.9	0	0	0.2	3.0
L	2.5	2.5	100	0	0
M	2.4	2.4	100	0	0
N	3.7	0	0	0	0
O	2.7	0	0	0	0
P	0.2	0	0	0	0
Q	0.3	0	0	0	0
R	1.8	0	0	0	0
S	1.0	0	0	0	0
T	2.02	0	0	0	0

Potential effects for the Route Alternatives and Segment Alternatives located within the Leech Lake Reservation and Chippewa National Forest would be consistent with those identified for the entire Study Area and are not discussed separately.

3.18.2.1. No-Build Alternative

Under the No-Build Alternative, no changes to existing communications networks would occur, no new transmission infrastructure would be constructed, and no impacts to existing oil and natural gas pipelines would occur.

In comments to the Commission on the Applicants' application for a Certificate of Need, the Energy Regulatory and Planning (ERP) division of the OES concluded that the No-Build Alternative would entail maintaining unreliable service in the local area.

3.18.2.2. Route Alternatives and Segment Alternatives

This section identifies direct and indirect effects from the Project on communications networks, existing oil and natural gas pipelines, and existing transmission lines. Potential effects are discussed by issue area. Although potential effects do not differ greatly between Route Alternatives or Segment Alternatives, areas where effects are more likely to occur because of the Project's proximity to certain utility features are discussed by Route and Segment Alternative.

Communications Networks

Interference could occur to both omnidirectional and unidirectional signals under each of the build alternatives, as discussed below.

Omnidirectional Signals

Under each of the Route Alternatives or Segment Alternatives, the presence of new transmission lines could interfere with omnidirectional signals and, thus, affect communication, television, or radio reception in four ways. The Utilities have stated that they are not aware of any previous complaints related to radio or television interference from existing transmission lines in and around the Study Area, many of which are owned by the Applicants.

The four types of interference are gap discharges, corona discharges, shadowing effects, and reflection effects (Otter Tail Power et al., 2008a). Gap discharges are the most commonly observed form of electrical interference with omnidirectional signals. Gap discharge interference is caused by the creation of spaces (gaps) between mechanically connected metal parts and can be the result of broken or poorly fitted parts (e.g., clamps, insulators, and brackets). When sparks discharge across a gap, electrical noise may be created. Gap discharges can be mechanically repaired. The potential for gap discharges is minimized on longer transmission lines with higher voltages because there are fewer structures and a greater mechanical load on the hardware present (Otter Tail Power et al., 2008a). The extent of electrical interference from gap discharges on a communication signal is dependant upon the strength of the communicational signal, quality of the antenna, and distance between the receiver and transmission line (Otter Tail Power et al., 2008a).

Corona discharges are a form of electrical interferences caused when small electronic discharges from energized conductor electric fields ionize nearby air. Corona discharges are the result of conductor irregularity, which may consist of physical damage, dust buildup, or water buildup. The ionization of air results in an energy loss that creates audible noise, radio noise, light, heat, and small amounts of ozone. Corona discharges can be minimized by the proper selection of conductors. The extent of electrical interference from corona discharges on a communication signal is dependent upon the strength of the communication signal and the magnitude of the radio frequency noise. Typically, the strength of the radio or television broadcast signal within a broadcaster's primary coverage area is strong enough to prevent interference from radio noise. Radio noise has the ability to cause interference with all radio reception, although it is noted that amplitude-modulated (AM) broadcast bands, 535 to 1,605 kHz and those stations broadcasting below 1,000 kHz are mostly affected (OES, 2009). The FCC has stated that metal structures constructed within 0.5 mile of an omnidirectional AM antenna could result in interference with the AM broadcasting station. Frequency-modulated (FM) stations are rarely affected by corona discharges caused from transmission lines because radio frequency noise decreases in magnitude with increasing frequency. Similarly, interference with cellular phones is rare due to the high frequencies used. Digital reception is typically more tolerant of noise. Because television is broadcasted digitally, interference with television reception would be minimal.

Shadowing and reflection effects are similar types of interference that are caused by large structures in the path of omnidirectional signals. Both shadowing and reflection effects are rare, and are typically not associated with transmission lines, but instead with large building structures. Shadowing effects can occur when the transmission line structure casts a shadow that obstructs or reduces a signal. Reflection effects can occur when the transmission line structure causes a reflection or scattering of the signal, resulting in the original signal becoming two or more signals. When two or more signals are received by the receiver in sequence, a second image can appear on the receiver's screen and displace the other image, which is referred to as ghosting or delayed image. The extent of reception interference on a communication signal is dependant upon the structure height and surrounding landscape. The Applicants have proposed using wood H-frame structures for the majority of structures. The two poles in each H-frame structure would be separated by approximately 20 feet. Due to the distances between poles, omnidirectional signals are expected to travel through the structures with little interference (Otter Tail Power et al., 2008a).

Unidirectional (Microwave) Signals

Unidirectional signals emitted and received from microwave antennae are dependent upon a line-of-sight between antenna receivers. If transmission line structures are located between two microwave signal antennae, interference could occur to the unidirectional signals. Typically, existing microwave towers are taller than the proposed pole structures. In addition, transmission lines can be constructed to avoid line-of-sight interference with existing towers.

Landlines

Modern telephone lines and communication circuits are typically well shielded to prevent potential interference from transmission lines. When landlines parallel transmission lines for long distances, inductive coupling (i.e., coupling between the energized source and electrical equipment) can occur. The induced voltage of the landline can be avoided by increasing the distance between parallel transmission lines and landlines, and electrical shielding of the line.

Existing Oil and Natural Gas Pipelines

Generally, the ROW for transmission lines and pipelines do not overlap because of the clearance and safety criteria for each utility. The Project ROW and pipeline ROW would be separated to avoid damage to the existing utility during construction and maintenance. In addition to clearance and safety considerations, there are a number of pipeline expansion proposals that limit the potential to overlap the Project ROW with existing pipeline ROWs.

When a high-voltage AC transmission line is located adjacent to a pipeline's ROW, the pipeline may be subjected to electrical interference from electric and magnetic induction, conductive interference, and capacitive effects. Electric and magnetic induction is the primary effect of the high-voltage AC transmission line on a buried pipeline during normal (steady state) operation. This form of interference is due to the magnetic field produced by the AC current flowing in the conductors of the transmission line coupling with the metallic pipeline, inducing a voltage and associated current on the pipeline.

Conductive interference is a concern when a transmission line fault occurs in proximity to the pipeline because it can cause AC currents to enter the pipeline at coating holidays (i.e., flaws in the coating) and produce a voltage gradient across the pipeline coating. Electric and magnetic effects are also a concern during a fault because the phase current in at least one phase (conductor) of the high-voltage AC transmission line is elevated.

Capacitive effects are typically only a concern during pipeline construction when long sections of the pipeline are above ground. To prevent contact shock hazards, proper horizontal and vertical separation between the transmission line's conductors and equipment used during pipeline construction and maintenance (such as cranes and shovels) must be maintained.

If these electrical interference effects are great enough during normal operation, then a potential shock hazard exists for anyone that touches an above-ground part of the pipeline, such as a valve or cathodic protection test station. In addition, during normal operation, if the induced AC current density at a flaw in the pipeline coating is great enough, AC pipeline corrosion may occur. Damage to the pipeline coating can occur if the voltage between the pipeline and surrounding soil becomes excessive during a fault condition.

The potential exists for damage to occur to underground pipelines during excavation and grading activity. The Applicants propose to use the Gopher One-Call system to identify and avoid impacts to existing utilities during construction, including pipelines and any associated distribution lines.

Existing Electric Transmission Lines

Under the Route Alternatives and Segment Alternatives, two construction options are available in areas where the Project would follow an existing transmission line ROW. The first is the construction of the Project line adjacent to the existing line, such that there are two parallel single-circuit lines. This would require additional easements to construct and operate the Project. No direct interference of existing parallel transmission lines would be expected during construction or operation of the Project. Parallel lines would be constructed at a distance necessary to allow for construction and line maintenance. This would lead, however, to a wider area of disturbance from clearing of new ROW.

Alternatively, there are opportunities to double-circuit the Project with existing 115 kV and 69 kV transmission lines. Double-circuiting could potentially occur in all locations where the Route or Segment Alternatives would parallel existing transmission lines (Route Alternatives 1, 2, and 3, and Segment Alternatives A, G, H, L, and M).

Double-circuiting would, in most cases, require less total ROW than two parallel circuits, but would increase reliability issues because a single incident has the potential to disrupt service on both lines. Double-circuit lines typically have increased construction costs and more complex maintenance. In most cases, double-circuiting would not affect operation of the existing transmission lines, except that construction of the Project would require moving the existing transmission lines to the new pole structures. Construction staging would need to be carefully coordinated with other utilities in portions where the Project would be double-circuited to ensure that electric reliability is maintained throughout the construction process. The existing transmission lines would remain in service during construction activities (Otter Tail Power et al., 2008a).

Overall, it is expected that the Project would have a positive impact on electric utilities in the Study Area by improving system reliability and the capacity of the electric power system to reduce the risk of brownouts.

3.18.2.3. Route Alternative 1

This section identifies potential direct and indirect effects from the Project on utilities specific to Route Alternative 1 and its associated Segment Alternatives.

Communications Networks

Three registered telecommunications antennae are located within the Study Area for Route Alternative 1 (Otter Tail Power et al., 2008a). The telecommunications antennae include:

- One ASR tower registered to AAT Communications Corporation and located in the city of Zemple (milepost [MP] 1-60);
- One ASR tower registered to Great Lakes Gas Transmission and located on Great Lake Road, east of Ball Club Lake (MP 1-57); and
- One cellular tower registered to American Cellular Corporation and located near the city of Zemple (MP 1-60).

Three microwave towers are located within 1 mile of Route Alternative 1 (Otter Tail Power et al., 2008a). One of the towers is located in Bemidji area, approximately 0.5 mile south of Route Alternative 1. A second tower in the Bemidji area is located approximately 0.8 mile north of Route Alternative 1. The third tower is located directly south of the city of Bena, approximately 600 feet north of Route Alternative 1.

Oil and Gas Pipelines

Route Alternative 1 would begin following the Great Lakes Gas pipeline ROW approximately 8,000 feet south of the Wilton Substation, south of County Road 14 (between MP 1-1 and 1-2). Route Alternative 1 would deviate from the pipeline ROW at the intersection of Monarch Drive SW and Oak Ridge Road SW in Bemidji for approximately 1,900 feet south and 2,700 feet east to avoid a residential area (between MP 1-3 and 1-4). Route Alternative 1 would then follow the pipeline ROW until combining with Route Alternative 2, north of Six Mile Lake (at MP 1-44), to follow U.S. Highway 2 and the Enbridge pipeline ROW to the Mississippi River crossing (between MP 1-51 and 1-52), located to the southwest of the city of Ball Lake. Route Alternative 1 would then follow the Great Lakes Gas pipeline ROW until deviating for approximately 4,000 feet to follow County Road 118 to the south of the city of Ball Lake and Ball Club Lake (between MP 1-53 and 1-54). Route Alternative 1 would deviate from the pipeline ROW and follow existing railroad and 115 kV transmission line ROWs for the remaining approximately 4.5 miles to the Boswell Substation (MP 1-64 to MP 1-68.65). In total, Route Alternative 1 could follow or parallel existing pipeline ROWs for approximately 61.4 miles.

None of the Segment Alternatives associated with this Route Alternative would parallel pipelines or introduce new pipeline crossings, with the following exceptions:

- Segment Alternative A would cross the Great Lakes Pipeline at MP 1-6 to follow an existing 115 kV transmission line from Bemidji to 460th Street in Hubbard County, approximately 0.5 mile west of the Leech Lake Reservation Boundary.

- Segment Alternative B would avoid the Pike Bay Experimental Forest and much of the Ten Section Area by deviating from Route Alternative 1 south of Pike Bay and west of Moss Lake between MPs 1-22 and 1-27. Segment Alternative B would deviate from Route Alternative 1 and the Great Lakes Gas pipeline ROW to create approximately 10.5 miles of new corridor.
- Segment Alternative K would cross the Great Lakes Pipeline near Hubbard County Road 15 and then follow Enbridge pipeline ROW to the existing Cass Lake Substation to connect with Route Alternative 2. Segment Alternative K would require crossing the Enbridge ROWs at some point to access the Cass Lake Substation.
- Segment Alternative L would cross the Great Lakes pipeline to connect Segment Alternative A to a new Cass Lake Substation or to Segment Alternative M to connect to the existing Cass Lake Substation.
- Segment Alternative M would cross the Enbridge Pipeline to connect to the existing Cass Lake Substation.
- Segment Alternative N would cross both the Enbridge and Great Lakes pipelines to connect Route Alternatives 1 and 2.
- Segment Alternative O would cross both the Enbridge and Great Lakes pipelines to connect Route Alternatives 1 and 2.
- Segment Alternative P may require the crossing of both the Enbridge and Great Lakes pipelines to connect Route Alternatives 1 and 2.
- Segment Alternative Q may require crossing both the Enbridge and Great Lakes pipelines to connect Route Alternatives 1 and 2.

Existing Transmission Lines

Route Alternative 1 would largely follow the Great Lakes Gas pipeline ROW, although existing transmission line ROWs would be crossed and paralleled for certain segments. Immediately exiting the Wilton Substation, Route Alternative 1 would follow two existing 69 kV transmission lines for approximately 1.2 miles before intersecting County Road 14 and continuing onto the Great Lakes Gas pipeline ROW (between MP 1-1 and 1-2). Route Alternative 1 would cross the existing Otter Tail Power Bemidji-Nary 115 kV transmission line to the north of Lake Marquette (between MP 1-5 and 1-6). Route Alternative 1 then would proceed along a pipeline ROW to Pike Bay. Approximately 3,000 feet after crossing 73rd Avenue NW and the Hubbard-Cass County Line, Route Alternative 1 would intersect with an existing 115 kV transmission line at the location for the proposed Cass Lake Substation (MP 1-18). North of Six Mile Lake, Route Alternative 1 would combine with Route Alternative 2 and follow an existing Great River Energy 69 kV transmission line to the city of Ball Club (between MP 1-44 and 1-51). Route Alternative 1 would deviate from the 69 kV transmission line ROW at County Road 119 in Ball Club for approximately 4,350 feet (between MP 1-53 and 1-54). Route Alternative 1 then would re-join the 69 kV transmission line ROW for 2 miles before the 69 kV line turns north and Route Alternative 1 would continue east along the Great Lakes Gas pipeline. East of Deer River, Route Alternative 1 would follow an existing Minnesota Power 115 kV transmission line for approximately 6.3 miles and into the Boswell Substation (between approximately MP 1-62 and the terminus at 1-68.65). In total, Route Alternative 1 could follow or parallel existing transmission line ROWs for 17.8 miles.

None of the Segment Alternatives associated with this Route Alternative would parallel transmission lines, with the following exceptions:

- Segment Alternative A would follow an existing Bemidji-Nary 115 kV transmission line from Bemidji to Cass Lake instead of following the Great Lakes Gas pipeline ROW. Segment Alternative A would deviate from Route Alternative 1 between MP 1-5 and 1-6 and rejoin Route Alternative 1 near MP 1-22.
- Segment Alternative L would connect Segment Alternative A to a new Cass Lake Substation or to Segment Alternative M to connect to the existing Cass Lake Substation. This segment would follow a 115 kV transmission line for the entire 2.5-mile length of the segment.
- Segment Alternative M would connect Segment Alternative L to the existing Cass Lake Substation, and would follow an existing 115 kV transmission line for its entire length.

3.18.2.4. Route Alternative 2

This section identifies potential direct and indirect effects from the Project on utilities specific to Route Alternative 2 and its associated Segment Alternatives.

Communications Networks

Four registered telecommunications antennae are located within the Study Area for Route Alternative 2 (Otter Tail Power et al., 2008a). The telecommunications antennae include:

- One ASR tower registered to the State of Minnesota, west of the city of Cass Lake and north of Route Alternative 2 (between MPs 2-19 and 2-20);
- One ASR tower registered to the Burlington Northern Railway, approximately 2,000 feet south of Grass Lake, along the railway between Cass Lake and Bena (near MP 2-29);
- One land mobile tower registered to the State of Minnesota, west of the city of Cass Lake and north of Route Alternative 2 (between MPs 2-19 and 2-20); and
- One land mobile tower registered to the Burlington Northern Railway, west of the city of Cass Lake and north of Route Alternative 2 (between MPs 2-19 and 2-20).

Although not located within the 1,000-foot-wide route, an omnidirectional transmitting antenna for KBUN AM, owned by the Paul Bunyan Broadcasting Company, is located approximately 1,500 feet north of Route Alternative 2 on Jefferson Avenue SW in Bemidji. The antenna transmits at 1450 KHz.

Five microwave towers are located within 1 mile of Route Alternative 2 (Otter Tail Power et al., 2008). Two of the towers are located approximately 0.4 and 0.8 mile north of Route Alternative 2 in Bemidji. A third Bemidji tower is located approximately 0.9 mile south of Route Alternative 2. The fourth tower is located in Cass Lake, approximately 225 feet north of Route Alternative 2. The final tower is located in Bena, approximately 0.7 mile south of Route Alternative 2.

Oil and Gas Pipelines

Route Alternative 2 would cross the Enbridge pipeline ROWs four times in the city of Bemidji before running parallel to the Enbridge pipeline ROWs in Cass Lake:

- As the Project exits the Wilton Substation to the northeast (MP 2-0).
- To the west of Lake Irving at Division Street W in Bemidji (between MP 2-2 and 2-3).
- South of Bemidji near the Bemidji Slough Wildlife Management Area (WMA), where Route Alternative 2 would follow U.S. Highway 2 and the Enbridge pipeline crosses U.S. Highway 2 (near MP 2-7).
- Along U.S. Highway 2, west of Cass Lake, where the Enbridge pipeline re-crosses U.S. Highway 2 south of Little Wolf Lake (near MP 2-17).

Route Alternative 2 then generally would follow the Enbridge pipeline ROW from Cass Lake to Deer River. Route Alternative 2 would deviate slightly from the Enbridge pipeline ROW to the south of Grass Lake when it would follow U.S. Highway 2 (between 2-28 and 2-30). Route Alternative 2 also would deviate from the Enbridge pipeline ROW at Reservation Highway 60 north of Portage Lake to avoid a residential area (between MP 2-35 and 2-36). Route Alternative 2 would follow U.S. Highway 2 to the east of Ball Club Lake, again deviating slightly from the Enbridge pipeline ROW (between MP 2-50 and 2-57) to follow the U.S. Highway 2 ROW. To the east of Deer River, Route Alternative 2 would follow the U.S. Highway 2 ROW for approximately 2 miles before continuing along the Enbridge pipeline ROW (starting between MP 2-63 and 2-64) to within 1 mile of the Boswell Substation (at MP 2-67). In total, Route Alternative 2 could follow or parallel existing pipeline ROWs for approximately 48.1 miles. In areas where the Project is located adjacent to the Enbridge ROWs, total combined ROW width for the Project and pipelines would be 325 feet.

Segment Alternatives associated with this Route Alternative generally do not interact with existing pipelines, except as follows:

- Segment Alternative C would require crossing the Enbridge pipeline ROWs when used in conjunction with Route Alternative 2.

- Segment Alternative G would follow the Enbridge pipeline ROWs for a 1.6 mile segment from the Wilton Substation to Division Street West. The Segment Alternative would cross the Enbridge pipeline ROWs.
- Segment Alternative H would cross the Enbridge pipeline ROWs twice, first to parallel with an existing 115 kV transmission line, and then to reconnect to Route Alternative 2 south of U.S. Highway 2.
- Segment Alternative I would continue to parallel the Enbridge pipeline ROWs for approximately 0.5 mile. It may require a crossing of the Enbridge pipeline to reconnect to Route Alternative 2 south of U.S. Highway 2.
- Segment Alternative K would cross the Great Lakes Pipeline near Hubbard County Road 15 and then would follow the Enbridge pipeline ROW to the existing Cass Lake Substation to connect with Route Alternative 2. Segment Alternative K would require crossing the Enbridge ROWs at some point to access the Cass Lake Substation.
- Segment Alternative N would cross both the Enbridge and Great Lakes pipelines to connect Route Alternatives 1 and 2.
- Segment Alternative O would cross both the Enbridge and Great Lakes pipelines to connect Route Alternatives 1 and 2.
- Segment Alternative P may require crossing both the Enbridge and Great Lakes pipelines to connect Route Alternatives 1 and 2.
- Segment Alternative Q may require crossing both the Enbridge and Great Lakes pipelines to connect Route Alternatives 1 and 2.

Existing Transmission Lines

Route Alternative 2 largely would follow the U.S. Highway 2 and Enbridge pipeline ROWs, although existing transmission line ROWs would be crossed and paralleled for certain segments. While following U.S. Highway 2/71 to the west of Bemidji, Route Alternative 2 would cross an existing Otter Tail Power 115 kV transmission line in two locations (near MP 2-2 and MP 2-3). An existing Otter Tail Power 69 kV transmission line begins to follow U.S. Highway 2 near the intersection of U.S. Highway 2 and Van Buren Avenue SW in Bemidji (between MP 2-9 and 2-10). Route Alternative 2 would follow this transmission line ROW to the east for approximately 8.5 miles to the proposed Cass Lake Substation, located near MP 2-18. Northeast of the city of Bena, Route Alternative 2 would parallel an existing 69 kV transmission line to the city of Ball Club (between MP 2-40 and 2-50). To the east of Ball Club River and County Road 89, Route Alternative 2 would cross an existing Great River Energy 69 kV transmission line (between MP 2-54 and 2-55). Route Alternative 2 would cross an existing Minnesota Power 115 kV transmission line east of Deer River (between MP 2-61 and 2-62), after which Route Alternative 2 would turn southeast to proceed to the Boswell Substation. Route Alternative 2 would briefly follow the Minnesota Power 115 kV transmission line ROW prior to terminating at the Boswell Substation (between MP 2-67 and 2-67.8). In total, Route Alternative 2 could follow or parallel existing transmission line ROWs for 9.4 miles.

- Segment Alternative G would follow an existing 115 kV transmission line ROW for approximately 1.6 miles from the Wilton Substation to Division Street.
- Segment Alternative H would continue to parallel with an existing 115 kV transmission line before connecting with Route Alternative 2 south of U.S. Highway 2.
- Segment Alternative M would connect Segment Alternative L to the existing Cass Lake Substation, and would follow an existing 115 kV transmission line for its entire length.

3.18.2.5. Route Alternative 3

This section identifies potential direct and indirect effects from the Project on utilities specific to Route Alternative 3 and its associated Segment Alternatives.

Communications Networks

Seven registered ASR antenna towers are located within the Study Area for Route Alternative 3. The telecommunications antennae include:

- One ASR tower registered to Otter Tail Power Company, located at the intersection of Mill Street and Tyler Avenue SE in Bemidji (between MPs 3-13 and 3-14);
- One ASR tower registered to Northern Minnesota Investments, located at the intersection of Mill Street and Tyler Avenue SE in Bemidji (between MPs 3-13 and 3-14);
- One ASR tower registered to Midcontinent Communications, located to the west of Tyler Avenue SE in Bemidji (between MPs 3-13 and 3-14);
- One ASR tower registered to AAT Communications, located within the 1,000-foot-wide route of Route Alternative 3 south of Blackduck (near MP 3-39);
- One ASR tower registered to Central States Tower Holdings LLC, located on Court Lake Road, east of the city of Tenstrike (between MPs 3-32 and 3-33); and
- Two ASR towers registered to Itasca County, located in the northern portion of the 1,000-foot-wide route for Route Alternative 3. One of the towers is positioned along County Road 29, approximately 4 miles east of the city of Alvwood (between MPs 3-56 and 3-57), and the other to the east of MN Highway 6 where Route Alternative 3 changes direction from east to south (near MP 3-81).

Oil and Gas Pipelines

Route Alternative 3 would start from the Wilton Substation in a similar manner to Route Alternative 1, and would begin following the Great Lakes Gas pipeline ROW approximately 8,000 feet south of the Wilton Substation, south of County Road 14 (between MP 3-1 and 3-2). Route Alternative 3 would follow the Great Lakes Gas pipeline ROW for approximately 9 miles until turning north after the intersection of County Road 400, southeast of Bemidji (between MP 3-9 and 3-10). Route Alternative 3 later would cross the Enbridge pipeline south of U.S. Highway 2 to the east of Deer River (between MP 3-108 and 3-109). Route Alternative 3 then would follow the Great Lakes Gas pipeline row to the east for approximately 2 miles (between approximately MP 3-108.5 and 3-110.5). Route Alternative 3 then would parallel the Great Lakes Gas pipeline ROW to the Boswell Substation. Route Alternative 3 could follow or parallel existing pipeline ROWs for a total of 8.1 miles.

Segment Alternatives E, R, S, and T, the only Segment Alternatives associated with this Route Alternative 3, would not parallel or cross any pipelines.

Existing Electric Transmission Lines

Route Alternative 3 would largely follow existing transmission line ROWs. Immediately exiting the Wilton Substation, Route Alternative 3 would follow an existing 69 kV transmission line for approximately 1.2 miles before intersecting County Road 14 and following the Great Lakes Gas pipeline ROW (between MP 3-1 and 3-2). Route Alternative 3 would cross the existing Otter Tail Power Bemidji-Nary 115 kV transmission line to the north of Lake Marquette (between MP 3-5 and 3-6). Route Alternative 3 would re-connect with an existing 69 kV line east of Bemidji, after turning north to cross U.S. Highway 2 at MP 3-11. Alternative 3 would follow the 69 kV transmission line ROW from Bemidji to Blackduck. South of Blackduck, the 69 kV transmission line turns north and Route Alternative 3 would continue east following roadway easements (between MP 3-39 and 3-54). Route Alternative 3 would rejoin a 69 kV transmission line right-of way at the intersection of County Road 13 and County Road 131 (between MP 3-53 and 3-54), which it would continue to follow east to MN Highway 6 and then south to an existing substation east of Deer River located between MP 3-107 and 3-108. Route Alternative 3 would follow an existing 115 kV transmission line ROW from the substation to the Boswell Substation. The 1,000-foot-wide route for Route Alternative 3 could follow or parallel existing transmission lines for a total of 91.3 miles.

Segment Alternative E would deviate from the 69 kV Transmission Line to follow MN Highway 6 for approximately 11 miles (between MP 3-92 and 3-102).

3.18.3. Mitigation

No large-scale or long-term negative effects of the Project alternatives are expected for utility systems. However, localized and temporary effects on utility systems are possible.

The following sections summarize the mitigation measures that could be implemented to reduce the potential impacts to utility systems from construction and operation of the

Project. Mitigation measures that are typically included in permits are noted. Cases where additional mitigation measures may be incorporated as a permit condition are also noted.

3.18.3.1. Omnidirectional Signals

Interference from the Project on omnidirectional signals could be reduced through proper maintenance of the line. Proper selection of hardware and preventative maintenance could reduce gap and corona discharges.

The HVTL route permit issued by the Commission could have a permit condition requiring the permittee to correct any interference to communications systems it causes or creates.

Radio Interference

Interference from transmission line corona discharges on AM radio stations within a station's primary coverage area could be reduced by modifying the receiving antenna system (Otter Tail Power et al., 2008a). If a two-way mobile radio is located adjacent to and behind a large metallic structure, signal blocking may result in interference. The Project would be constructed on wood H-frame structures for the majority of the Project length, which would reduce signal blocking. In locations where metallic structures were used, mobile radio towers could be relocated such that the transmission line structures would not block two-way signals. AM antenna located outside but in proximity to the selected route could be identified and considered in structure placement and design. The Applicants could work with individual mobile radio owners regarding placement of the Project, such that blocking interference does not occur. If existing communications networks cannot be avoided through placement of the Project transmission line and modifications to broadcasting station or receiver antennae do not eliminate interference, the transmission line structures could be detuned at the affected radio frequency to prevent interference.

Television Interference

Due to the high frequency of television broadcast signals, the Project would not be expected to cause interference within a station's primary coverage area. However, if interference did occur, the addition of an outside antenna for viewers could correct the problem.

Television reception interference could also be the result of a transmission line structure blocking the signal, if a structure was placed in close proximity to the receiver. If viewers report problems with television reception interference due to the placement of structures, the Applicants have agreed to investigate (through measurements) whether the structure caused the reception interference. Should this be the case, corrective measures could be implemented. Reception interference could be corrected with the addition of an outside antenna or amplifier for viewers.

3.18.3.2. Microwave (Unidirectional) Signals

The Applicants propose working individually with all unidirectional tower owners/operators in proximity to the transmission line to resolve any potential interference. Mitigation may include shorter transmission line structures near the signal direction to maintain line-of-sight abilities for microwave towers (Otter Tail Power et al., 2008a).

3.18.3.3. Oil and Natural Gas Pipelines

With proper planning and mitigation, pipelines and high voltage AC transmission lines could be safely co-located on adjacent ROWs. The AC interference effects could be predicted with computer modeling. The National Association of Corrosion Engineers has standards that ensure that pipeline integrity would not be degraded nor personnel safety compromised because of AC interference from a transmission line constructed and operated adjacent to a pipeline. Mitigation techniques for AC interference on pipelines include reducing the impedance of the transmission structure grounds, grounding the pipeline in conjunction with de-couplers, burying gradient control wires along the pipeline or ground mats under aboveground facilities (such as at valves), and the use of dead fronts at test stations.

None of the above mitigation methods would be expected to require additional ROW beyond the existing pipeline ROW and 125-foot ROW for the Project. Reducing transmission impedance consists of adding stacked or parallel ground rods to the structure grounding system. This is done adjacent to the transmission structure, thus no additional transmission line ROW is required. Grounding a pipeline typically occurs within the existing pipeline ROW and consists of connecting a copper or zinc cable to the pipeline through a de-coupler device to prevent DC cathodic protection current from flowing to ground. Gradient control wires are typically copper conductors buried parallel to and adjacent to the pipeline (within 5 to 10 feet).

Ground mats consist of approximately 8-foot square sections of conductors buried underneath where pipeline personnel stand when operating a valve. Dead fronts consist of replacing the existing test stations with test stations that are non-conductive and require no additional land. Lastly, additional "coupon stations" are sometimes installed to monitor the pipeline to ensure that mitigation measures are effective at preventing AC pipeline corrosion. These facilities are installed adjacent to the pipeline and use coupons that are exposed to the same environment as the pipeline and monitored to determine if AC corrosion is occurring. This typically would not require additional

ROW beyond the existing pipeline ROW and 125-foot ROW for the Project (Otter Tail Power et al., 2008a).

The Applicants have agreed to ensure that computer modeling of AC interference effects is completed and that any required mitigation is designed and installed prior to energizing the transmission line. The Applicants have met with Enbridge and Great Lakes Gas, owners of major pipelines in the Study Area, to ensure that the necessary separation occurs between the proposed transmission line and pipelines and that safety requirements are met. This should help ensure that there are no adverse impacts to pipeline structures, pipeline operation, or public safety resulting from locating the transmission line adjacent to a pipeline ROW (Otter Tail Power et al., 2008a).

3.18.3.4. Electric Transmission Lines

Any planned service disruptions to electric service that are necessary during construction activities could be scheduled with the affected owners of the existing transmission line in accordance with reliability standards. Advanced scheduling of these disruptions would allow for alternative arrangements for electrical service to be made when possible and allow for customers to be notified in advance.

Utility repair crews could be present or on-call during construction activities to respond to any unplanned incidents that may result in an interruption to electric service.

3.19. *Traffic and Transportation*

This section describes traffic and transportation networks and facilities in the Study Area, and the potential impacts of the Project on those networks and facilities. The Study Area is defined as the 1,000-foot-wide route developed for each Route Alternative and Segment Alternative. Facilities examined include roads, railroads, airports, and navigable waters.

3.19.1. Affected Environment

This section provides an overview of the existing federal, state, and county highways and roads; railways; airports; and navigable rivers and lakes located in proximity to the Study Area. Transportation facilities in the Leech Lake Reservation (LLR) and Chippewa National Forest (CNF) are discussed separately.

Scenic byways are discussed herein and in Section 3.1, Aesthetics. Figure 3.19-1 illustrates existing transportation and utility infrastructure in the Study Area.

3.19.1.1. Federal, State, and County Roads

The Study Area is readily accessible by an extensive system of roads, including local, collector, and arterial roads, most notably U.S. Highway 2 (U.S. 2). Table 3.19-1 lists the annual average daily traffic (AADT) volumes for U.S. Highways and Minnesota (MN) Highways crossed or paralleled by the Project alternatives. Data for traffic volumes were not available for all county highways and roads in the Study Area. Traffic volumes for these roads are typically lower than for U.S. or Minnesota highways.

Table 3.19-1: Average Annual Daily Traffic Volumes of Highways Near the Study Area

U.S. or Minnesota Highway	Location	Route and Segment Alternatives	AADT
U.S. 71 (Crossings)	South of Bemidji	1	8,600
	South of Bemidji	1	4,900-5,600
U.S. 71 (Parallel and Crossings)	Between Tenstrike and Blackduck	3	3,400
U.S. 71/MN Highway 197 (Crossing)	South of Bemidji	3	8,600
U.S. 2 (Crossing)	Southeast of Bemidji	3	9,500
	East of Zemple	3	6,000-8,400
U.S. 2 (Parallel) U.S. 2/MN Highway 6 (Parallel)	South of Bemidji	2	9,500
	Near Cass Lake	2	5,300-8,300
	Between Bena and Zemple	1 and 2	3,400
	Between Zemple and Boswell Substation	1 and 2	6,000-8,400
MN Highway 6 (Crossing)	Near Boswell Substation	1	560
	South of Gunderson Lake	3	750
MN Highway 6 (Parallel)	Between Bowstring and Deer River	E	1,100-3,550
MN Highway 46 (Crossing)	Alvwood	3	800-900
MN Highway 371 (Crossing)	South of Cass Lake	1	3,800-5,600
	Cass Lake	2	5,600-6,100

Source: MnDOT, 2007

The Minnesota Department of Transportation (MnDOT) maintains a rest area at U.S. 2 milepost (MP) 131, north of Route Alternative 2 between Project MP 2-20 and 2-21.

U.S. 2 serves as the primary east-west transportation corridor in the Project area for heavy commercial loads, particularly for large and oversized loads coming out of the Port of Duluth (Duluth-Superior Port). The Duluth-Superior port is the largest port on the Great Lakes and is one of the premier bulk cargo ports in North America. This area is designated as a regional trade center (RTC). Truck transportation is a primary means for moving materials in and out of the RTC (MnDOT, 2009a).

Within Minnesota, a three tier system is in place to designate heavy commercial truck traffic, which is based on the heavy commercial average annual daily traffic (HCAADT). Based upon observed statewide data, tiers were classified based on the following:

- Tier 1: Roads on the network with HCAADT greater than 650
- Tier 2: Roads on the network with HCAADT between 301 and 650
- Tier 3: Roads on the network with HCAADT less than 300

The Tier 1 network in northern Minnesota supports adequate movements throughout the region, because these types of routes link major cities and allow freight to be shipped in all directions. U.S. 2 is a Tier 1 roadway and is considered one of the major truck corridors within the State of Minnesota (MnDOT, 2009a).

For these reasons, a joint study commissioned by MnDOT, the Wisconsin Department of Transportation and the Duluth-Superior Metropolitan Interstate Council, *Northern Minnesota & Northwestern Wisconsin Regional Freight Plan (Freight Plan)*, recommended that U.S. 2 be designated as a super haul route. The design criteria for a super haul route includes roadways that can generally accommodate a loaded vehicle with a 16-foot height limit, a 16-foot width limit with an 8-foot wide axle, a 130-foot length limit, and a 235,000-pound weight limit. The report also provided a recommendation that counties and cities should provide adequate notice of at least two weeks for road closures along portions of these types of routes to provide adequate time for permit staff to reroute loads (MnDOT, 2009a).

In addition, within the Freight Plan, U.S. 2 was identified as an expanded envelope route between Bemidji and Grand Rapids. This type of route is a super haul route that can carry vehicles above and beyond the identified criteria in at least one dimension, such as height, width, length, or weight. In addition to the super haul designations, the report recommended that the shoulder width along major highways should be 10 feet, based upon the preference of commercial and fleet operators (MnDOT, 2009a). Consequently, maintenance of this roadway as a super haul route is an important consideration when planning future developments within this part of the State.

MnDOT has indicated that it plans to expand MN Highway 197/U.S. 71 on the south side of Bemidji (State Project 0409-12). This highway improvement project is planned to occur in 2010 or 2011. Possible other future projects include the resurfacing of this segment, which includes the MnDOT Bridge #04012. The right-of-way (ROW) width varies in this area from 100 to 150 feet (MnDOT, 2009a). Route Alternative 1 crosses MN Highway 197 at MP 1-7. Route Alternative 2 crosses MN Highway 197 at MP 2-6. All other Project alternatives avoid the section of MN Highway 197/U.S. 71 included in the highway expansion plans.

MnDOT has long-term plans to add bypass lanes to U.S. 2, between the cities of Cass Lake and Deer River. However, a specific timeline for this highway improvement project has not been developed because funding has not become available. The proposed improvement is not part of the MnDOT 2003-2023 Statewide Transportation Plan (Bittman, 2008). If the project does receive funding, MnDOT has indicated that it hopes to design the project without having to acquire additional ROW. The ROW width varies in this area from 66 to 200 feet (MnDOT, 2009a). MnDOT has also indicated that it would likely design the U.S. 2 bypass lanes according to current freeway standards (Frisco, 2008).

3.19.1.2. Railways

The Study Area contains portions of the Burlington Northern Santa Fe (BNSF) railway corridor. Within this portion of the State, the rail network is an important mode of transportation for moving a variety of commodities, especially heavy bulk goods. The BNSF has a total of 638 miles within Northern Minnesota, with part of this service running between Bemidji and Grand Rapids (MnDOT, 2009a).

The BNSF has developed a utility accommodation policy that addresses new utility installations that parallel or cross BNSF railroad lines. According to this policy, utility lines should be located to avoid or minimize the need for adjustments for future railroad improvements and to permit access to the utility lines for their maintenance with minimum interference to railroad traffic. For utilities that parallel BNSF rail lines, the BNSF considers any utility line greater than 500 feet in length to be a parallel line. The line then must be located on a uniform alignment within 10 feet or less of the property line (BNSF, 2007). The following provides the requirements for overhead installations:

- Minimum clearance of 4 feet required above signal and communication lines.
- Poles must be located 50 feet out from the centerline of the railroad main, branch, and running tracks, CTC sidings, and heavy tonnage spurs. The Pole location adjacent to industry tracks must provide at least a 10-foot clearance from the centerline of the track, when measured at right angles.
- Regardless of the voltage, unguyed poles should be located a minimum distance from the centerline of any track, equal to the height of the pole above the ground-line plus 1 foot.
- Poles (including steel poles) must be located a minimum distance from the railroad signal and communication line equal to the height of the pole above the ground-line or else be guyed at right angles to the lines. High voltage towers (34.5 kV and higher) must be located off railroad ROW.
- For proposed electrical lines paralleling tracks, BNSF may request that an inductive interference study be performed at the expense of the utility owner. Inductive interference from certain lines have the potential to disrupt the signal system in the track causing failures in the track signals and highway grade crossing warning devices (BNSF, 2007).

For utilities that cross railroad property, to the extent feasible and practical, are to be perpendicular to the railroad alignment and preferably at not less than 45 degrees to the centerline of the track. Utilities are not to be placed within culverts or under railroad bridges, buildings, or other important structures (BNSF, 2007). The following is required by the BNSF for utilities that cross railroad property:

- Minimum 4 feet clearance required above signal and communication lines.
- Poles must be located 50 feet out from the centerline of railroad main, branch and running tracks, CTC sidings, and heavy tonnage spurs. Pole locations adjacent to industry tracks must provide at least a 10-foot clearance from the centerline of track, when measured at right angles.

- Regardless of the voltage, unguyed poles shall be located a minimum distance from the centerline of any track, equal to the height of the pole above the ground-line plus 10 feet.
- Poles (including steel poles) must be located a minimum distance from the railroad signal and communication line equal to the height of the pole above the ground-line or else be guyed at right angles to the lines. High voltage towers (34.5kV and higher) must be located off the railroad ROW.
- Crossings should not be installed under or within 500 feet of the end of any railroad bridge, or 300 feet from the centerline of any culvert or switch area.
- Complete spanning of the property is encouraged with supportive structures and appurtenances located outside railroad property. For electric supply lines, normally the crossing span should not exceed 150 feet with adjacent span not exceeding 1.5 times the crossing span length.
- Joint-use construction is encouraged at locations where more than one utility or type of facility is involved. However, electricity and petroleum, natural gas or flammable materials are not to be combined.
- To ensure that overhead wire crossings are clear from contact with any equipment passing under such wires, electric lines with a minimum clearance of 26.5 feet or greater above top of rail when required by the "National Electric Safety Code" or state and local regulations. Electric lines must have a florescent ball marker on low wires over the centerline of the track.
- For proposed electrical lines crossing tracks, BNSF may request that an inductive interference study be performed at the expense of the utility owner. Inductive interference from certain lines have the potential to disrupt the signal system in the track causing failures in the track signals and highway grade crossing warning devices (BNSF, 2007).

3.19.1.3. Airports

There are three airports located within 2 miles of the Study Area, as shown in Figure 3.19-1. Table 3.19-2 lists these airports and the Project Route Alternatives within 2 miles of each airport. Expansion of the terminal at Bemidji Regional Airport is the only major planned improvement at these airports (MnDOT, 2008).

Table 3.19-2: Airports Near Project Route Alternatives

Airport	Location	Route Alternatives	Distance from Route Alternatives
Bemidji Regional	North-northeast of Wilton Substation	1, 2, and 3	1.5 mile
Moberg Airbase	North of Wilton Substation	1, 2, and 3	1 mile
Nary National-Sheffland Field	Nary	1 and 2	2 miles

Bemidji Regional Airport (BJI) is the only major airport located in proximity of the Study Area. BJI is located approximately 1.5 miles north-northeast of the Wilton Substation. However, the main runway at BJI is aligned approximately northwest-southeast (with a secondary runway aligned southwest-northeast), meaning that air traffic arriving and departing from BJI would cross over the transmission lines several miles from the airport.

Moberg Airbase is a private airport located approximately 1 mile north of the Wilton Substation. The airport has one runway, which is aligned northwest-southeast, similar to the main runway for BJI. Adjacent to the airport is a waterway used for sea plane takeoffs and landings.

Nary-National Sheffland Field is located approximately 2 miles south of U.S. Highway 2 and Route Alternatives 1 and 2. The airport is approximately 2 miles north of Segment Alternatives A and L. The airport has one runway that is aligned north-south.

3.19.1.4. River and Lake Navigation

There are numerous lakes, rivers, and streams within the 1,000-foot Route Alternatives and Segment Alternatives. Many of the larger water bodies, such as Lake Bemidji, Leech Lake, Lake Winnibigoshish, and the Mississippi River are used for recreational boating activities, as described in Section 3.13, Recreation and Tourism.

3.19.1.5. Leech Lake Reservation

Approximately 43 miles of Route Alternatives 1 and 2 cross the Leech Lake Reservation. The major transportation resources within the Leech Lake Reservation are U.S. Highway 2, MN Highway 371, and MN Highway 6.

Route Alternatives 1 crosses Cass County Highways 69, 76, and 8.

Route Alternative 2 parallels U.S. Highway 2 in some portions within the Leech Lake Reservation. This alternative crosses Cass County Highways 75, 10, 8, and 9 as well as Itasca County Highway 89 at the eastern boundary of the Leech Lake Reservation.

Segment Alternatives N and O would parallel Cuba Hill Road and Sucker Bay Road respectively, connecting Route Alternatives 1 and 2 east of Cass Lake.

Route Alternative 3 avoids most of the Leech Lake Reservation. Segment Alternative E contains an approximately 11-mile segment within the LLR that parallels MN Highway 6, to the south of Bowstring, deviating from Route Alternative 3 between MP 3-92 and 3-102.

3.19.1.6. Chippewa National Forest

U.S. Highway 2 passes through the CNF by easement or permit. Approximately 25 miles of Alternatives 1 and 2 and their associated Segment Alternatives would cross CNF land. These alignments would involve construction across 12 numbered Forest roads and four unclassified Forest roads. The most significant Forest roads crossed by Route Alternatives 1 and 2 include Forest Road 2137 (Pike Bay Loop), Forest Road 2133 (Cuba Hill Road), Forest Road 2930, Forest Road 2135 (Ketchum Road), Sucker Bay Road, Portage Lake Road, and Portage Road. While traffic volumes were not available for these Forest roads, none of these roads are major arterial roadways, nor are they subject to large traffic volumes. In addition, the crossings of and parallel routes to U.S. 2 east of Cass Lake would occur within CNF land.

As shown in Figure 3.19-1, approximately 60 miles of Route Alternative 3 would cross CNF land, but would not cross any Forest roads. Route Alternative 3's crossings of U.S. 71 near Tenstrike (between MP 3-34 and 3-35) and MN Highway 46 at Alvwood (between MP 3-53 and 3-54) are depicted, as well. Segment Alternative E would parallel MN Highway 6 south of Bowstring (MP E-0 through E-10.44), within CNF land.

3.19.2. Direct/Indirect Effects

This section identifies the potential direct and indirect effects to traffic and transportation facilities.

Potential direct effects from the Project include:

- Road closures, lane closures, and traffic detours, resulting in increased traffic times
- Railway closures or delays due to construction of Project structures at rail crossings
- Interference with maintenance and upkeep of roadway clear zones
- Changes in flight take-off and landing patterns at airports to avoid Project structures
- Interference with river and lake navigation routes if Project structures are placed in water bodies and block navigation channels

Potential indirect effects from the Project include:

- Removal of living snow fences, which may increase winter driving hazards
- Changes in viewsheds from scenic byways

Potential Effects from Transmission Line Co-location with Existing Road Easements

Construction of Route Alternatives and Segment Alternatives would result in temporary construction-related detours and road closures, resulting in an overall increase in traffic and travel times for the Study Area. Road or lane closures would occur where the alternatives cross and (to some degree) parallel roads. Closures and detours would typically be necessary to string transmission lines across roads, or to allow for the movement of construction vehicles and the delivery of construction materials. Longer traffic delays due to road closures would occur on roads with high traffic volumes, such as U.S. 2, U.S. 71 and MN Highway 371.

In accordance with MnDOT policy, complete road closures and related detours would likely last for only short periods of time (a period of hours, as opposed to a period of days) and could likely be anticipated and advertised well in advance. Some lane closures may be longer-term in nature, particularly in areas where the Project closely parallels a road.

Road or lane closures are not anticipated during operation of the Project. Assuming that the Project structures are placed in accordance with MnDOT's Accommodation Policy for the placement of aerial transmission lines immediately adjacent but outside the highway ROW, the Project ROW would allow sufficient area for maintenance activities such that the roadway would not be closed. Road closures during operation would only be necessary when replacement of transmission line components becomes necessary—such as after storm events. In such cases, impacts to transportation would be similar to those experienced during construction, albeit for a shorter duration and over a more limited distance.

All Route Alternatives parallel existing roadway ROWs for some portion of their length. Bordering roadway ROWs are roadway clear zones, which are defined by MnDOT as unobstructed, flat areas that extend from the travel land and provide drivers an area to stop or regain control of a vehicle that runs off the road (MnDOT, 2009a). The clear zone is kept free of structures and other collision hazards. Co-location of the Project and existing roadways may limit MnDOT's ability to use adjacent areas for construction and maintenance staging areas. Ditches that parallel existing roadways require clearance for heavy equipment needed during maintenance and upkeep. The horizontal reach on ditch dredging equipment can range up to 60 feet; the vertical clearance needed for dredging equipment is 30 feet (MnDOT, 2009a). If Project structures are placed in clear zones, MnDOT may be restricted in performing maintenance and upkeep of these areas.

Existing vegetation bordering existing roadway ROWs acts as a living snow fence that protects the roadway from blowing snow drifts. Living snow fences limit snow removal required by MnDOT during winter storms and reduce highway closures due to unsafe driving conditions. Living snow fences are purposely planted trees, shrubs, crops (typically corn), or native grasses along roadway easements. If living snow fences are removed during construction or operation of the Project, motorists in the Study Area may encounter increased driving hazards from blowing snow during winter months.

The increased hazard from the clearing/removal of living snow fences would be long-term if not restored; however, the potential impact would be short-term if cleared ROW is restored following construction.

Potential Effects on Future Transportation Plans for U.S. and State Highways

The Project would utilize an as-yet undetermined number of roads to transport personnel, equipment, and materials. Most roads proposed for access for the Project already allow for the passage of a range of vehicles, including high-clearance vehicles and logging trucks.

The feasible 125-foot-wide ROW evaluated for Route Alternatives 1 and 2 generally would be located within 300 to 1,500 feet of U.S. 2. While the placement of the transmission line would be near the ROW, the Project would not interfere with the future designation of this roadway as a Super Haul Route. However, the construction of the transmission line could limit its current use as a route for heavy commercial transport.

Roads in the Project area experience wide levels of year-round use by area residents, recreational users, and logging trucks. The potential for conflict with highway expansion plans is addressed as specific to each Route Alternative in the discussions that follows.

Potential General Effects on Railways

In areas where the Project would parallel the railroad, construction activity could likely occur without infringing upon the BNSF ROW, assuming that access to the Project ROW is sited to avoid crossing the BNSF ROW. If the BNSF ROW is entered during Project construction, approval would be required from BNSF. At locations where the Project crosses the BNSF railroad, rail traffic would be halted or redirected during Project construction. Construction of the alternative across the BNSF railroad at numerous points could cause temporary delays for freight rail traffic. Construction (including delivery and installation of materials, and stringing of transmission lines across the BNSF railroad) could likely be timed to avoid most rail traffic. However, due to the number of railroad crossings involved in Route Alternative 2, delays may not be entirely avoided under that alternative.

Design and construction of all build alternatives would need to mitigate for electrical interference with the railroad. Such mitigation is discussed in Section 3.19.3. In addition, the BNSF Utility Accommodation Policy, as outlined in 3.19.1.2, would need to be followed.

During operation, required maintenance of the Project transmission line could be timed to avoid rail traffic. Potential impacts to railroad maintenance activities could be minimized by the use of increased structure heights at railroad crossings. However, rail maintenance crews would need to exercise caution to avoid coming into contact with the transmission line. This could require additional safety precautions or employee training, similar to precautions already taken to avoid existing transmission lines that cross the railroad.

Potential Interference from High Voltage Transmission Lines on Railways

When a high-voltage alternating current (AC) transmission line is located adjacent to a railway, the railway's tracks and signals may be subject to electrical interference from capacitive, electric and magnetic, and conductive effects. The American Railway Engineering and Maintenance-of-Way Association (AREMA) has specifications for steady state rail-to-ground and equipment-to-ground voltage levels to ensure the safety of railway operating personnel and the public.

Capacitive coupling results from the electric field from the transmission line's conductors coupling with above ground conductive objects that are insulated from the earth, such as the railway's tracks that are typically installed on high impedance ballast (the rock bed used to support the tracks). Electric and magnetic induction results from the magnetic field produced by the alternating current flowing in the conductors of the transmission line coupling with the above ground and below ground metallic objects, such as railway tracks and buried communications cables, if present. Conductive interference results from fault currents entering the ground and raising the soil potential in the vicinity of the railway. If a transmission line is located in proximity and parallel to a railway for long distances, all of these interference mechanisms can cause high currents and voltages to develop on the railway's tracks and communication cables. If the AC interference is above certain thresholds, it can result in personal safety hazards, damage to signal and communication equipment, and false signaling of equipment.

These AC interference effects could be predicted with computer modeling once a route is selected and ROW identified. With proper planning and mitigation management, railways and high-voltage AC transmission lines can be safely co-located. During fault conditions, the safety criteria established by the American National Standards Institute/Institute of Electrical and Electronics Engineers Standard 80 (Guide for Safety in AC Substation Grounding) is used. These standards indicate that mitigation would be necessary in cases where step or touch potentials are in excess of 15 volts of alternating current, or when the available source current that can be conducted through a human body exceeds 6 milliamps (Lawson, 2009). In addition, railway signal and equipment manufacturers provide AC interference voltage tolerances for proper signal operation so that nearby transmission facilities can be designed to ensure that AC interference levels do not exceed the acceptable safety criteria or equipment voltage tolerance (Otter Tail Power et al., 2008a).

3.19.2.1. No-Build Alternative

The No-Build Alternative would not involve any construction or alteration of traffic or transportation patterns. Accordingly, it would have no impacts to transportation facilities.

3.19.2.2. Route Alternative 1 and Associated Segment Alternatives

This section identifies potential direct and indirect effects from the Project on transportation facilities specific to Route Alternative 1 and its associated Segment Alternatives.

Federal, State, and County Highways

Route Alternative 1 crosses four highways: U.S. 2, U.S. 71, MN Highway 6, and MN Highway 371. Route Alternative 1 would parallel U.S. 2 and U.S. 2/MN Highway 6 for a cumulative length of approximately 25 miles (about 36 percent of its length), which is approximately one-half the distance that these roads would be paralleled by Route Alternative 2 (60 miles) and similar to the distance that these roads would be paralleled by Route Alternative 3 (32 miles). The alignment in these areas would depend upon a number of factors, including MnDOT safety and operating standards. The feasible 125-foot-wide ROW evaluated for this Route Alternative would generally be located within 300 to 1,500 feet of U.S. 2.

Route Alternative 1 would cross the following County Highways:

- Beltrami County: County Highways 14, 7, 11, and 2
- Hubbard County: County Highways 36, 45, and 9
- Cass County: County Highways 69, 76, and 8
- Itasca County: County Highways 18 and 11

As discussed above in Section 3.19.2, potential effects to these roadways might include: 1) road closures, lane closures, and traffic detours, resulting in increased traffic times; 2) interference with maintenance and upkeep of roadway clear zones; and 3) removal of living snow fences, which may increase winter driving hazards. The extent of potential impacts is dependent on the distance of Project ROW from roadway ROW, the length of existing roadway ROW that would be paralleled by the Project ROW and how the Project ROW is accessed from the roadway.

Route Alternative 1 has the potential to affect the planned MN Highway 197/U.S. 71 expansion because it would cross MN Highway 197 at MP 1-7. Highway construction on MN Highway 197/U.S. 71 is expected to occur in 2010 or 2011. Potential interference on highway expansion from the Project could be reduced by coordinating construction schedules with MnDOT.

Most of the Segment Alternatives associated with this Route Alternative do not parallel or cross U.S. Highways, Minnesota Highways, or County Highways, with the exceptions of Segment Alternative A which would cross U.S. 71 and Hubbard County Highway 36. Use of Segment Alternative A would allow Route Alternative 1 to avoid a the planned U.S. 71 expansion because, according to MnDOT, the limits of the construction are located between the city of Bemidji and the intersection of U.S. 71 and North Plantagenet Road SW, the Beltrami-Hubbard County line.

Railways

Construction of the Project could result in delays or closure of rail lines and result in increased rail travel times where the ROW would closely follow or cross existing rail lines. To avoid interference with rail traffic during operation of the Project, the BNSF Accommodation Policy, as outlined in Section 3.19.2, would need to be followed.

The BNSF railway runs between the Wilton and Boswell substations, generally paralleling the south side of U.S. 2 (Figure 3.19-1). Route Alternative 1 follows the BNSF corridor for an estimated 7 miles, between Bena and Ball Club along U.S. 2/MN Highway 6 (between MP 1-44 and 1-51). Route Alternative 1 then continues east along the south of the BNSF corridor for an additional 5 miles. The total distance that Route Alternative 1 could follow an existing rail ROW is greater than that for Route Alternative 3, but much less than the distance of rail ROW that could be followed by Route Alternative 2.

The actual number and location of railway crossings is dependent upon the siting of the selected 125-foot ROW within the 1,000-foot-wide route. In the feasible 125-foot ROW evaluated, this Route Alternative crosses the railway at two locations, between MP 1-61 and 1-62 and at approximately MP 1-64, both of which are southeast of Zemple, as shown on Figure 3.19-1.

Segment Alternative K would parallel the railroad for most of its length. The feasible 125-foot ROW evaluated for this Segment Alternative included a crossing approximately 0.5 mile west of the existing Cass Lake Substation.

Because Route Alternative 1 would parallel the BNSF railroad for only a short length and would likely cross the BNSF at only two locations, Route Alternative 1 would be expected to have minimal interference on railroad delays compared to Route Alternative 2. Route Alternative 1 would be expected to have similar affects on rail travel as Route Alternative 3, which has a similar number of railroad crossings and distance of parallel ROW.

Airports

Due to the distance of each airport from the Route and Segment Alternatives, and the flight patterns during take-off and landing (based on orientation of airport runways), the placement of Project structures within the Route and Segment Alternatives would not create obstacles or hazards for air traffic related to the nearby airports.

River and Lake Navigation

As discussed in Section 3.4, Water Resources, numerous water basins and water courses are located in the Study Area, several of which would be crossed by Route Alternative 1. All river and lake crossings would be above ground.

The Applicants designed the Route and Segment Alternatives to avoid crossing most major bodies of water in the Study Area. In areas where water crossings cannot be avoided, including crossings of Mississippi River, the Applicant has stated that the Project would span water crossings, such that pole structures are not placed directly in water bodies. As such, the placement of pole structures outside of water bodies would not require re-routing of watercraft in lakes or rivers or interfere with navigable waters.

3.19.2.3. Route Alternative 2 and Associated Segment Alternatives

This section identifies potential direct and indirect effects from the Project on transportation facilities specific to Route Alternative 2 and its associated Segment Alternatives.

Federal, State, and County Highways

Route Alternative 2 crosses five highways including U.S. 71/MN Highway 197, MN Highway 371, MN Highway 6, and U.S. 2. This Route Alternative would be parallel U.S. 2/U.S. 71, U.S. 2, and U.S. 2/MN Highway 6 for a cumulative length of approximately 60 miles (about 88 percent of its lengthThe alignment in these areas would depend upon a number of factors, including MnDOT safety and operating standards. The feasible 125-foot-wide ROW evaluated for this Route Alternative would generally be located within 300 to 1,500 feet of U.S. 2.

Route Alternative 2 has the potential to affect the planned MN Highway 197/U.S. 71 expansion because it crosses MN Highway 197 at MP 2-6. Highway construction is expected to occur in 2010 or 2011. Potential interference with highway expansion projects could be reduced by coordinating construction schedules with MnDOT. Because Route Alternative 2 parallels major roads for a large proportion of its length, the alternative would have the largest impact to roads and traffic. However, transmission line construction is likely to be phased, rather than simultaneous over the entire length of the Route Alternative. In addition, Route Alternative 2 would have fewer crossings of state and county highways than other alternatives. For example, Route Alternative 2 crosses the following County Highways:

- Beltrami County: County Highways 6, 7, 11, 50, and 45
- Hubbard County: County Highways 8, 45, and 46
- Cass County: County Highways 75, 10, 8, and 9
- Itasca County: County Highways 39, 18, and 11

Most of the Segment Alternatives associated with this Route Alternative do not parallel or cross U.S. Highways, Minnesota Highways, or County Highways, with the following exceptions:

- Segment Alternative F would parallel and then cross MN Highway 371.
- Segment Alternatives H and I would cross Beltrami County Highway 14.

As discussed above in Section 3.19.2, potential effects to these roadways might include: 1) road closures, lane closures, and traffic detours, resulting in increased traffic times; 2) interference with maintenance and upkeep of roadway clear zones; 3) removal of living snow fences, which may increase winter driving hazards; and 4) changes in viewsheds from scenic byways. The extent of potential impacts is dependent on the distance of Project ROW from roadway ROW, the length of existing roadway ROW that would be paralleled by the Project ROW and how the Project ROW is accessed from the roadway.

In addition to the aforementioned crossings, the 1,000-foot route for Route Alternative 2 also passes through a Scenic Easement maintained by MnDOT, located south of Ball Club Lake, between the water edge and U.S. 2 (between MP 2-52 and 2-54). The scenic easement encompasses the majority of the 1,000-foot-wide route in this area. Bordering U.S. 2 to the south in this area are a railroad, Great Lakes Gas pipeline, and Enbridge pipeline, which limits the potential to locate the Project ROW to the south of U.S. 2. Use of the scenic easement is restricted to residential, agricultural, horticultural, grazing, or forest purposes. Segment Alternative P provides an opportunity to crossover to Route Alternative 1 in this area.

Railways

Construction of the Project could result in delays or closure of rail lines and result in increased rail travel times where the ROW would closely follow or cross existing rail lines. To avoid interference with rail traffic during operation of the Project, the BNSF Accommodation Policy, as outlined in Section 3.19.2, would need to be followed.

Route Alternative 2 follows the BNSF railway corridor for the majority of its length, with deviations away from the railroad southwest of Bemidji, near Lake Irving; along the west side the city of Cass Lake, near Grace Lake, Midge Lake, and Little Wolf Lake; and south of the city of Deer River to the Boswell Substation, as shown on Figure 3.19-1. Route Alternative 2 has the potential for multiple crossings of the railway; the actual number and location of railway crossings is dependent upon the selection of the 125-foot-wide ROW within the identified 1,000-foot-wide route.

For the feasible 125-foot ROW evaluated, Route Alternative 2 crosses the railroad at several locations: about 5,000 feet south of the Beltrami-Hubbard County Line (between MP 2-10 and 2-11); at the Cass Lake Substation along the west side of the city of Cass Lake (MP 2-18); at the east side of the city of Cass Lake (between MP 2-20 and 2-23); about 2 miles west of the city of Deer River (between MP 2-56 and 2-57); about 1 mile southeast of Zemple (between MP 2-60 and 2-61); and about 1 mile north of the Boswell Substation (MP 2-67). However, depending upon the actual location of the ROW within the 1,000-foot-wide route, the total number of crossings would vary and could be much greater than the crossings noted.

Segment Alternative F would cross the railroad in Cass Lake, near MN Highway 371.

Segment Alternative K would parallel the railroad for most of its length. The feasible 125-foot ROW evaluated for this Segment Alternative included a crossing approximately 0.5 mile west of the existing Cass Lake Substation.

Route Alternative 2 would require a greater number of railroad crossings than Route Alternatives 1 or 3, and would result in the greatest number of rail travel delays of the three Route Alternatives.

Airports

Due to the distance of each airport from the Route and Segment Alternatives, and the flight patterns during take-off and landing (based on orientation of airport runways), the placement of Project structures within the Route and Segment Alternatives would not create obstacles or hazards for air traffic related to the nearby airports.

River and Lake Navigation

As discussed in Section 3.4, Water Resources, Route Alternative 2 has the potential to cross the lowest number of PWI water resources of the Project alternatives. All river and lake crossings would be above ground.

The Applicants designed the Route and Segment Alternatives to avoid crossing most major bodies of water in the Study Area. In areas where water crossings cannot be avoided, including crossings of Mississippi River, the Applicant has stated that the Project would span water crossings, such that pole structures are not placed directly in water bodies. As such, the placement of pole structures outside of water bodies would not require re-routing of watercraft in lakes or rivers or interfere with navigable waters.

3.19.2.4. Route Alternative 3 and Associated Segment Alternatives

This section identifies potential direct and indirect effects from the Project on transportation facilities specific to Route Alternative 3 and its associated Segment Alternatives.

Federal, State, and County Highways

Route Alternative 3 crosses five highways: U.S. 71/MN Highway 197, U.S. 2, MN Highway 6, and MN Highway 46. This alternative would parallel U.S. 71, U.S. 2/MN Highway 6, and MN Highway 6 for a cumulative length of approximately 32 miles (about 28 percent of its length), which is a similar distance as Route Alternative 1 (25 miles) and approximately half the distance that Route Alternative 2 would parallel these roadways (60 miles). The alignment in these areas would depend upon a number of factors, including MnDOT safety and operating standards. In certain areas, it may be possible to develop the 125-foot ROW required for the Project adjacent to the existing highway ROWs. The feasible 125-foot-wide ROW evaluated for this Route Alternative would generally be located within 300 to 1,500 feet of U.S. 2.

Route Alternative 3 is much longer and crosses many more state and county highways than the other alternatives; however, most of those roads experience relatively low traffic volumes. For example, Route Alternative 3 crosses the following County Highways:

- Beltrami County: County Highways 14, 7, 11, 20, 22, 31, 39, and 30
- Itasca County: County Highways 13, 29, 35, 19, and 11

Segment Alternative E, the only Segment Alternative associated with Route Alternative 3, would parallel MN Highway 6 for its entire length and would cross Itasca County Highway 37.

As discussed above in Section 3.19.2, potential effects to these roadways might include: 1) road closures, lane closures, and traffic detours, resulting in increased traffic times; 2) interference with maintenance and upkeep of roadway clear zones; and 3) removal of living snow fences, which may increase winter driving hazards. The extent of potential impacts is dependent on the distance of Project ROW from roadway ROW, the length of existing roadway ROW that would be paralleled by the Project ROW and how the Project ROW is accessed from the roadway.

Unlike Route Alternatives 1 and 2, there are no planned MnDOT expansion projects along Route Alternative 3 or identified scenic easements along the Route Alternative. Thus, there are no anticipated impacts to expansion projects or changes in viewsheds along scenic byways.

Railways

Construction of the Project could result in delays or closure of rail lines and result in increased rail travel times where the ROW would closely follow or cross existing rail lines. To avoid interference with rail traffic during operation of the Project, the BNSF Accommodation Policy, as outlined in Section 3.19.2, would need to be followed.

Route Alternative 3 follows the BNSF corridor for approximately 3 miles leading up to the Boswell Substation (between MP 3-111 and 3-114). This Route Alternative would likely cross the BNSF corridor in two locations: northwest of Rosby (after MP 3-10) and north of the Boswell Substation (between MP 3-110 and 3-111). As with the other Route Alternatives, the actual number and location of railway crossings is dependent upon the selection of a final ROW within the identified 1,000-foot-wide route.

Because Route Alternative 3 would parallel the BNSF railroad for only a short length and would likely cross the rail line at only two locations, Route Alternative 3 would be expected to have minimal interference on rail travel and shorter delays that Route Alternative 2. Route Alternative 3 would be expected to have similar affects on rail travel as Route Alternative 1, which has a similar number of railroad crossings and distance of parallel ROW.

Airports

Due to the distance of each airport from the Route and Segment Alternatives, and the flight patterns during take-off and landing (based on orientation of airport runways), the placement of Project structures within the Route and Segment Alternatives would not create obstacles or hazards for air traffic related to the nearby airports.

Unlike Route Alternatives 1 and 2, Nary-National Sheffland Field is not located in proximity to Route Alternative 3.

River and Lake Navigation

As discussed in Section 3.4, Water Resources, Route Alternative 3 has the potential to cross the greatest number of PWI water resources. All river and lake crossings would be above ground.

The Applicants designed the Route and Segment Alternatives to avoid crossing most major bodies of water in the Study Area. In areas where water crossings cannot be avoided, including crossings of Mississippi River, the Applicant has stated that the Project would span water crossings, such that pole structures are not placed directly in water bodies. As such, the placement of pole structures outside of water bodies would not require re-routing of watercraft in lakes or rivers or interfere with navigable waters.

Because impacts to navigable waters are expected to be negligible, although Route Alternative 3 would cross two to three times the number of water bodies as Route Alternatives 1 and 2, no greater affects on lake or river navigation from Route Alternative 3 would be anticipated.

3.19.2.5. Leech Lake Reservation

The public highways, county highways, and railways described in this section for Route Alternatives 1, 2, and 3 serve as the transportation backbone for the LLR. Roadways, highways, airports, rail lines, and navigable waters within the LLR are typically owned and maintained by other government or private entities. These transportation resources are used by the LLBO and others living and traveling through the area. Thus, the transportation impacts of all build alternatives on the LLR are similar to those described for Route Alternatives 1, 2, and 3 above. There are no anticipated impacts from the Project on traffic and transportation resources unique to the LLR.

3.19.2.6. Chippewa National Forest

Route Alternatives would cross a large amount of the CNF, including Forest Service Roads. Forest Service Roads are generally not high-traffic roadways. Potential impacts to Forest Service Roads would vary based on the location and use of the road. The primary impact to Forest Service Roads would be road closure and access limitations during construction. The Applicants could work with CNF to determine the uses of specific Forest Service Roads during the construction season and associated concerns that may warrant mitigation.

The transportation impacts of all build alternatives on the CNF are similar to those described for Route Alternatives 1, 2, and 3 above.

3.19.3. Mitigation

A variety of mitigation measures could be implemented to reduce the potential impacts to transportation facilities from construction and operation of the Project. Mitigation measures that are typically included in permits are noted. Cases where additional mitigation measures may be incorporated as a permit condition are also noted.

The transmission line would be designed in accordance with National Electrical Safety Code (NESC) standards to minimize impacts to transportation. NESC standards establish clearances required between transmission lines and transportation structures (e.g., roadways and railways) and tree lines. The Applicants could work with state and local officials to minimize any impacts during construction and operation of the proposed transmission line.

HVTL permits issued by the Commission direct the Permittee to comply with MnDOT and all applicable road authorities' management standards and policies during construction. The permit also directs the permittee to provide written notice of construction to MnDOT and applicable city, township, and county road authorities.

Under the HVTL permit, the Applicants could be required to restore the ROW, temporary work space, access roads, abandoned ROS, and any other lands affected by construction. This could include the replacement of living snow fences affected during construction activities.

Due to the proximity of the Project to airports, the Project would require that a "Notice of Proposed Construction or Alteration" be filed with the Federal Aviation Administration (FAA). All public airports within 5 miles of the Project must be notified and provided an opportunity to comment on compatibility of the Project and airport operations. The FAA and MnDOT Office of Aeronautics could be notified to address compatibility of the Project and Very High Frequency Omnidirectional Radio Range (VOR) systems used in the Study Area to supplement federal air navigation aids.

Project alternatives have been selected to avoid surface water features to the extent practicable. In areas where surface water features are present, it is anticipated that ROW alignments could be directed to avoid surface water or that water bodies could be spanned. All water crossings under all of the alternatives, including the Mississippi River crossing west of Deer River, would be spanned by poles placed from 800 to 1,000 feet apart. There are no water bodies that are wider than the maximum span along the alternatives, such that complete avoidance would not be feasible.

3.19.3.1. MnDOT

The Applicants are required to obtain MnDOT and county permits, as applicable, for transmission line crossings over regulated roadways. In accordance with MnDOT's Utility Accommodation Policy, a permit would be required if the Project required use of highway ROWs for construction access or maintenance. Portions of the Project that require use of ROWs along the National Highway System require approval of the Federal Highway Administration (FHWA).

Alignments for aerial or blowout zone encroachments could be designed in accordance with the MnDOT Utility Accommodation Policy, which requires the general placement of aerial lines in the outer 5 feet next to the highway ROW. The 5-foot standard for pole placement was incorporated into the Accommodation Policy to ensure that lines are placed as near as possible to the highway ROW but outside the blowout zone. In addition, the Project could allow for clearance for existing structures, which includes a minimum vertical access zone of 10 feet plus a safety zone of 25 feet to allow for maintenance (MnDOT, 2008).

Construction activities may necessitate access from the highway ROW to the transmission line ROW at existing or additional turnout or approach locations. Construction of temporary additional turnouts or approaches may require installation of culverts and fill materials. Installation of additional temporary access points would be subject to review and approval of highway officials. Construction forces would implement traffic control measures in accordance with the MnDOT Manual on Uniform Traffic Control Devices, which could include flag persons, barriers, and flashing lights. Removal of existing conductors and stringing of new overhead conductors over highways would require installation of temporary wood pole "guard structures" and other measures to safeguard the public and the construction workforce. Temporary guard structures are designed to provide vertical clearance of the conductors above the road surface to avoid impacting normal vehicular traffic on the roadway.

After installation of the new conductors is complete, the temporary guard structures would be removed. At some locations, additional measures such as boom trucks equipped with "bat wings" may be employed to ensure that adequate vertical clearance was maintained at the highway crossings during stringing operations. Restriction of traffic may occasionally be required for short periods of time during pole deliveries or during critical wire stringing activities. Construction workforces would work closely with the Minnesota State Patrol to ensure the implementation of appropriate measures to safeguard the public and construction workforces, and to notify the public about planned road closures and detours (Otter Tail Power et al., 2008a).

3.19.3.2. High-Voltage Transmission Line and Railway Compatibility

Depending upon AC interference levels, several mitigation methods could be used, including reducing the distance between insulated joints in track sections, grounding the railroad's tracks, and buried gradient control wires or matting. It is unlikely that installing any of the above mitigation methods would require additional ROW. Reducing the distance between insulated joints involves placement of additional joints in the existing tracks to shorten track sections. This reduces coupled track area and AC interference voltage levels.

Grounding the tracks and communication cables is one of the most effective methods for mitigating interference. Typically this is done at communication and signal cable access points (such as at splice locations and manholes) and the other points where the track would have high induced voltage if not grounded. Grounding would reduce voltage levels along track sections and provide a path for AC interference currents to flow to ground. Burying gradient control wires or matting is a highly effective method to mitigate both inductive and conductive interference. Gradient control wires or matting consists of one or more bare conductors buried parallel to and near the railroad. These measures raise the earth potential in the vicinity of the railroad such that the difference in potential between the railroad and local ground is reduced. As a result, rail-to-ground and rail touch voltages are significantly reduced (Otter Tail Power et al., 2008a).

Taller structures could be used where the Project crosses the BNSF railroad, to increase clearance between passing trains and the conductors. Where appropriate, the Project could be consolidated with existing transmission lines to reduce the number of railroad crossings. Potential double circuiting opportunities are discussed in Section 3.18, Utility Systems.

The Applicants have agreed to ensure that computer modeling of AC interference effects is completed and that any required mitigation is designed and installed prior to energizing the transmission line.

3.20. Safety and Health

This section identifies and describes potential safety and health impacts from operation of a high-voltage transmission line. Information for this analysis was obtained primarily from health studies available from federal and state government agencies, including the National Institute of Environmental Health Sciences (NIEHS), U.S. Environmental Protection Agency (USEPA), World Health Organization (WHO), and the Minnesota State Interagency Working Group on EMF Issues.

3.20.1. Affected Environment

The discussion about the affected environment provides a summary of electric and magnetic fields (EMF), including an overview of health effects from EMF. Additional safety and health issues may result during construction of the Project, when construction workers could be subject to typical construction-related incidents and injuries. This discussion is non-specific to any one Route Alternative, because the construction and operation of the Project would be similar for each Route Alternative and Segment Alternative and result in the same affected environment.

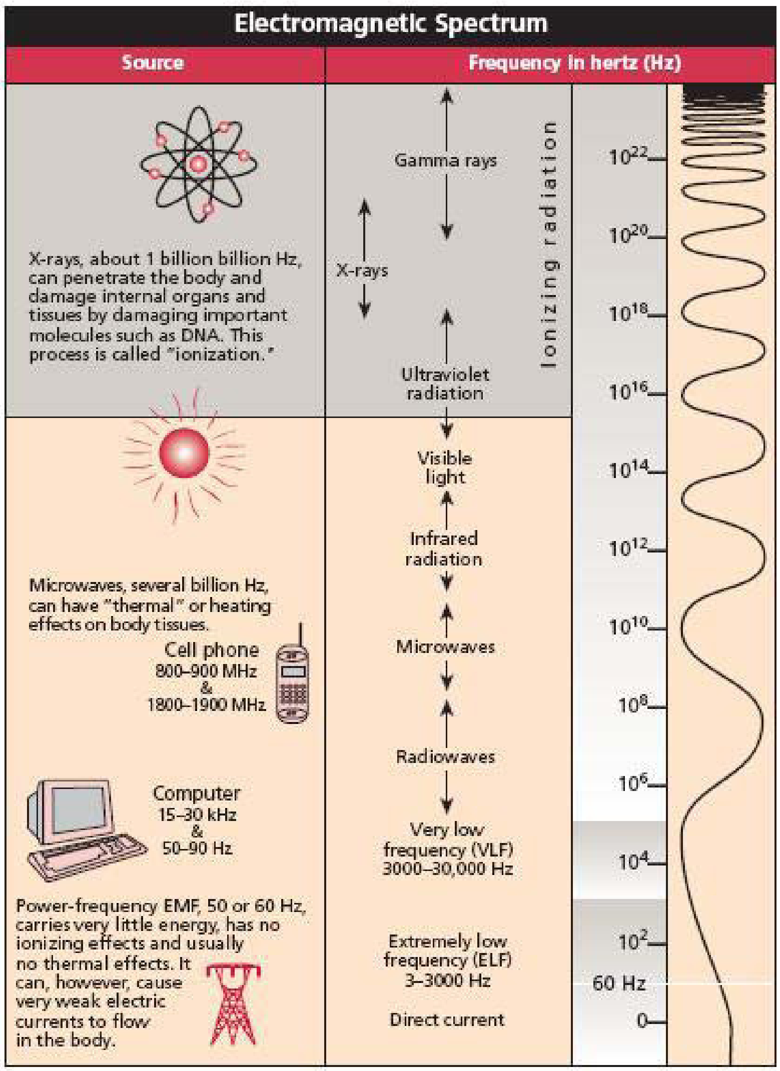
3.20.1.1. Electric and Magnetic Fields

Wherever there is electricity there are electric and magnetic fields (EMF). Electric and magnetic fields are not only created by high-voltage transmission and distribution lines, but also by the appliances, lights, and wiring in homes, businesses, and schools. As a result, people are exposed on a daily basis to a complex mix of electric and magnetic fields at many different frequencies.

Electric and magnetic fields are invisible just like radio, television, and cellular phone signals, all of which are part of the electromagnetic spectrum. Natural and human-made electromagnetic fields are, in fact, present everywhere in our environment. Natural electric fields for example are produced by the local build-up of electric charges in the atmosphere that are associated with thunderstorms. The natural static background electric field is approximately 120 volts per meter (V/m). The Earth has a magnetic field that ranges from approximately 300 to 700 milligauss (mG). The Earth has a steady-state or static (zero hertz) magnetic field, but has similar characteristics to the magnetic fields emanating from human-made sources.

Electromagnetic fields created by humans include X-rays and magnetic resonance imaging (MRIs) machines, electric and magnetic passenger trains, electric cars, and cellular telephones. The frequency of transmission line EMF in the United States is 60 hertz and falls in the extremely low frequency (ELF) range of the electromagnetic spectrum (any frequency below 300 hertz). By comparison, cellular phone communications operate at frequencies almost one billion times greater than EMF resulting from electric power. The electromagnetic spectrum (Figure 3.20-1) is a range of frequencies that includes visible light, X-rays, magnetic resonance imaging (MRI) machines, radios, televisions, and cellular telephones.

Figure 3.20-1: Electromagnetic Spectrum



The wavy line at the right illustrates the concept that the higher the frequency, the more rapidly the field varies. The fields do not vary at 0 Hz (direct current) and vary trillions of times per second near the top of the spectrum. Note that 10^4 means 10 x 10 x 10 x 10 or 10,000 Hz. 1 kilohertz (kHz) = 1,000 Hz. 1 megahertz (MHz) = 1,000,000 Hz.

Low frequency EMF from alternating current power lines fall within the low-energy part of the electromagnetic spectrum.

The strongest EMF around the outside of a substation comes from the power lines entering and leaving the substation. The strength of the EMF from equipment within a substation, such as transformers, reactors, and capacitor banks, decreases rapidly with increasing distance. Beyond the substation fence or wall, the EMF produced by the substation equipment is typically indistinguishable from background levels (NIEHS, 2002).

For the frequencies associated with power lines, it is useful to discuss separately electric and magnetic fields, which arise from the voltage of a power line and the flow of electricity, respectively.

- Electric fields are measured in kilovolts per meter (kV/m).
- Magnetic fields—or flux density—are measured in mG or microTesla (μT).
- Electric field intensity is proportional to the voltage of the transmission line.
- Magnetic field intensity is proportional to the current flow.
- Electric fields are easily shielded or weakened by objects such as trees or walls.
- Magnetic fields are difficult to shield and, thus, more easily penetrate objects.

Electric Fields

Electric fields are created by voltage or the difference in the electric charge between two points, and are measured in V/m or kV/m. The greater the voltage, the stronger the electric field.

Electric fields may interact directly with the human body by inducing a surface electric discharge or contact currents. Indirect effects occur when a person is in contact with an electrically charged conducting object (e.g. vehicle or a metal fence). The available data for exposure to static electric fields suggest that the only negative human health effects are the direct perception of body hair movement and small shocks, similar to the shock received by the induced friction from walking on a carpet and touching a doorknob. On the whole, scientific evidence indicates that chronic exposure to electric fields at or below levels traditionally established for safety does not cause adverse health effects. Safety concerns related to electric fields are sufficiently addressed by adherence to the National Electric Safety Code (NESC) standards.

There are currently no federal guidelines for the strength of electrical fields beneath high voltage transmission lines. However, six states have established their own regulations or guidelines with regard to transmission line electric fields (Table 3.20-1).

Table 3.20-1: State Electric Field Regulations or Guidelines

State	Electric Field	
	On ROW	Edge ROW
Florida	8 kV/ma	2 kV/m
	10 kV/mb	
Minnesota	8 kV/m	
Montana	7 kV/m	1 kV/mc
New Jersey		3 kV/m
New York	11.8 kV/m	1.6 kV/m
	11 kV/md	
	7 kV/me	
Oregon	9 kV/m	

Notes:

a. transmission lines of 69 – 230 kV
b. 500 kV Transmission Lines
c. May be waived by landowner
d. Private Road Crossings
e. Highway Crossings

In addition to the state guidelines identified above, there are a number of national and international boards, committees, and commissions that have recommended electric field exposure guidelines or thresholds that pertain to 60 hertz high-voltage transmission lines. Table 3.20-2 summarizes the suggested electric field guidelines from a number of these internationally recognized organizations.

Table 3.20-2: International Electric Field Strength Guidelines

Organization	Electric Field (kV/m)	
	General Public	Occupational
Institute of Electrical and Electronic Engineers (IEEE)	5	20
International Commission on Non-Ionizing Radiation Protection (ICNIRP)	4.2	8.3
American Conference of Governmental Industrial Hygienists (ACGIH)	—	25
National Radiological Protection Board (NRPB)	4.2	—
European Union (EU))	4.2	—

Magnetic Fields

Magnetic fields are created by electric current or flow (measured in amperes). Current passing through any conductive material, including a wire, produces a magnetic field in the area around that material. This field is expressed in units of magnetic flux density, expressed as gauss (G) or Teslas. For the purpose of measuring magnetic fields commonly found in the environment, milliGauss (mG) or micro Teslas (µT) commonly are used (one milliGauss = 10 micro Teslas). The greater the current, the stronger the magnetic field. Unlike electric fields, however, magnetic fields pass through most materials and are therefore more difficult to shield.

Magnetic fields are not singularly associated with power lines. Every person is exposed to these fields to a greater or lesser extent throughout each day, whether at home, in schools, or in offices. The general wiring and appliances located in a typical home can produce an average background magnetic field of 0.5 to 4.0 mG. Table 3.20-3 contains field readings for a number of selected, commonly encountered items in the home and office. These represent median readings, meaning one might expect to find an equal number of readings above and below these levels.

Table 3.20-3: Magnetic Fields (milligauss) From Common Home and Business Appliances

Type	Distance From Source (in feet)			
	0.5	1	2	4
Computer Display	14	5	2	-
Fluorescent Lights	40	6	2	-
Hairdryer	300	1	-	-
Vacuum Cleaners	300	60	10	1
Microwave Oven	200	40	10	2
Conventional Electric Blanket	39.4 peak 21.8 average			
Low EMF Electric Blanket	2.7 peak 0.09 average			

Source: EPA, 1992

Peak magnetic field levels as high as 70 mG have been measured directly below overhead distribution lines and as high as 40 mG above underground lines (NIEHS, 2002). Magnetic fields directly beneath overhead distribution lines typically range from 10 to 20 mG for main feeder lines and less than 10 mG for lateral lines (NIEHS, 2002).

There are currently no state or federal standards establishing a threshold for magnetic fields produced by high voltage transmission lines. Some states have set magnetic field exposure standards (Table 3.20-4). The exposure limits established by Florida and New York were not based on potential human or environmental impact, but were intended to maintain electric transmission systems within current levels or as benchmarks for comparing different design alternatives.

Table 3.20-4: State Magnetic Field Regulations or Guidelines

State	Magnetic Field at Edge of ROW at maximum load
Florida	150 mG[a]
	200 mG[b]
	250 mG[c]
New York	200 mG

Notes:

a. for lines of 69 – 230 kV
b. for 500 kV lines
c. for 500 kV lines in certain existing ROW

In addition to the state guidelines identified above, there are a number of national and international boards, committees, and commissions that have recommended magnetic field exposure guidelines. Table 3.20-5 summarizes the suggested magnetic field guidelines from a number of these internationally recognized organizations. The exposure guidelines established by the International Commission on Non-Ionizing Radiation Protection have typically been the guidelines adopted by most countries and organizations.

Table 3.20-5: International Magnetic Field Guideline

Organization	Magnetic Field (mG)	
	General Public	Occupational
Institute of Electrical and Electronic Engineers (IEEE)	9,040	27,100
International Commission on Non-Ionizing Radiation Protection (ICNIRP)	830	4,200
American Conference of Governmental Industrial Hygienists (ACGIH)	—	10,000/1,000[a]
National Radiological Protection Board (NRPB)	830	4,200
European Union (EU))	830	—

Note: a. For persons with cardiac pacemakers or other medical electronic devices

EMF Health Effects Overview

Concerns about health effects of electric and magnetic fields (EMF) from power lines were first raised in the late 1970s. Since then, considerable research has been conducted to determine if exposure to magnetic fields, such as those from high-voltage power lines, causes biological responses and health effects. In summary:

- Initial epidemiological studies done in the late 1970s showed a weak correlation between surrogate indicators of magnetic field exposure (such as wiring codes or distance from roads) and increased rates of childhood leukemia (Wertheimer et al., 1979);
- More recent studies that used direct measurements of magnetic field exposure show either a very weak, or no statistical correlation with adverse health affects (Savitz et al., 1988); and

- Toxicological and laboratory studies have not been able to show a biological mechanism between EMF and cancer or other adverse health effects.

While there are numerous internet sites devoted to EMF dangers (whether from power lines, cell phones, or radio frequency signals), the vast majority of experts believe that EMF from power lines does not cause leukemia or any other health problem. In part, these experts argue the physical impossibility of any health effect due to such low-frequency, low-energy magnetic fields.

Scientific review panels have generally concluded that the combined data show at best a weak association with ELF/EMF and at worst that the findings are mutually inconsistent and inconclusive.

The study of cancer in relation to ELF electric and magnetic fields has been a topic of study since the late 1970s. Since that time there have been several epidemiological studies that have explored the possible association of not only cancer risks, but other potential human maladies (brain tumors, leukemia, breast cancer, and mental health issues). Studies have focused on both occupational exposures for individuals working in electrical industries and public exposures for children and adults living and working around common EMF sources (in-home wiring, transmission lines, home, and office appliances/equipment). The results of the various studies conducted over the last three decades, specifically those regarding the relationship between EMF and childhood leukemia and other cancer risks, have been mixed; some have found an association while others have not.

Where there is association suggested in epidemiological studies, it is usually very near the statistical threshold of significance. However, when these studies are repeated in a laboratory, the results have not reproduced or identified a biological mechanism to support a link between childhood leukemia and magnetic fields. The replication of field results in a laboratory setting is a basic test of scientific validity. Researchers continue to look at magnetic fields until more certain conclusion can be reached.

In fact, the World Health Organization (WHO), in 1996, launched a large multidisciplinary research effort to address growing public concerns over the possible health effects from exposure to EMF. In their conclusions WHO indicated that, "…in the area of biological effects and medical applications of non-ionizing radiation approximately 25,000 articles have been published over the past 30 years. Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals."

Based upon in-depth review of scientific literature, the WHO concluded that, "…current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research."

Leukemia is the most common childhood cancer worldwide for children from infancy to age 14, with approximately 2,600 cases diagnosed in the United States annually. Unfortunately, the exact cause of childhood leukemia is not known. Many suspected risk factors have been studied and evaluated, but ultimately most children with leukemia do not have any risk factors, and as stated above, the cause of their cancer is not known at this time. In the case of high-voltage power lines as a suspected risk factor, the WHO indicates that few children have time-averaged exposures to residential 60 Hz magnetic fields in excess of the levels suspected to be associated with an increased incidence of childhood leukemia. Approximately one to 4 percent have mean exposures above 0.3 μT and only one to 2 percent have median exposures in excess of 0.4 μT. If there are any risks such as childhood leukemia associated with living near power lines, then it is clear those risks are very small, otherwise we should be witnessing an observable epidemic of childhood cancers. However, there is little, if any evidence of such an epidemic of childhood cancer.

Implantable Medical Devices

Implantable medical devices such as pacemakers, defibrillators, neurostimulators, and insulin pumps may be subject to interference from strong electric and magnetic fields. It is important that their function is not impaired. Most of the research on electromagnetic interference and medical devices is related to pacemakers. According to a 2004 EPRI report, implantable cardiac devices are much more sensitive to electric fields than to magnetic fields. The earliest interference from magnetic fields in pacemakers was observed at 1,000 mG, far greater than the magnetic fields associated with high-voltage transmission lines.

Therefore, the focus of research has been on electric field impacts. Possible effects of electric fields on pacemakers are:

- rate increase;
- erratic pacing;
- switch to asynchronous pacing or fixed-rate pacing;
- single beat inhibition (i.e. a single beat is missed by the pacemaker); and
- total inhibition.

These effects are usually temporary and normal function of the device resumes once the person is removed from the source of EMF. Older unipolar models of pacemakers are expected to be relatively more sensitive to electric fields, with interactions starting at 1.2-1.7 kV/m. Modern bipolar devices are much less susceptible to interactions with electric fields, with interaction starting around 6 kV/m (see Figure 3.20-1).

3.20.1.2. Construction Equipment and Activities

Heavy equipment typically is used to construct any project involving transmission lines and substations. This equipment can include, but is not limited to, machinery for cutting vegetation and incidental stump removal, such as stump grinding equipment; flatbed trailers; rubber-tired or tracked cranes; rope machines; wire trailers; and wide track bombardiers (Otter Tail Power et al., 2008a). This type of equipment often requires the use oils and gas for fueling. As a result of these liquids, the potential for releases or spills from the equipment is present. The danger associated with a release or spill is that the material is toxic to either people and/or the environment, and if the material makes its way to a water source.

Workers also are subject to typical construction related incidents including slips, trips, falls, wounds, and traumatic injuries. Additional safety issues relevant to this Project may result from the construction of tall structures and working with energized equipment. These types of incidents are generally well understood, and consequently, background information is not presented here.

3.20.2. Direct/Indirect Effects

This section identifies direct and indirect safety and health effects from the Project alternatives. Potential direct effects to safety and health include impacts to humans or animals from the following:

- Electric and magnetic fields (EMFs)
- Interference with medical devices
- Stray voltage
- Construction activities and equipment

Potential indirect effects to safety and health include impacts resulting from decreased power reliability.

Direct and indirect effects resulting from the Project would be similar for all Route Alternatives and Segment Alternatives. Likewise, effects for the Leech Lake Reservation and CNF would be similar to those for the entire length of the Route Alternatives and are not addressed separately.

3.20.2.1. No-Build Alternative

Because no structures would be installed and no existing rights-of-way would be expanded or new rights-of-way would be created, the No-Build Alternative would not directly impact health and safety in the Study Area.

In comments to the Commission on the Applicants' application for a Certificate of Need, the Energy Regulatory and Planning (ERP) division of the OES concluded that the No-Build Alternative would entail maintaining unreliable service in the local area, resulting in a deleterious effect to public safety.

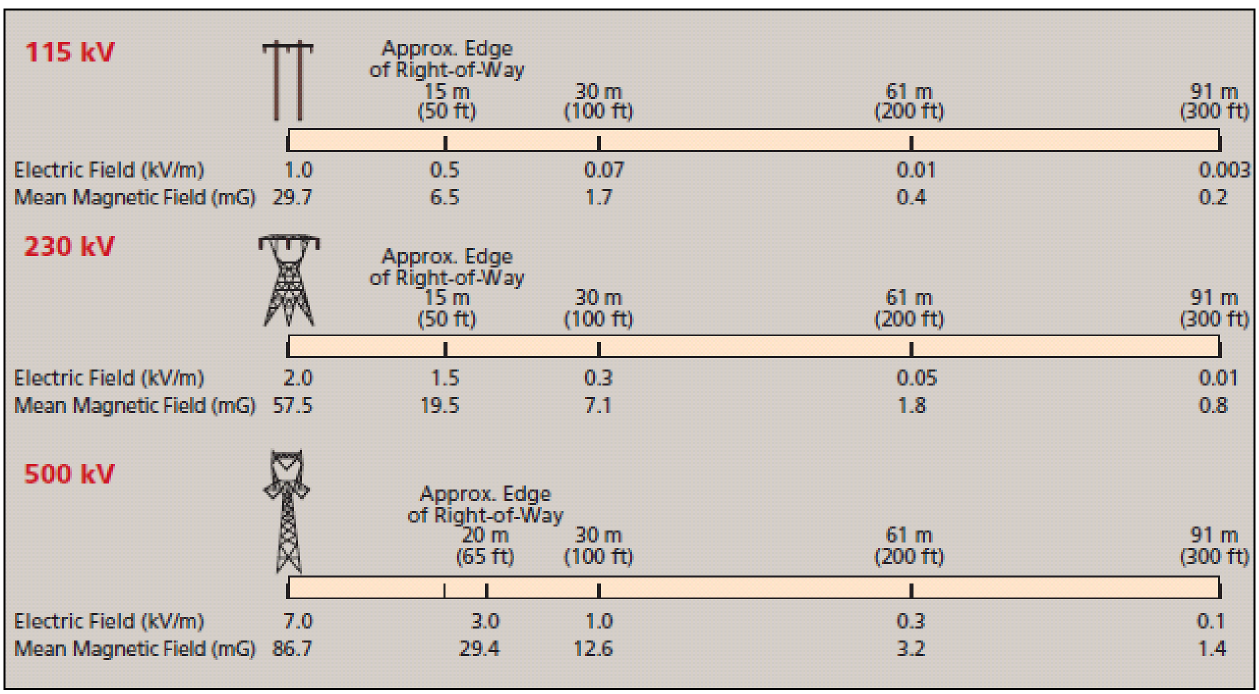
3.20.2.2. Route Alternatives and Segment Alternatives

Direct and indirect effects resulting from the Project would be similar for all Route Alternatives and Segment Alternatives. Direct and indirect effects resulting from the Project would include the introduction of electric and magnetic fields from construction of the Project.

Electric fields are attenuated by objects, and are completely shielded by electrically conducting materials such as metal, the earth, or the surface of the body. Magnetic fields, on the other hand, penetrate most materials.

In comparison to transmission lines, typical voltage for power distribution lines in North America ranges from 4 to 24 kilovolts (kV). Figure 3.20-2 shows the typical EMF levels for power transmission lines. Electric field levels directly beneath overhead distribution lines may vary from a few volts per meter to 100 or 200 volts per meter. The estimated peak electric field level beneath the Project line is 2.6 kV per meter.

Figure 3.20-2: Typical EMF Levels for Power Transmission Lines



Source: NIEHS, 2002

Electric Fields

Estimates of the anticipated electric fields by structure type are shown in Table 3.20-6. Using the Corona and Fields Interactive 1989 Experimental (CFI8X) model developed by the Bonneville Power Administration, the Applicants have estimated electric fields for the Project. As shown in Table 3.20-6, the Project would have a peak magnitude of electric field density of approximately 2.6 kV/m underneath the conductors, 1 meter above ground level.

Table 3.20-6: Estimated Electric Fields (kV/meter)

Structure type	Typical Right-of-Way Width (feet)	Edge of Right-of-Way (kV/m)	Maximum Overall (kV/m)
230 kV Single-Circuit – Single Pole Davit Arm	125	0.54	2.15
230 kV Single-Circuit – H-Frame	125	0.84	2.63
230/115 kV Double-Circuit - Single Pole Davit Arm	125	0.96	2.14
230/69 kV Double-Circuit - Single Pole Davit Arm	125	0.93	2.31

Source: OES, 2009

The predicted levels are significantly less than the maximum limit of 8.0 kV/m, which has been a permit condition imposed by the Commission in other transmission line application permits as well as other state regulations and international guidelines of identified in Tables 3.20-1 and 3.20-2.

The standard was designed to prevent serious hazard from shocks when touching large objects, such as tractors, parked under HVTLs of 500 kV or greater. If the electric field from a transmission line couples with a conductive object, such as a vehicle or metal fence located in close proximity to the line, a voltage would be induced on the conductive object. The magnitude of the induced voltage is dependent upon a variety of factors including the shape, size, and orientation of the object, as well as weather conditions. If a person touches an object carrying the induced voltage, and that object is insulated or semi-insulated from the ground, then a small current would pass through the person's body to the ground. This might be accompanied by a spark discharge and mild shock – similar to what can occur when a person walks across a carpet and touches another grounded person or object (OES, 2009).

High intensity electric fields also have the potential to interfere with the operation of pacemakers and implantable cardioverter/defibrillators. Interference with implanted cardiac devices can occur if the electric field intensity is high enough to induce sufficient body currents to cause interaction. Modern bipolar devices are much less susceptible to interactions with electric fields. Medtronic and Guidant, manufacturers of implanted cardiac devices, have indicated that electric fields below 6 kV/meter are unlikely to cause interactions affecting operation of most of their devices (OES, 2009).

Older unipolar designs are more susceptible to interference from electric fields. Research has indicated that the earliest evidence of interference was in electric fields ranging from 1.2 to 1.7 kV/meter. For older style unipolar designs, the electric field for some proposed structure types do exceed levels that may produce interference directly under the conductors, but not at the edge of the right-of way. In the unlikely event that a pacemaker is affected, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker would return to its normal operation when the person moves away from the source of the interference (OES, 2009).

Magnetic Fields

Peak magnetic field levels can vary considerably depending upon the amount of current carried by the line. The estimated peak magnetic field level beneath the Project line is 260 mG.

The Applicants have estimated the anticipated magnetic fields for the structures being considered for the Project, as shown in Table 3.20-7. As shown in the table, the maximum estimated magnetic field, both overall and at the edge of the Project right-of-way (ROW), would occur when a 230 kV single-circuit H-frame structure was used.

Table 3.20-7: Estimated Magnetic Fields (milligauss)

Structure type	Typical Right-of-Way Width (feet)	Edge of Right-of-Way (mG)	Maximum Overall (mG)
230 kV Single-Circuit – Single Pole Davit Arm	125	42.38	160.92
230 kV Single-Circuit – H-Frame	125	61.01	259.25
230/115 kV Double-Circuit - Single Pole Davit Arm	125	27.16	116.84
230/69 kV Double-Circuit - Single Pole Davit Arm	125	33.53	119.57

Source: OES, 2009

Past scientific studies do not show any major risk of health effects from exposure to magnetic fields. Policy decisions have continued to support the construction of electric infrastructure, taking into consideration the most recent information available about the issue (OES, 2009).

The Project would have a peak magnitude of magnetic field density of approximately 260 mG directly underneath the conductors with a single-circuit H-frame structure. The magnetic field densities drop to approximately 61 mG at the edge of the ROW. These levels are significantly less than the magnetic field level standards established by other states and by international boards, as shown in Tables 3.20-4 and 3.20-5. These levels are also less the magnetic fields typically experienced by users of common household appliances such as hair dryers, vacuum cleaners or microwave ovens.

As discussed in Section 3.20.1.1, there is no evidence of magnetic field interference with implantable medical devices at levels associated with high-voltage transmission lines.

None of the Route Alternatives or Segment Alternatives would have direct or indirect effects associated with magnetic fields.

Stray Voltage

Stray voltage is a condition that can occur at the electric service entrances to structures from distribution lines, not transmission lines. Stray voltage is a natural phenomenon that can be found at low levels between two contact points at any property where electricity is grounded (WPSC, 2009). More precisely, stray voltage is a voltage that exists between the neutral wire of the service entrance and grounded objects in buildings. Stray voltage may also occur in enclosed areas between two grounded objects. When an animal comes into contact with the earth between two grounded objects when a current is passing through the earth, this is commonly known as stray voltage.

As required by code, electrical systems, including farm systems and utility distribution systems, must be grounded to earth to ensure continuous safety and reliability. Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops. This voltage is called neutral-to-earth voltage. When a portion of this neutral-to-earth voltage is measured between two objects that may be simultaneously contacted by an animal, it is frequently called stray voltage. Stray voltage is not electrocution, ground currents, EMF, or earth currents (OES, 2009).

Stray voltage has been raised as a concern on some dairy farms because it may impact operations and milk production. In rural areas, livestock can receive electrical shocks from milking equipment.

Problems with stray voltage are usually related to the distribution and service lines directly serving the farm or the wiring on a farm. In those instances when transmission lines have been shown to contribute to stray voltage, the electric distribution system directly serving the farm or the wiring on a farm was directly under and parallel to the transmission line (OES, 2009).

Stray voltage may result from a damaged, corroded, or poorly connected wiring or damaged insulation. It also can develop on incoming metallic pipes, such as utility lines, through induction from transmission lines, if the transmission lines are in parallel with the utility lines over some distance (WPSC, 2009).

The Project, as a transmission line, would not directly create stray voltage situations. To the extent that a Route Alternative or Segment Alternative exists on the same set of structures, or parallels distribution lines, the Project may indirectly induce stray voltage in certain locations.

Construction Equipment and Activities

Due to the use of heavy equipment, worker safety would be an important concern for both construction and operation for all of the alternatives. Indirect impacts may result from the construction activities including minor and major injuries. These types of injuries are associated with any type of construction project.

In addition, the potential for a release or spill from the construction equipment is possible. Equipment would be brought to staging areas for the set-up of the transmission lines and substations, and may be used for maintenance activities.

Compliance with NESC and OSHA regulations, as required by federal law, would minimize the potential for construction related injuries. Development of spill prevention and response procedures, such as those required in a Spill Prevention Control and Countermeasure (SPCC) plan and Storm Water Pollution Prevention Plan (SWPPP) under state and federal law, would minimize the likelihood of a release. Thus, these types of incidents are expected to be minimal for the construction and operation of this Project.

3.20.3. Mitigation

The following sections summarize the mitigation measures that could be implemented to reduce the potential impacts from construction equipment and activities, and from electromagnetic fields and stray voltages during operation. Many mitigation measures are incorporated in industry equipment design standards or electrical codes.

Mitigation measures that are typically included in permits are noted. Cases where additional mitigation measures may be incorporated as a permit condition are also noted.

3.20.3.1 Construction Equipment and Activities

Several mitigation strategies are available to minimize the potential for spills or leaks from the equipment during construction. The following mitigation measures would be included as Best Management Practices in the Applicants' Storm Water Pollution Prevention Plan (SWPPP), which would be required under the state general permit for storm water associated with construction related activities.

- Frequent inspection of construction equipment to ensure hydraulic systems and oil pans were in good condition and free of significant leaks;
- Requiring portable spill containment kits for each piece of construction equipment with the potential to discharge a significant amount of oil to the environment;
- Ensuring that equipment operators would be present at the nozzle at all times when refueling was in progress; and
- Prohibiting the refueling of equipment in wetlands.

The Applicants have agreed to the above-identified mitigation measures to minimize the potential for spills and leaks. In the event of a spill, the source of the spill would be identified and contained immediately upon discovery. The spill and contaminated soils would be collected, treated, and disposed of in accordance with all applicable federal, state, and local requirements. If a significant spill were to occur to surface waters, methods to contain and recover released material, such as floating booms and skimmer pumps, would be used. Noticeably contaminated soils would be excavated and placed on and covered by plastic sheeting in bermed areas. An emergency response contractor would be secured, if necessary, to further contain and clean up a severe spill (Otter Tail Power et al., 2008a). Cleanup and remediation activities, if required, would be conducted to state-specific standards developed and enforced by the Minnesota Pollution Control Agency.

To mitigate impacts to individual workers, Occupational Health and Safety Administration (OSHA) standards would be followed for all activities related to the construction of the transmission line and substations.

During construction and operation, the transmission line would be equipped with protective devices to safeguard the public if an accident occurs, such as a structure or conductor falling to the ground. Protective safety measures to minimize potential health and safety effects to workers and the general public are incorporated in the industry design standards. The protective devices are breakers and relays located where the transmission line connects to the substation. The protective equipment would de-energize the transmission line should such an event occur. In addition, substation facilities would be fenced and access limited to authorized personnel as per industry practice (Otter Tail Power et al., 2008a).

3.20.3.2 Electrical Safety

The National Electrical Safety Code provides standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and ROW widths. In addition, the United States Occupational Safety and Health Administration (OSHA) regulates worker safety in both construction and industrial settings and has developed and enforces regulations that are designed to protect workers from potential accidents.

Industry design standards minimize potential impacts that may occur if accidents, such as structure failure or the disconnection of a conductor, occurs. Breakers and relays located at substations would de-energize a transmission line if an accident occurs. Substations typically are fenced, and access is limited to authorized personnel. Proper signage provides warning to the public of the risk of coming into contact with the energized equipment.

To ensure that any electric discharge does not reach unsafe levels, the NESC requires that any discharge be less than 5 milliamperes (“ma”).

HVTL permits specify a maximum electric field limit of 8 kV/meter measured 1 meter above the ground. The restriction was designed to prevent serious hazards from shocks when touching large objects like a bus or combine parked under high voltage transmission lines (OES, 2009).

Impacts from electric fields could be minimized by grounding metal buildings, fences, or other large permanent conductive object in close proximity or parallel to the line to prevent excessive discharges. Vehicles, which may be parked under or adjacent to transmission lines, generally are grounded adequately through their tires. In some instances, such as vehicles with unusually old tires or those parked on dry rock, plastic, or other surfaces that insulate them from the ground, the vehicle can be grounded by attaching a grounding strap to the vehicle that is long enough to touch the earth.

Minimizing the length of transmission line parallel to or co-located (through the use of structures that allow under-building of distribution lines) with distribution or local service conductors would minimize the potential for a transmission line to contribute to stray voltage. However, co-locating or paralleling existing distribution or local serving electric lines may be advantageous for minimizing other potential effects from the Project.

Insulated electric fences used in livestock operations can pick up an induced charge from transmission lines. Usually, the induced charge would drain off 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. Potential shocks can be prevented by shorting out one or more of the fence insulators to ground with a wire when the charger is disconnected or installing an electric filter to ground charges induced from a power line, while still allowing the charger to be effective.

3.21. Noise

This section provides a summary of the basic principles of noise, briefly summarizes the evolution of noise regulation in the United States, presents the current Minnesota noise standards and policies, and analyzes potential impacts and mitigation from noise produced during the construction and operation of the Project alternatives.

3.21.1. Affected Environment

Noise is typically defined as "unwanted sound." It may be as mild as a general nuisance, such as a noise causing distraction or masking desired sounds, or severe enough to impede communication, affect behavior, and cause temporary or permanent hearing loss. Prior to the 1960s, noise was not officially recognized or regulated in the United States. In the National Environmental Policy Act in 1969 and the Noise Control Act in the early 1970s, the issue of noise abatement was taken up at the federal level. Today, many state, county, and local municipalities have also adopted noise ordinances to minimize noise issues at the local level.

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 decibel (dBA) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of 3 dBA is barely perceptible to average human hearing. A 5 dBA change (either an increase or a decrease) in noise levels, however, is clearly noticeable. A 10 dBA change in noise levels is perceived as a doubling (if it is an increase in noise levels) or halving (if it is a decrease) of noise loudness.

Noise levels also change depending upon the distance from a point or stationary source (e.g., factory operation). In general, for every doubling of the distance from the stationary source of noise, the sound level decreases by 6 decibels. Thus, a source of noise measured at 80 decibels from a distance of 50 feet would produce a sound level of 74 decibels from 100 feet away. For line sources (e.g., highways), the sound level decreases by 3 decibels for every doubling of distance from the source of the sound. Table 3.21-1 provides the typical decibel levels for some common noise sources that are experienced by people during everyday living.

Table 3.21-1: Common Noise Sources and Levels

Sound Pressure Level (dBA)	Typical Sources
120	Jet aircraft takeoff at 100 feet
110	Same aircraft at 400 feet
90	Motorcycle at 25 feet
80	Garbage disposal
70	City street corner
60	Conversational speech
50	Typical office
40	Living room (without TV)
30	Quiet bedroom at night

Source: Rau and Wooten, 1980

The Minnesota noise regulations are administered by the Minnesota Pollution Control Agency (MPCA) under Minnesota Rule 7030.0050. This Rule lists various activity categories by their Noise Area Classification (NAC).[2] NAC 1 refers typically refers to areas such as schools, residences, churches, hotels, and correctional institutions. NAC 2 refers to railroad and airport terminal, retail and commercial business areas. Applicable areas under NAC 3 are locations at or near highways, industrial facilities, amusement parks, and forestry related activities.

Table 3.21-2 identifies the established noise standards for daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) for each classification. The standards are expressed as a range of dBA (decibel – A weighted) within a one hour period; L_{50} is the dBA that is exceeded 50 percent of the time within an hour, while L_{10} is the dBA that is exceeded 10 percent of the time within the hour.

Table 3.21-2: MPCA Noise Standards (dBA – Decibel, A-weighted)

Noise Area Classification	Daytime		Nighttime	
	L_{50}	L_{10}	L_{50}	L_{10}
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Source: MPCA, 2008

Under the Route Alternative 1, a majority of the route traverses over forest and to a lesser extent over shrubland or agricultural areas and would qualify under NAC 3. Near the more developed areas in and around cities along the route, especially Bemidji,

[2] http://www.pca.state.mn.us/publications/p-gen6-01.pdf

Cohasset, Grand Rapids, Deer River, and Zemple, there are residential areas that would be subject to the more stringent NAC 1 noise standard. Route Alternative 1 avoids the Cass Lake and Bena areas.

Under Route Alternative 2, there would be a higher percentage of areas subject to NAC 1 as this route passes through the all the cities in route Alternative 1, but also includes Bena and Cass Lake.

Under Route Alternative 3, many of the smaller cities impacted along Route 2 would be avoided. However, the cities of Tenstrike, Blackduck, Alvwood, and Bowstring would be affected. In general, 84% of the route is over forested, shrubland, or cropland which would be predominantly classified under NAC 3.

The Leach Lake Reservation and Chippewa National Forest areas are both > 90% forested or shrub/cropland, and would fall predominantly under NAC 3 with the exception of areas designated for camping and picnicking, which are classified as NAC 1.

3.21.2. Direct/Indirect Effects

This section identifies and discusses potential direct and indirect noise impacts for each of the Project alternatives. The direct and indirect effects of the No-Build Alternative are presented in Section 3.21.2.1 and noise impacts due to construction and operation of Route Alternatives 1 through 3 are discussed in Section 3.21.2.2.

Potential direct effects from the Project include:

- Increases in noise during construction of the Project
- Increases in noise during operation of the Project

Potential indirect effects from the Project include:

- Increases in audible traffic noise due to the reduction of tree lines

3.21.2.1. No-Build Alternative

Under the No-Build Alternative, the Project would not be constructed. No new construction of transmission lines, substations, new access roads, or other Project related activities would occur. Under this alternative there would be no direct or indirect noise effects.

3.21.2.2. Route Alternatives 1, 2, and 3 and Segment Alternatives

Noise generated by construction equipment would likely to constitute the greatest noise impact as a result of the Project. Earth moving machinery, such as bulldozers, or supporting equipment, such as air compressors or concrete mixers, would generate temporary noise. Table 3.21-3 provides noise levels experienced for typical construction equipment within 50 feet from the source of the noise.

Table 3.21-3: Typical Noise from Construction Equipment (dBA)

Sound Pressure Level (dBA)	Typical Sources
76	Pump
80	Backhoe
81	Air Compressor
83	Mobile Crane
85	Concrete Mixer
88	Jack Hammer
89	Paver
98	Rock Drill
101	Pile Driver

Source: FTA, 2006

Operational noise impacts could potentially occur along the transmission lines and at the substations. Transmission conductors and transformers at substations produce audible noise levels depending upon weather conditions and their design (e.g., conductor conditions and voltage levels). Table 3.21-4 provides expected noise levels under varying weather conditions. In general, under dry weather conditions, transmission lines are not expected to emit an audible noise above rural or residential background levels (30-45 dBA 50 feet from the source). As described in Table 3.21-4, the audible noise of a 230 kV line during fair weather would likely be very low (15-20 dBA) and seldom noticeable, even when standing directly under the line.

However, in foggy, damp, or rainy, or snowy weather conditions, power lines typically emit a subtle crackling sound due to the small amount of electricity ionizing the moist air near the wires. During periods of heavy rain, the audible noise of the transmission line more than doubles when the conductor is wet. However, the sound made by heavy rain (55-60 dBA) would be greater than that produced by the transmission lines (40-45 dBA). During light rain, dense fog, snow, and other times when there is moisture in the air, transmission lines could produce audible noise levels greater than rural background levels but similar to household background levels. During dry weather, audible noise from transmission lines could produce nearly imperceptible, sporadic crackling sounds.

The audible noise levels of a transmission line also depend significantly upon the line's geometry and operating voltage. The audible noise of a 230 kV line during fair weather would likely be very low and seldom noticeable, even when standing directly under the line.

Table 3.21-4 provides estimates for expected noise measurements at the edge of the ROW for different structure types. These estimates were calculated by the Applicants using transmission line noise level algorithms developed by the Bonneville Power Administration. All of the noise levels shown in Table 3.21-4 are below the lowest MPCA nighttime L_{50} limit of 50 dBA for Noise Area Classification 1. Transmission line structures used for Route Alternatives 1, 2, and 3 would be similar and primarily consist of H-frame wood structures (Otter Tail Power et al., 2008a). As such, there would be no differences in the expected noise levels for Route Alternatives 1, 2, and 3.

Table 3.21-4: Transmission Lines - Expected Noise Calculations

Voltage	Structure Type	Noise at Edge of ROW (dBA)		
		Fair Conditions	Wet Conditions L5	Wet Conditions L50
230 kV	Single Pole Davit Arm	16.5	45.0	41.5
	H-Frame	15.4	43.9	40.4
230 kV / 115 kV Double-circuit	Single Pole Davit Arm	17.6	46.1	42.6
230 kV/ 69 kV Double-circuit	Single Pole Davit Arm	17.3	45.8	42.3

In all route alternatives, transmission line noise impacts at the edge of the ROW would meet the MPCA noise standards.

In the case of all route alternatives, an indirect effect from noise would be the loss of existing tree lines that act as sound barriers for roadway noise. In cases where the existing tree cover would parallel an existing roadway and was removed during construction, residents located immediately along the Project ROW could experience an increase in noise from roadway traffic.

Because the Project would not be adding any transformers to either the Wilton or Boswell substations, no additional noise impacts are estimated from substation improvements to those sites. Depending upon the alternative selected, the Cass Lake Substation may either be expanded or a new substation may be constructed. In either scenario for the Cass Lake Substation, a 230/115 kV transformer would be installed.

Transformers produce noticeable noise when active. Noise levels are highly dependent upon the size and voltage level of the transformer. Transformers associated with substation expansion or construction would be designed to meet National Electrical Manufacturers Association (NEMA) standards. Transformers rated greater than 70 megavolt-amperes (MVA), would be designed to operate at the NEMA TR-1-1993 (2000) standard for noise, which limits the maximum sound level (from a distance of 1 foot from the wall surfaces of a transformer) to 77 dBA during operation, 79 dBA with stage 1 fans running, and 80 dBA with stage 2 fans running (Elliot et al., 1997). Transformers rated less than or equal to 70 MVA would be designed to operate at maximum sound levels 10 dBA below the NEMA TR-1 standards. The maximum sound level from transformers rated at 70 MVA or less would be 67 dBA during operation, 69 dBA with stage 1 fans running, and 70 dBA with stage 2 fans running. All maximum sound levels assume that the transformer is operating at optimal conditions with the top oil temperature rise 65 degrees Celsius above the ambient air, and equipment (e.g., fans, pumps, and filters) operating to manufacturer's specifications (Otter Tail Power et al., 2009).

Corona discharges along transmission lines are also a form of electrical interference caused when small electronic discharges from energized conductor electric fields ionize nearby air. Corona discharges are the result of conductor irregularity, which may consist of physical damage, dust buildup, or water buildup. The ionization of air results in an energy loss that creates audible noise, radio noise, light, heat, and small amounts of ozone. The extent of electrical interference from corona discharges on a communication signal is dependent upon the strength of the communication signal and the magnitude of the radio frequency noise. Typically, the strength of the radio or television broadcast signal within a broadcaster's primary coverage area is strong enough to prevent interference from radio noise. Radio noise has the ability to cause interference with all radio reception, although it is noted that amplitude-modulated (AM) broadcast bands, 535 to 1,605 kHz and those stations broadcasting below 1,000 kHz are mostly affected (OES, 2009). The FCC has stated that metal structures constructed within 0.5 mile of an omnidirectional AM antenna could result in interference with the AM broadcasting station. Frequency-modulated (FM) stations are rarely affected by corona discharges caused from transmission lines because radio frequency noise decreases in magnitude with increasing frequency. Similarly, interference with cellular phones is rare due to the high frequencies used. Digital reception is typically more tolerant of noise. Because television is broadcasted digitally, interference with television reception could be minimal.

Route Alternative 1 and Associated Segment Alternatives

The location of construction noise impacts from Project construction would vary by Route and Segment Alternatives. Route Alternative 1 and its associated Segment Alternatives pass farther south of the cities of Cass Lake and Bena, relative to Route Alternative 2. As such, anticipated construction noise impacts to Cass Lake and Bena from Route Alternative 1 would be less than those anticipated for Route Alternative 2. All three build alternatives begin near the city of Bemidji, where construction noise impacts would be similar for Route Alternatives 1, 2, and 3.

Route Alternative 1 would include construction of a new substation west of Cass Lake. The nearest residence to the proposed location for a new substation is approximately

3,150 feet southwest of the new substation location. Because of this distance, no noise impacts to sensitive receptors are expected from construction or operation of the new substation. If Segment Alternatives A and D are used in the Cass Lake area, no new substation would be constructed and there would be no associated noise impacts.

Route Alternative 2 and Associated Segment Alternatives

Route Alternative 2 and its associated Segment Alternatives would be located within the cities of Cass Lake and Bena. Construction noise impacts to these areas would be the greatest for Route Alternative 2. All three build alternatives begin near the city of Bemidji, where construction noise impacts would be similar for Route Alternatives 1, 2, and 3.

Route Alternative 2 would include the expansion of the existing Cass Lake Substation through the construction of a new 230/115 kV transformer. The substation is located approximately 354 feet south of the nearest residential home. It is anticipated that temporary noise effects would be experienced during construction by residences in proximity of the Cass Lake Substation. During operation and maintenance, noise impacts would be similar to those already experienced by receptors from the existing Cass Lake Substation. No major incremental changes in operational noise, as experienced by the closest receptor, are expected from operation of the transformer.

Route Alternative 3 and Associated Segment Alternatives

Route Alternative 3 and its associated Segment Alternatives would be located within or near the cities of Tenstrike, Blackduck, and Deer River. Under Route Alternative 3, populations in these areas would experience temporary construction-related noise impacts. All three alternatives begin near the city of Bemidji, where construction noise impacts would be similar, with some mild variation by route.

There are no proposed new substations or substation improvements for Route Alternative 3 (Otter Tail Power et al., 2008b). As such, there are no noise impacts associated with substation construction or operation.

3.21.3. Mitigation

The HVTL permit issued by the Commission would include a condition that requires the Project to meet Minnesota noise standards. Noise impacts associated with construction could be mitigated by limiting the hours of work to daytime hours. Heavy equipment used in construction could be equipped with sound attenuation devices, such as mufflers, to minimize the daytime noise levels. The primary mitigation measure for reducing noise from HVTLs is to route the lines away from sensitive noise receptors, to the extent possible.

Noise impacts from substations could be mitigated through substation design. In some cases, additional land beyond that required for the footprint of the substation may be acquired to ensure sufficient setbacks from sensitive noise receptors. Other design measures include layout and landscaping to increase noise attenuation to nearby receptors. Low noise transformers could be used to reduce noise generation from substation equipment.

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4. Cumulative Effects

This section identifies existing and proposed projects within the vicinity of the Study Area that, along with the Project build alternatives, may result in cumulative effects on existing resources. Projects identified and discussed herein were identified through public comments received during the scoping period for this Project and through information submitted by the Minnesota Department of Transportation (MnDOT) and Chippewa National Forest (CNF).

The Council on Environmental Quality (CEQ) defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7). In 1997, the CEQ published Considering Cumulative Effects under the National Environmental Policy Act as a comprehensive guidance document for cumulative analyses. The methodologies recommended in this guidance document were used by the EPA in their Final Protocol to Assess Expanded Cumulative Effects on Native Americans (2007) and were recommended by the Minnesota Environmental Quality Board (MEQB) as providing "the best source of guidance on cumulative impacts." Therefore, the 1997 CEQ guidance document was used in this EIS to assess the potential cumulative effects of the Project in combination with other past, present, and reasonably foreseeable future actions in the vicinity of the Study Area.

This section is intended to provide an overall, synergistic analysis of the system-level cumulative effects resulting from the combined influence of the resource-specific effects to the Study Area.

4.1. Projects Evaluated

The following projects were evaluated for the potential to result in cumulative effects with the Project build alternatives: Enbridge Energy pipeline expansions; MnDOT roadway expansions; St. Regis Superfund Site; electric generation projects; and U.S. Forest Service projects. Table 4-1 provides a summary of the characteristics for each project considered in this cumulative analysis, to the extent that the information was readily available from existing sources, which is then followed by a brief narrative description about each project.

Table 4-1: Project Characteristics for Cumulative Effects Analysis

Project Characteristics	Bemidji-Grand Rapids Transmission Line	Enbridge – Alberta Clipper Pipeline	Enbridge – Southern Lights Pipeline	MnDOT – MN 197/U.S. 71 Widening	MnDOT – US2 Bypass Lanes	USFS - Various Activities	St. Regis Superfund Site
Location (counties)	Beltrami, Hubbard, Cass, and Itasca	Through northern ND, MN, and WI: within the B-GR Project area only - Beltrami, Hubbard, and Cass	From Clearbrook, MN to Superior, WI; within the B-GR Project area only - Beltrami, Hubbard, and Cass	Beltrami	Cass and Itasca	Beltrami, Cass, and Itasca	Cass, southern part of the city of Cass Lake
Length/Area	68-112 miles	327 miles (68-75 miles near B-GR ROW)	175 miles (68-75 miles near B-GR ROW)	East side of existing ROW, crosses B-GR Project at MP1-7 under Alternative 1 and MP 2-6 under Alternative 2	At various sites between Cass Lake and Deer River	1.6 million acres, with 666,000 managed by the USFS	125 acres (Alternative 2 ROW within or adjacent to southern part of the site)
ROW Width/Area	125 feet wide	75 feet wide of new ROW (140 feet temporary for construction), existing ROW up to 125 feet wide	(part of Alberta Clipper)	70 feet wide of new road area, 50 feet wide of new ROW, reconstruct as a 4-lane divided highway	Possibly no new ROW required, existing ROW is 66 to 200 feet wide	n/a	n/a
Construction Period	2010	8 to 10 months total, 2 to 3 months per segment, begin summer 2009 (4 spreads) and completed in early 2010 (2 spreads)	8 to 10 months total, 2 to 3 months per segment, begin summer 2009 (4 spreads) and completed in early 2010 (2 spreads)	2010 or 2011	Long-term plan, date unknown	unknown	Ongoing, as testing indicates; cleanup started in 1984
Construction Workforce	75	300	(part of Alberta Clipper)	unknown	unknown	unknown	unknown

4.1.1. Enbridge Energy Pipeline Expansions

Enbridge Energy is proposing two new pipelines within the Study Area. The projects, referred to as the Alberta Clipper Project and Southern Lights Diluent Project, are expected to be co-located or adjacent to the existing Enbridge pipeline.

The proposed Alberta Clipper Project is an approximately 326.9-mile pipeline that would transport crude oil from the US-Canada border through 15 counties in North Dakota, Minnesota, and Wisconsin (USDS, 2009). Approximately 68 to 74.8 miles of the proposed Alberta Clipper pipeline would be located in proximity to Alternatives 1 and 2 of the Bemidji-Grand Rapids Line. The proposed Southern Lights Diluent Project is a 175-mile long, 20-inch diameter underground pipeline proposed for co-construction with the Alberta Clipper Project.

Enbridge estimates that it would have a lay rate for the pipeline of 3,000 to 7,500 feet per day, dependent on conditions along the alignment. No more than 14,000 feet of the alignment would be open trench at any one time on each pipeline construction spread. As a result, the trench typically would be open no more than 2 days at a specific location, weather permitting. The pipelines would be buried at least 36 inches deep (depth of soil over the pipelines) and could be as much as 54 inches deep, depending upon agreements with the agencies involved.

The proposed Alberta Clipper and Southern Lights Diluent pipeline routes would closely follow the existing Enbridge pipeline right-of-way (ROW). As such, the affected environment and potential effects would be consistent with those described throughout the Final EIS for the existing Enbridge pipeline. Required mitigation measures would be consistent with those required for located the Project near the existing Enbridge pipeline, including maintaining minimum distances from the pipelines to avoid electrical interference and allow for maintenance of the pipeline or transmission line if needed.

Project Route Alternative 2 generally follows the existing U.S. Highway 2 ROW, much of which parallels the ROWs for four existing and two permitted Enbridge pipelines from Cass Lake to the Boswell Substation for a total of 48.1 miles. The existing Enbridge ROWs vary in width up to 125 feet. The new ROW required by Enbridge would be up to 75 feet wide, which would result in a total Enbridge ROW of 200 feet. If the Project is located adjacent to the Enbridge ROWs, total combined ROW width for the Project and pipelines would be 325 feet.

Construction of the Enbridge pipelines during construction of the Project would result in compounding effects on a number of resource areas, as described in Table 5-2. Where the Enbridge projects require new ROW in addition to the existing cleared Enbridge ROW, the project would result in additional loss of wetlands, agricultural land and prime farmlands, forests, vegetation, and wildlife habitat in or near the Project Study Area.

4.1.2. MnDOT Roadway Expansions

MnDOT has indicated that it plans to reconstruct MN Highway 197/US Highway 71 as a four-lane divided highway on the south side of Bemidji (State Project 0409-12). This highway improvement project is planned to occur in 2010 or 2011, and would involve expansion of an estimated 70 feet of new road area and approximately 40 feet of new ROW along the east side of existing MN Highway 197/US Highway 71 (Frisco, 2008). Project Alternatives 1, 1B, and 1C cross MN Highway 197 at milepost (MP) 1-7. Project Alternatives 2, 2A, and 2C cross MN Highway 197 at MP 2-6. All other Project alternatives avoid the section of MN Highway 197/US Highway 71 included in the highway expansion plans.

MnDOT also has long-term plans to add bypass lanes to U.S. Highway 2, between the cities of Cass Lake and Deer River. However, a specific timeline for this highway improvement project has not been developed because funding has not become available. The proposed improvement is not part of the MnDOT 2003-2023 Statewide Transportation Plan (Bittman, 2008). If the project does receive funding, MnDOT has indicated that it hopes to design the project without having to acquire additional ROW. The ROW width varies in this area from 66 to 200 feet (MnDOT, 2009a). MnDOT has also indicated that it would likely design the U.S. Highway 2 bypass lanes according to current freeway standards (Frisco, 2008).

Portions of Project Alternatives 1 and 2 parallel roadways that are included on MnDOT expansion plants. Construction of the Project during roadway expansion would result in compounding effects on a number of resource areas, as described in Table 5-2. Similar to the Enbridge projects, if the roadway expansion projects required new easements, the project could result in additional loss of wetlands, agricultural land and prime farmlands, forests, vegetation, and wildlife habitat. Although typical, these effects would be greater in non-developed areas not already developed with a highway.

4.1.3. U.S. Forest Service Projects

A number of existing and proposed U.S. Forest Service projects are located within the Project Study Area, as shown in Figure 5.1-1 (USFS, 2009). The following provides a brief summary of the management area directions, as specified in the U.S. Forest Service Plan (2004):

- Candidate Research Natural Areas (CRNA) –
    - comprises 1,699 acres, with 0 acres suitable for timber management; and
    - managed similar to Research Natural Areas (see below), with the exception that the interim ROS class objective is semi-primitive non-motorized, until they are formally designated RNAs.
- Experimental Forest (EF) -

  - comprises 8,184 acres, with 0 acres suitable for timber management;
  - managed for silvicultural or other treatment research and experimentation conducted by the North Central Forest Experiment Station; and
  - includes management of the Cut Foot, Marcell, and Pike Bay EFs.
- General Forest (GF) –
  - comprises 347,319 acres, with 257,213 acres suitable for timber management;
  - emphasizes land and resource conditions that provide a wide variety of goods, uses, and services; and
  - has the most young-forest and the largest sized timber harvest units.
- General Forest, Longer Rotation (LR) –
  - comprises 191,829 acres, with 149,899 acres suitable for timber management;
  - emphasizes land and resource conditions that provide a wide variety of goods, uses, and services; and
  - while still having timber production as a key emphasis, generally has longer rotations and more uneven-aged and partial cut harvests.
- Riparian Emphasis (RE) –
  - comprises 52,883 acres, with 25,550 acres suitable for timber management;
  - riparian ecological functions are actively restored, protected, and enhanced in areas where ecosystem processes are sensitive to degradation, restoration focuses on parts of the ecosystem that are not functioning at or within the range of desired conditions; and
  - located along major rivers and lakes that receive varying levels of public use for recreational purposes and also selected large areas of relatively contiguous wetlands, development ranges from some of the most heavily used recreational areas to some of the remote areas of the forest.
- Research Natural Area (RNA) –
  - comprises 2,140 acres, with 0 suitable for timber management;
  - focus on preserving and maintaining unique or high quality native plant community areas for ecological research, observation, genetic conservation, monitoring, and educational activities; and
  - provide opportunities for low impact activities designed to educate people about ecological processes, and dispersed recreational use occurs but is generally discouraged.
- Recreation Use in a Scenic Landscape (RU) –
  - comprises 12,469 acres, with 7,448 suitable for timber management;
  - emphasizes land and resource conditions that provide scenic landscape for recreational activities in natural-appearing surroundings; and
  - often near high standard roads where developed recreation activities may already be provided.
- Semi-primitive Non-motorized Recreation (SPNM) –
  - comprises 21,937 acres, with 18,091 suitable for timber management;

    - emphasizes land and resource conditions that provide recreational opportunities in nearly primitive surroundings where motorized use is not permitted; and
    - located in parts of the forest with few low-standard roads and trails, management activities are not very noticeable, visitors may occasionally see stands that have been regenerated, low-standard timber access roads, and non-motorized trails.
- Unique Biological, Aquatic, Geological, or Historical (UB) –
    - comprises 18,026 acres, with 0 suitable for timber management;
    - areas with outstanding biological, aquatic, geological, historical, and other special values; and
    - primarily managed for interpretive purposes, exhibit plant communities and individual species of particular interest, unique historical and recreational areas are located in a number of areas and where traditional uses occur.
- Water
- Eligible Scenic Rivers (WSR) –
    - comprises 1,537 acres, with 1,111 suitable for timber management;
    - emphasizes land and resource conditions that provide interim protection of the Big Fork River corridor which is identified as scenic; and
    - settings range from semi-primitive to developed recreational areas.

The area surrounding Project Alternatives 1 and 2 and along Segments N and O (see Figure 5.1-1), show that the areas are now mainly used for timber production. There are a number of undefined future projects identified along Segment N and north of Project Alternative 2, and also a few unaccomplished projects. Many of the remaining undefined future projects are located north of Project Alternative 2, east of Segment O and just past Lake Winnibigoshish. Project Alternative 3 has a number of undefined, unaccomplished projects along the route located north of the Spring Lake area.

4.1.4. St. Regis Superfund Site

The St. Regis Paper Company Superfund Site is located on approximately 125 acres in the city of Cass Lake, within the boundaries of the Leech Lake Reservation and adjacent to Chippewa National Forest lands. A portion of the site is located within the 1,000-foot-wide route identified for Project Alternative 2. The Applicants have proposed an expanded route width (Segment F) in the Cass Lake area, which would allow placement of the 125-foot ROW to the south of the St. Regis Site, avoiding potential cumulative effects.

The St. Regis Site was used for wood treatment between the 1950s and 1980s. Historic operations included the pretreatment of lumber with creosote, pentachlorophenol (PCP), and copper chromium arsenate. Wastewater generated from the process was discharged to on-site disposal ponds. Starting in 1957, wastewater and sludge from the disposal ponds was removed from the site and burned at the city dump. The site was placed on the National Priorities List (NPL) for contamination of soil and groundwater with dioxin, pentachlorophenol, and polycyclic aromatic hydrocarbons.

Remediation at the St. Regis Site has been ongoing since 1984. Remedial actions completed in the 1980s and 1990s included the excavation of soil and sludge that was placed in an on-site vault, and operation of a groundwater extraction and treatment system. In 2001 and 2003, soil sampling revealed dioxin contamination that had not been addressed during earlier remediation activities. Over 4,000 tons of contaminated soils were removed from the site between 2004 and 2006. Additional monitoring wells were installed at the site in 2008 to investigate the discovery of a tax plume. Current contaminants of concern are arsenic, benzo(a)pyrene equivalents, and polycyclic aromatic hydrocarbons (PAHs) present as dust in residential houses surrounding the area. A feasibility study was completed for the site in 2009. A public hearing on the study is expected for early 2010, after which the EPA would determine the remedial action plan for additional cleanup of the site.

Project Alternative 2 could potentially be located within or adjacent to the St. Regis Superfund Site. Alternatives 1 and 3 are not located near the St. Regis Site. The Applicants have proposed an expanded route width (Segment F) in the Cass Lake area, which would allow placement of the 125-foot ROW to the south of the St. Regis Site. If the ROW is located within the St. Regis Site, construction may interfere with remediation activities. Disruption of soil or groundwater during pole placement could result in new contamination or health and safety concerns at the site. If the project ROW is located outside the St. Regis Site, no cumulative effects are expected.

4.1.5. Electrical Generation Projects

Development of the Project would create the infrastructure to support increased electrical generating capacity. Specifically, the transmission line would allow for the increased development of renewable energy in the Red River Valley and eastern North Dakota. These areas have significant potential for energy generation to be derived from renewable energy sources such as wind. With increased reliance on renewable or "emission free" power generation, there would be a potential for reduced carbon emissions resulting from the decreased or displaced necessity to combust coal or other more significant criteria pollutant emitting fuels. This positive effect on air emissions would be realized under each of the Project build alternatives.

4.2. Cumulative Effects Methodology and Analysis

The 1997 CEQ guidelines recommend analyzing cumulative effects according to a tiered approach among specific resources, interconnected systems, and human communities. This hierarchical approach allows for a quantitative, resource-specific analysis as well as a synergistic, additive discussion of the system-level influence of regional actions.

The temporary boundary for the analysis is defined as the life of the Project, estimated at over 50 years. The spatial boundary for the analysis is the Study Area, defined as the 1,000-foot-wide route identified for each alternative, and neighboring cities/communities. Under the resource-specific lens, the resources considered were identified as those having the potential for cumulative effects by the Project build alternatives. If the Project did not result in direct or indirect impacts on a resource, then that resource was eliminated from the cumulative effects evaluation. Table 4-2 provides a summary of the resource-specific effects analysis.

Table 4-2: Resource-Specific Cumulative Effects Analysis

Resource	Cumulative Effects Summary
Aesthetics	Co-location of the Project with pipeline expansion projects would result in compounding effects on the viewshed in the Study Area where tree clearing is required for the pipeline expansion projects.
Air Emissions	Construction of the Project at the same time as roadway or pipeline expansion projects, if construction is delayed, in the Study Area may result in compounding effects from fugitive dust and air emissions from construction vehicles. The Project may indirectly affect alternative energy projects in the region by creating infrastructure to support increased electric generating capacity.
Soils and Geology	Construction of the Project at the same time as roadway or pipeline expansion projects may result in increased temporary disruption to surface soils and the increased potential for soil erosion or compaction. Disruption of soil at the St. Regis Superfund Site for the construction of Alternative 2 may result in increased health concerns and interfere with ongoing soil remediation at the site.
Water	No direct cumulative effects are expected. The Project is expected to span water bodies. Water resources in the Study Area may be indirectly affected by the compounding effects of soil erosion.
Floodplains	No direct cumulative effects are expected. Floodplains in the Study Area may be indirectly affected by the compounding effects of soil erosion.
Wetlands	Co-location of the Project and roadway or pipeline expansions may result in compounding effects to wetlands, including changes in sedimentation, turbidity, and runoff; changes in wetland fill and long-term loss of wetlands; and wetland type conversion.
Biological Resources	Co-location of the Project and roadway or pipeline expansions may result in temporary displacement of wildlife and long-term habitat fragmentation. Removal of vegetation from co-located easements would increase acreage converted from forest to grass or shrub land, resulting in compounding conversion of existing vegetation communities and potential for the spread of noxious weeds in ROWs.
Species of Special Concern	Same as Biological Resources
Cultural Resources and Values	None expected
Land Use	Co-location of the Project and roadway or pipeline expansions on a single property owner's land would result in compounding temporary and long-term loss of land use. Placement of the Project within the St. Regis Superfund Site could interfere with remediation of the site and limit future redevelopment of the site.

Socioeconomics	Multiple easements located on a single land-owner's property could affect the property value and affect the land use through fragmentation of the property. Construction of the Project easement adjacent to roadway or pipeline expansion projects could result in compounding negative effects to property values, although it is noted that the anticipated negative effect on property value for a property with an existing easement is less than for a property with no existing easement. Construction of the Project at the same time as other construction projects in the vicinity of the Study Area would result in compounding effects on the short-term influx of income to surrounding communities during construction.
Environmental Justice	Construction of the Project at the same time as other construction projects in the Study Area may result in compounding temporary effects to hunting and gathering, which could be disrupted during construction activities.
Recreation	Co-location of the Project with roadway or pipeline expansion easements may result in compounding effects on forested land, resulting in the removal of forested areas used for recreational activities. Adjacent easements would create a wider cleared width that would allow for increased recreational traffic: hiking, snowmobiling, riding ATVs. Creation of wide co-located easements would allow for the development of new recreational trails on public land, although create the potential increase for trespassing on private land.
Agriculture	Co-location of the Project and roadway or pipeline expansions on adjacent easements may result in compounding loss of agricultural land or prime farmland. Adjacent easements may also result in fragmentation of agricultural land or prime farmland, affecting agricultural activities.
Forestry	Co-location of the Project and roadway or pipeline expansions on adjacent easements may result in compounding loss of forest, which could affect potential for future timber production and fragment wildlife or vegetation populations. Similar compounding effects may occur if the Project is located adjacent to existing or future CNF forest projects, some of which require a certain amount of forested acreage to study wildlife, vegetation, and fire suppression.
Mining	None expected
Community Services	None expected
Utility Systems	None expected
Traffic and Transportation	Construction of the Project at the same time as roadway or pipeline expansions could result in compounding effects to road closures and traffic delays. Staggered construction of projects in the Study Area could result in prolonged road closures and delays.
Safety and Health	Construction of Alternative 2 within the St. Regis Superfund Site could disrupt contaminated soils, increasing the risk of worker exposure to potential hazardous contaminants.
Noise	Construction of the Project at the same time as roadway or pipeline expansions could result in compounding effects on noise levels in the Study Area from construction equipment. Staggered construction schedules of projects in the vicinity of the Study Area would result in an increase in the duration of noise, but not the level of noise.

4.2.1. Aesthetics

Cumulative aesthetic impacts would include disruption to the existing landscape from the addition of transmission lines and the expansion of the substations, loss of trees, and devaluation of high-value or sensitive scenic resources. As projects are added to landscapes, there tends to be a gradual decline in the overall visual quality. However, unlike other types of resources, there is no quantifiable visual measurement of what is deemed good or bad. Most measurements for visual resources are subjective and dependent on individual viewers. In other words, there is no precise point at which one additional project is "too much."

That being stated, the Project likely would be visible to many residents located near it, as well as those traveling on highways and county, township, and forest roads. As indicated in Section 3.1, Aesthetics, the direct and indirect impacts were evaluated on the basis of whether or not the transmission line could be seen from a particular vantage point, either a named resource, such as the Mississippi River, or a general setting, such as the location of an existing transmission line or the frontage road near U.S. Highway 2. Cumulative effects primarily concern whether or not the visual setting would be degraded with the addition of another built component, such as the transmission lines and poles.

For example, co-location of the Project with Enbridge pipeline expansion projects would result in compounding effects to the viewshed in the overlapping 68 to 75-mile long Study Area, with tree clearing to widen the existing 125-foot Enbridge ROW to the combined existing and new ROWs totaling 325 feet. In this type of environment, the construction of the 230 kV H-frame is a departure from the existing, cleared setting. The poles would be clearly visible and would add a vertical component to the landscape. This would compound the existing effect by creating an additional break within the landscape, especially in forested areas, where additional trees would need to be removed. Viewers' attention would be drawn both to the clearing, as well as the transmission lines and poles.

Cumulative effects associated with the addition of the transmission line to areas adjacent to the pipeline ROW, however, would not further impact the SIO ratings of high, moderate, and low for a particular resource. As previously indicated, the SIO rating is based on the overall quality and characteristics associated with a resource. For this reason, the cumulative effects would be localized and would not alter the overall rating of a resource.

Two Mississippi River crossings would likely be visible, one as the Project leaves the Bemidji area and another as the Project approaches the Boswell Substation. Visual simulations were not created for these locations. Specific projects and existing infrastructure are not noted; thus, cumulative impacts associated with the visual setting are not anticipated at the river crossings.

Selected additional site-specific impacts could occur at Project mileposts (MPs) 1-7 and 2-6 if the MN Highway/US Highway 71 widening occurs. It does not appear that work at the St. Regis Superfund site and the addition of bypass lanes to U.S. Highway 2 would contribute to the cumulative aesthetic impacts because it appears that the existing site and the highway ROW for intermittent lanes may be large enough to accommodate these projects. In addition, the Applicants have widened the route in the area of the Superfund site in order to avoid it.

As indicated within section 3.1, Aesthetics, in locations where existing transmission lines are present, the addition of a new line would further impact the visual experience of visitors and residents. The combination of the parallel utility lines and repeated pattern of pole placement increases the visual dominance of the transmission structures against the sky and their contrast with the horizontal line of the background trees and other low-lying vegetation. Cumulative effects associated with the addition of the transmission line to areas with an existing transmission line would not further impact the SIO ratings of high, moderate, and low for a particular resource, since the SIO rating is based on the overall quality and characteristics associated with a resource.

4.2.2. Air Quality

Potential impacts to air quality from construction of the Project could include temporary degradation of air quality from the emission of air pollutants during the operation of construction equipment and vehicles. Construction of the Enbridge pipeline projects began in 2009 and is scheduled to conclude prior to the start of construction of the transmission line project. Thus, cumulative impacts to air quality from increased particulate matter or heavy equipment and other vehicular exhaust emissions are not likely to increase, but would occur over a longer period of time.

4.2.3. Geology and Soils

Surface soils would be disturbed by site clearing, grading, and excavation activities at structure locations, pulling and tensioning sites, setup areas, and during the transport of crews, machinery, materials, and equipment over access routes (primarily along the transmission ROW).

The vast majority of impacted acreage, from 876 acres for Project Alternative 1 to 1,070 acres for Alternative 3, would be temporary in nature primarily due to equipment access. Depending upon the alternative, approximately 3 to 5 acres would undergo long-term impacts due to the installation of pole structures. Construction of the Enbridge pipelines would also disturb soils, resulting in increased potential for erosion, compaction, and mixing of topsoil; damage to agricultural drainage tiles; and introduction of rock to the soil. Agricultural production on approximately 2,528.8 acres would be temporarily lost from production for the construction season. Sixteen contaminated waste sites were identified within 0.5 mile of the Enbridge pipelines route in Minnesota, including five sites identified in Itasca County. Eight unpermitted dumps were identified in or near the ROW in several counties in Minnesota, including Itasca County. Cumulative soil impacts from ongoing cleanup activities at the St. Regis Superfund site are unclear until potential additional contamination issues and resolutions are identified. Impacts to soils are likely to be temporary, minimal and localized for the highway projects and the future U.S. Forest Service projects.

4.2.4. Water Resources and Floodplains

Temporary or long-term direct impacts to surface water resources are unlikely to occur to PWI basins or watercourses. Project alternatives have been located to avoid surface water features to the extent practicable. In areas where surface water features are present, it is anticipated that ROW alignments could be directed to avoid surface water or that water bodies could be spanned. All water crossings under all of the alternatives, including the Mississippi River crossing west of Deer River, would be spanned by poles placed from 800 to 1,000 feet apart. There are no water bodies that are wider than the maximum span along the alternatives, such that complete avoidance would not be feasible.

If pole placement were to occur within a water basin or watercourse, temporary direct impacts may include soil erosion along the shoreline and sedimentation caused by construction. Fuel or chemical spills from construction equipment could degrade storm water runoff quality. Impacts to surface water quality could result from the use of herbicides or pesticides in maintaining the transmission line ROW during operation. However, conditions in the High Voltage Transmission Line (HVTL) and Storm Water permit would reduce the likelihood and include mitigation measures for these potential impacts.

Potential cumulative impacts to water resources would be greater for the Enbridge pipeline construction, and would occur prior to the initiation of construction of the Project transmission line. The proposed Enbridge pipelines would involve a total of 76 perennial and 86 intermittent crossings in Minnesota (15 additional crossings were not surveyed). Construction of the pipelines could result in temporary or short-term impacts due to increased sedimentation, degradation of aquatic habitat from instream construction activities, increased runoff and erosion, changes in channel morphology and stability, temporary reductions in flow during hydrostatic testing activities, alteration of aquatic habitat, and temporary to short-term surface water quality degradation during or after construction from disposal of materials and equipment or vehicle spills and leaks. But, overall, it is not anticipated that groundwater or surface water quality would be greatly affected during pipeline construction or operation.

Cumulative impacts to water resources from the Project transmission line and the highway projects are likely to be minimal or non-existent, and impacts from the St. Regis Superfund site continue to be studied and addressed as needed.

4.2.5. Wetlands

Potential impacts resulting from construction and maintenance of the Project could include a loss of wetlands and/or wetland functions, conversion of wetlands, change in water quality and water recharge, loss of habitat, and impacts from construction and maintenance access. Conversion of wetland type would occur where the clearing of forested wetland areas would be required within the ROW. Approximately 15 acres of wetland would be affected for each mile of ROW crossing through a wetland or wetland complex.

The greatest potential impacts to wetlands would result from conversion of wetlands, ranging from 166 acres of wetland conversion for Route Alternative 2 to 269 acres of wetland conversion for Route Alternative 3. Approximately 1,346.16 acres of wetlands would be impacted during construction of the Enbridge pipelines, 820.64 acres of which would be maintained in an herbaceous state during operations. These impacts could result in wetland type conversion. The predominant wetland types that would be crossed by the Enbridge pipelines are forested and scrub-shrub communities.

In addition to standard construction efforts to minimize or mitigate wetland impacts, winter construction has been proposed for up to 25 miles of expansive wetlands. Overall, temporary and long-term impacts to wetlands, mitigated according to Enbridge plans and agency requirements, would result in minor impacts to wetland resources, as would impacts from highway projects and the St. Regis Superfund site.

4.2.6. Biological Resources

This section identifies potential cumulative impacts to general vegetation and fauna in the Project Study Area.

4.2.6.1. Vegetation

The primary impacts to vegetation from construction would be cutting, clearing, or removing the existing vegetation within the construction work area, and the potential introduction of noxious weeds. The primary long-term impact of the alternatives on vegetation is the conversion of existing vegetation communities to managed grassland or shrubland within the transmission line ROW. Maintenance of these areas would preclude recovery of natural vegetation for the lifetime of the Project. The magnitude of impacts relates to the type of vegetation that would be converted: conversion of unmanaged upland shrub and grassland communities is much less than impacts to forest communities because of the magnitude of change that occurs. The Applicant routed the alternatives to take advantage of adjacent utility corridors and existing access roads to the extent practicable, which has reduced the area of natural vegetation that would be lost as a result of the Project and minimized fragmentation of natural habitats adjacent to the ROW.

Project Alternatives 1 and 2 would result in approximately 1,000 to 1,100 acres of impacts to native vegetation cover, with the aspen/white birch communities receiving the greatest impacts. Alternative 3 and 3E would each result in approximately 1,800 acres of impacts to existing vegetation communities. Vegetation classes potentially affected by the Enbridge pipelines during construction include upland forested lands (1,254.5 acres), agricultural lands (2,528.8 acres), developed lands (617.2 acres), open lands (655.4 acres), and wetlands (1,346.2 acres). Impacts to herbaceous habitats generally would be shorter term than those to woody communities, with herbaceous vegetation typically becoming reestablished within 3 years, shrubland taking 5 to 10 years and forestlands taking 50 years or more. Vegetation within the Enbridge ROW would be maintained in an herbaceous state during operations, including areas currently composed of forested lands (622.2 acres), agricultural lands (569.4 acres), developed lands (36.7 acres), open lands (195.2 acres), and wetlands (820.7 acres). Overall, cumulative impacts from the Enbridge pipelines and Project transmission line to vegetation would be minor and generally short term, although impacts to forested lands would be long term. The ROWs for the highway projects and the St. Regis Superfund site are already cleared and so the cumulative impacts to forested lands are expected to be minimal and more localized.

4.2.6.2. Fauna

Potential wildlife impacts from the Project include the direct or indirect loss or conversion of habitats, increased habitat fragmentation, and the potential risk of avian collisions with transmission conductors and equipment. The Project would expand the existing ROWs or create new ROWs that would convert woodlands to maintained grass/shrub. Species that rely upon forested habitat would generally be displaced in favor of grass or shrubland adapted species.

Overall, the Project routes would convert approximately 430 to 815 acres (Alternatives 2 and 3, respectively) of woodland to grasslands and shrublands.
Construction and operation of the Enbridge pipelines would result in both short-term disturbance and long-term modification to wildlife habitats (see above), including impacts from habitat fragmentation and widening of the existing ROW. To limit potential construction and operation impacts to wildlife, Enbridge has identified a number of mitigation measures and, consequently, overall impacts to wildlife are expected to be minor.

Unlike the Project transmission line that would span water bodies and thereby avoid impacts to fisheries resources, the Enbridge pipelines primarily could affect fisheries resources by loss or alteration of habitat, reduced spawning success, direct and indirect mortality, adverse health effects, and loss of individuals and habitats due to hydrostatic testing and exposure to toxic materials. Enbridge would adhere to agency recommendations on timing windows for instream work and proposes to modify the proposed crossing method based upon flow conditions at the time of construction.

Consequently, the open-cut method would be used for water bodies planned as a dry crossing, if the water body is dry or has no perceptible flow at the time of construction. Alternatively, a dry crossing method would be used for water bodies planned as an open cut but with perceptible flow at the time of construction. To minimize the impacts of construction activities on fish and their habitats, Enbridge generally would complete all open-cut instream activity for minor water body crossings (less than 10 feet wide) within 24 hours and all activity for intermediate (10 to 99 feet wide) and major (100 feet wide or greater) water bodies would be crossed in less than 48 hours, not including those crossed by horizontal directional drill (HDD) methods. Thus, with the proposed mitigation the Enbridge pipelines would have overall minor construction impacts to aquatic habitat and organisms.

Because the ROWs for the highway projects and the St. Regis Superfund site are already cleared and, thus there would be no cumulative effects on forest lands in the associated localized habitats, impacts to fauna are expected to be minimal and more localized.

4.2.7. Species of Concern

This section identifies potential cumulative impacts to federal, state, and tribal threatened, endangered, and sensitive (TES) vegetation and fauna in the Project Study Area.

4.2.7.1. Vegetation

Non-motile plant species could potentially be impacted if Project transmission structures and the Enbridge pipelines were sited on top of, or immediately adjacent to, the known locations of these species or if individuals or populations would be destroyed during clearing and/or long-term maintenance of the ROW. To the extent practicable, the ROWs could be sited to avoid known locations of these species or, in the event that known occurrences of species cannot be avoided, to ensure that project features (i.e., transmission line poles and support structures) are not located on top of, or immediately adjacent to, these species.

Because the ROWs for the highway projects and the St. Regis Superfund site are already cleared and, thus there would be no cumulative effects on localized vegetation, impacts to these species are expected to be minimal.

4.2.7.2. Fauna

More motile species, such as birds and mammals, would likely avoid the Project and Enbridge pipeline ROWs during the construction periods and move into surrounding, undisturbed habitats. The habitats impacted are relatively common within the region and that State; therefore, compatible habitat is likely located near the ROWs. While this migration may increase short-term competition for resources, it is unlikely that the region is overpopulated with these species such that short-term migration would lead to adverse effects on state-wide populations.

Long-term impacts from habitat conversion within the ROWs could cause localized impacts to bird and mammal species dependent upon mature forests for foraging or nesting such as the Bald Eagle, Great Blue Heron, Osprey, Connecticut Warbler, and Black-backed Woodpecker, Canada Lynx, and Gray Wolf. However, impacts to bird species can be minimized by avoiding known nesting sites during the breeding season by approximately one-eighth of a mile (660 feet) for large raptors and colonial waterbirds (e.g., Bald Eagles, Great Blue Herons, and Osprey) and maintaining approximately 200 feet around known nesting sites for smaller species such as Connecticut Warbler, Black-backed Woodpecker, and Olive-sided Flycatcher.

The Projects are not located within the Federally-designated critical habitat for the Canada Lynx. Canada Lynx are uncommon in the Study Areas and Snowshoe Hare habitat is also relatively uncommon (less than 5 percent of each alternative). Therefore, the Study Areas are not likely to become common foraging habitat for Canada Lynx and no adverse effects would be anticipated.

Because the ROWs for the highway projects and the St. Regis Superfund site are already cleared and, thus there would be no cumulative effects on localized habitat, impacts to these species are expected to be minimal.

4.2.8. Cultural Resources

The construction of Project transmission line facilities could affect recorded and currently unknown cultural resources. The transmission line, with its pole installation and substation modification, has the potential to disturb archaeological sites. The Project could alter the setting and viewsheds of historic structures or landscapes, or the setting of and access to Traditional Cultural Properties. In areas not previously disturbed and where archaeological potential is assessed to be high, such as near large lakes and river crossings, unrecorded archaeological sites or traditional cultural properties may be affected during construction of transmission structures, substations and substation modifications, or access roads. Historic buildings or other sites may be impacted, as well, in that construction of modern transmission structures may impact the historic viewshed in which above-ground archaeological and historic resources are located. Impacts to cultural resources, including historic structures, archaeological sites, and traditional cultural properties, would be considered significant if they result in adverse effects to historic properties that are eligible for listing on the NRHP.

Impacts to natural resource use, such as wild rice harvesting, maple sugaring, sweet grass harvesting, or berry picking, would depend upon the requirements of the resource, and the Project alternative. Game animal populations are not anticipated to be affected by the Project and no indirect effects to natural resource appreciation and use are anticipated.

In addition to the potential Project impacts, the principal types of impacts the Enbridge pipelines could have on cultural resources include physical destruction or damage caused by pipeline trenching, related excavations, or boring; introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features by short-term pipeline construction or construction of aboveground appurtenant facilities and roads; and change of the character of the property's use or of physical features within the property's setting that contribute to its significance. Enbridge's main method of mitigation for potential impacts to cultural resources is avoidance and no impacts to cultural resources are anticipated.

A Programmatic Agreement would be used to conclude Section 106 review, to ensure that an appropriate formal process is followed for the outstanding cultural resources surveys that result from Project adjustments or from current denial of survey permissions by affected landowners.

Because the ROWs for the highway projects and the St. Regis Superfund site were previously highly disturbed and developed, there likely would be no additional cumulative effects on cultural resources where these projects are in proximity to the Project and Enbridge ROWs.

4.2.9. Land Use

Potential Project impacts include the incompatibility with local land use and zoning, incompatibility with planned development, and loss of use to landowners. Due to the small amount of land required, the Project alternatives would not directly or indirectly impact local land use and zoning categorizations, because these designations would not be altered. Land uses might be affected long-term only in areas where trees need to be cleared (i.e., outside of existing ROWs and utility lines). In these instances, a portion of land would be cleared for access and maintenance; the overall use of the parcel, and hence the land use designation, would not typically be altered.

Landowners may experience both a temporary and long-term loss of use in areas where new Project land would be needed. The temporary loss of use for landowners would occur during construction. During this time, machinery would be placed on individual property owners' lands to allow for the placement of poles and wires. Indirect effects may include noise, dust, and additional traffic not typically associated with the existing land use, especially in rural or forested areas. The overall land use outside of the defined easement, however, would not be altered during construction. Creation of the Project ROW and construction access roads may increase public access to private lands, creating the potential for increased trespassing and unauthorized use of such lands. Enforcement of private land use and trespassing laws would be the responsibility of local law enforcement.

The long-term loss of use outside of existing ROWs and utility lines would be minimal due to the small footprint required by each transmission line pole and the 125-foot ROW. Long-term Project impacts to forest land would range from 432.3 acres for Alternative 2A to 825.0 acres for Alternative 3. It is likely that long-term impacts to land use would also occur as a result of the proposed substation configurations in the Cass Lake area. In Project Alternative 1, a new substation would be constructed in Section 30 of Pike Bay Township (T145 N, R 31 E); in Alternative 2, the existing Cass Lake Substation, located in Section 17 of Pike Bay Township (T145 N, R31W) would be expanded. In either case, approximately 4 acres of forested land would be impacted. Alternative 3 does not include any substation construction or improvements.

Construction of the Enbridge pipelines would affect the following land use categories: forested lands (1,254.5 acres), agricultural lands (2,528.8 acres), developed lands (617.2 acres), open lands (655.4 acres), and wetland/open water (1,346.2 acres). Total acres that would be affected by the Enbridge pipelines are 6,402.1 acres. Enbridge would compensate all landowners for lost crops and any documented damage caused by construction activities. Enbridge routed the pipelines in an effort to minimize the number of residences impacted. As a result, Enbridge has been involved in easement negotiations with the owners of 21 residences that would be within 50 feet of the construction ROW along the 326.9-mile pipeline. Enbridge has committed to implementing a comprehensive inspection, monitoring, and compliance control plan to ensure that multiple contractors comply with the conditions of permits. Implementation of the Enbridge proposed plans and mitigation would result in overall minor impacts to land use.

Because the ROWs for the highway projects and the St. Regis Superfund site were previously developed, there likely would be no additional cumulative effects on land use and zoning where these projects are in proximity to the Project and Enbridge ROWs.

4.2.10. Socioeconomics

Subsistence use and subsistence patterns have been affected in the past by settlement patterns, highways, snowmobiles, pipeline and transmission rights-of-way and introduction of invasive species. Affects within the LLR are primarily concentrated along the Hwy 2 corridor.

Cumulative effects to subsistence land uses for lands within the Refuge boundary would include expanded areas of utility rights of way; continued exchanges of land from individual and Forest Service use to utility use, increased access to formerly remote areas; and increased fragmentation of forest areas that may require further changes to traditional subsistence patterns and knowledge; and alienation of users from their traditional use areas.

The net effects of new transmission rights-of-way within subsistence use areas involve changes in management that could affect subsistence users and the possibility for future co-location of utility rights-of-way.

The following sections describe the potential cumulative socioeconomic (e.g., employment, income, and business) impacts during construction and operation of the projects.

4.2.10.1. Construction

Potential cumulative socioeconomic impacts include impacts to homes and businesses from residential and business losses, landowner compensation, and property values, and also from impacts to local, regional, and subsistence-based economies during construction of the Project.

Construction of the Project would require approximately 75 temporary but full-time employees to construct the transmission line and additional workers would be required for the substation modifications. Other projects under construction durin the present or reasonably foreseeable future include the construction of the Enbridge pipelines, which would require 300 people over its entire 327 miles, and construction of the highway projects and ongoing cleanup at the St. Regis Superfund site These construction jobs would not create new long-term jobs in the Study Area. Opportunities for part-time personnel also may be available during the construction of the transmission line and pipelines.

To the extent that local contractors are used for portions of the construction, total direct wages and salaries paid to contractors and workers in surrounding counties would contribute to the total personal income of the region. These construction jobs would provide a short-term influx of income to the area. Construction expenditures made for equipment, energy, fuel, operating supplies, and other products and services would benefit businesses in the local communities to the extent that the products and services are purchased locally. Additional personal income would be generated for residents in the region and the State by circulation and recirculation of dollars paid out by the Applicants as business expenditures and State and local taxes.

Short-term indirect positive economic impacts would result from these construction activities. Revenue likely would increase for some local businesses, such as hotels, restaurants, gas stations, and grocery stores, due to increased spending from workers associated with construction of the Project, the Enbridge pipelines, the highway projects, and at the St. Regis Superfund site in Cass Lake.

Potential negative cumulative effects to local, regional and subsistence-based economies could result from construction of the Project and other projects in the Study Area (Enbridge, highway projects, and St. Regis). Loss of income could result from a decrease in recreational users of the area during construction. Impacts to the subsistence-based economy could result from loss of acreage for subsistence activities, fragmentation of habitat, and introduction/spread of invasive species due to increased disturbance/new corridors. These impacts would primarily be limited to projects located on the LLR where LLBO tribal members have hunting and gathering rights.

Impacts to the subsistence-based economy will be further assessed by LLR and federal agencies for inclusion in the Final EIS.

4.2.10.2. Operation

Potential cumulative socioeconomic impacts include impacts to homes and businesses from residential and business losses, landowner compensation, and property values, and also from impacts to local, regional and subsistence-based economies during operation of the Project.

Operation of the Project would not require an increase in full-time or part-time employees. Other projects under operation during the present or reasonably foreseeable future are not anticipated to require an increase in employees during operation.

The increase in transmission capacity and reliability would be an economic benefit to the surrounding communities and businesses. Additional capacity would not only provide electricity for economic growth from new or enlarged industry and businesses, it would help to assure that income was not lost as a result of a potential brownout or temporary blackout of power from severe weather events. This could have a long-term positive economic impact to the Project Study Area. The availability of reliable power also could have a positive effect on the quality of services provided to the public. An additional benefit would include an increase to the each county's tax base, resulting in an incremental increase in revenue from utility property taxes.

The Project, the Enbridge pipelines, the highway projects, and at the St. Regis Superfund site are not anticipated to have a direct negative impact any businesses and is not expected to have negative economic impacts. The operation and maintenance of the transmission line would not negatively impact the socioeconomic resources related to industry in the four-county area.

The Project would not cause the displacement of any individuals from their homes or businesses where property or easement acquisition is necessary. Federal, state, and local regulations dictate property acquisition requirements. Affected landowners would be compensated for their property at fair market value. Residents and local business owners and customers in the Study Area primarily would be affected by temporary construction activities and long-term aesthetic changes.

Agricultural land that is located within the ROW would be temporarily removed from production during construction. Project Alternative 1A affects the most prime farmland within the ROW as compared to the other alternatives. Landowner compensation would be established by individual easements for the Project and the Enbridge pipelines. Because the existing ROWs appear to be large enough for the highway projects and the St. Regis Superfund site is not expanding, purchase of easements would not likely occur for those projects.

Negative impacts to subsistence-based economies may occur from the operation and maintenance of the Project as a result of loss of acreage for subsistence activities, fragmentation of habitat, and introduction/spread of invasive species due to increased disturbance/new corridors. These impacts would primarily be limited to projects located on the LLR where LLBO tribal members have hunting and gathering rights.

Impacts to subsistence-based economies will be further assessed by LLR and the federal Cooperating Agencies for inclusion in the Final EIS.

4.2.11. Environmental Justice

The proposed activities also would not result in an economic hardship due to taxes (which would not be increased). If approved, the Project and the Enbridge pipelines may increase the amount of tax revenue available to the four counties. Both projects could provide increased opportunities for firewood gathering or employment. During construction, the projects likely would provide an opportunity for temporary employment for members of the minority and low-income communities in the area.

The Project, Enbridge pipelines, and highway projects would, however, impact food resources used by those conducting subsistence hunting, fishing, and gathering activities, potentially resulting in no cumulative impacts. Some temporary disruptions may occur if access is limited, for safety purposes, to areas typically used for hunting and gathering. Animal communities also may be temporarily disturbed during construction due to the movement of equipment, noise, and dust. Additionally, any offsite contamination from the St. Regis Superfund site could make some subsistence resources unfit for consumption.

Negative impacts to subsistence-based economies may occur from the operation and maintenance of the Project as a result of loss of acreage for subsistence activities, fragmentation of habitat, and introduction/spread of invasive species due to increased disturbance/new corridors. These impacts would primarily be limited to projects located on the LLR where LLBO tribal members have hunting and gathering rights.

Impacts to subsistence-based economies will be further assessed by LLR and the federal Cooperating Agencies for inclusion in the Final EIS.

4.2.12. Recreation and Tourism

Constructing of the Project transmission line and Enbridge pipelines adjacent to an existing linear utility corridor would not significantly change the recreational uses of the area, because the corridor was previously disturbed and the existing visual spectrum includes a linear type feature. However, these projects would change the vegetated state of the ROW in some areas from forest land to shrub land or grassland. The widened or new Project ROW would eliminate approximately 433 to 813 acres of forestland, depending upon the alternative selected.

The Project generally would span trails such that a direct impact to the individual trail would be minimal. Trails, especially those for OHV use, are often located within existing ROWs. The existing ROW could be used by OHVs, as long as the vehicles are not operated on the inside slope of the ditch, shoulder, or roadway of state or county roads (MnDNR, 2008b and 2008c). Another potential indirect impact would be the encouragement of OHV use by opening up a new ROW that people may use for all terrain vehicle traffic. The use of the ROWs would be a negative impact in sensitive areas, while it would be a positive impact in areas where this type of use is allowed. The addition of the new ROW would allow for the possibility of creating more connections between existing trails, as well as providing new trails for users.

A visual impact, or indirect effect, would result from the inclusion of the poles and conductors, cleared ROW, or widened existing ROW within the viewshed of recreational users, and in particular trail users, during construction and operation. Generally, this impact would be brief because the conductors would be perpendicular to trails and, therefore, observed for only a short time.

Clearing vegetation in the ROWs would indirectly alter the wildlife habitat within the immediate vicinity, potentially affecting viewing and hunting opportunities. Interior forest dependent wildlife may move to a different area of the forest or utilize other existing habitat. Likewise, shrub- or grassland dependent species may become more available for viewing within an opened corridor.

During construction, increased levels of noise and dust may also occur as machinery is moved throughout the overall cumulative Project areas. Worker conversations and movement also would contribute to this impact, although the noise associated with these activities would dissipate after the completion of construction. Dust may be stirred from the ground as machinery is used to raise the poles and to string the conductors, to dig the trench for and recover the pipeline ROWs, construction of the highway road beds, and to perform cleanup activities at the St. Regis Superfund site. Impacts to recreation use from dust generation are expected to be minor and temporary.

Recreational activities also have a passive use value, through observation of wildlife and birds, and attendance at outdoor or forest-related events. These areas primarily include forested lands contained within the CNF. In these instances, people anticipate an uninterrupted view of forest cover or other natural setting and not the presence of structures associated with the transmission lines or pipeline ROWs. People who prefer this type of recreation, therefore, are impacted indirectly by the addition of new transmission and pipelines.

4.2.13. Agriculture

Although heavily forested as a whole, the Study Area also contains agricultural areas, particularly at the western and eastern edges and along the northern portion of the Study Area. The primary agricultural uses in the Study Area are pasture, row crops, and small grains. Wild rice also is grown commercially (OES, 2009).

Impacts to farmlands usually are greatest during the construction phase. During construction, utility equipment may damage crops, compact the soil, require grading and the temporary relocation of livestock fencing, and temporarily interrupt some farming activities (OES, 2009). Operational impacts would include the loss of farmland once the project features are in place.

All Project alternatives would result in long-term and temporary impacts to lands in agricultural use. During construction, temporary impacts within the ROWs may occur such as soil compaction and crop damages, depending upon the time of construction. Construction activities that may disturb surface soils include site clearing, grading, and excavation activities at structure locations, pulling and tensioning sites, setup areas, and the transport of crews, machinery, materials, and equipment over access routes. This analysis assumes that previously disturbed sites would be used for staging and stringing set up areas. If construction time periods from the Project and Enbridge pipeline construction are staggered, cumulative effects from temporary loss of agricultural land during construction are not expected.

Long-term loss of agricultural land would occur from the addition of Enbridge above-ground pipeline values and access points. However, the pipelines themselves would likely be buried deep enough (a minimum of 36 to 54 inches deep from the top of the pipeline to ground level) that traditional farming activities could continue after construction.

4.2.14. Forestry

Co-location of the Project and roadway or pipeline expansions on adjacent easements may result in compounding loss of forest, which could affect potential for future timber production and fragment wildlife or vegetation populations. Similar compounding effects may occur if the Project is located adjacent to existing or future CNF forest projects, some of which require a certain amount of forested acreage to study wildlife, vegetation, and fire suppression.

Total acres that would be affected by the Enbridge pipelines are 6,402.1 acres, approximately 1,254.5 acres of which are forested lands.

4.2.15. Mining

Because there are no direct or indirect effects, there are no cumulative impacts to mining.

4.2.16. Community Services

Because there are no anticipated long-term direct or indirect effects, there are no cumulative impacts to community services.

4.2.17. Public Utilities

When a high-voltage AC transmission line is located adjacent to a pipeline, the pipeline may be subjected to electrical interference from electric and magnetic induction, conductive interference, and capacitive effects. Capacitive effects are typically only a concern during pipeline construction when long sections of the pipeline are above ground. If the Project follows the Enbridge pipeline and construction of the Project overlaps with the construction timeframe of the two Enbridge pipelines, precautions would be necessary to mitigate the increased risk of electrical interference. To prevent contact shock hazards, proper horizontal and vertical separation between the transmission line's conductors and equipment used during pipeline construction and maintenance (such as cranes and shovels) must be maintained.

If these electrical interference effects are great enough during normal operation, then a potential shock hazard exists for anyone that touches an above-ground part of the pipeline, such as a valve or cathodic protection test station. In addition, during normal operation, if the induced AC current density at a flaw in the pipeline coating is great enough, AC pipeline corrosion may occur. Lastly, damage to the pipeline coating can occur if the voltage between the pipeline and surrounding soil becomes excessive during a fault condition.

4.2.18. Traffic and Transportation

Short-term impacts to traffic and transportation may occur during Project construction, due to detours or traffic delays caused by construction vehicles crossing roads, delivering materials, setting guard poles, or stringing conductors.

In locations where the Project is sited in proximity to other cumulative effects projects, especially in locations where the Project would closely following existing pipeline or roadway ROWs that are undergoing construction during the timeframe of Project construction, road closures and delays could result in compounding traffic delays. The longest delays in traffic would occur on roads with high traffic volumes, including U.S. 2, U.S. 71, and MN 371. However, complete road closures and related detours would likely last for only short periods of time (a period of hours, as opposed to a period of days), and could likely be anticipated and advertised well in advance for all projects. Some lane closures may be longer-term in nature, particularly where the Project closely parallels a road that is under construction or is located in proximity to construction of a pipeline or other cumulative effects project.

Project Route Alternative 1 and Segment Alternatives B and C have the potential to affect the planned MN 197/U.S. 71 expansion because they cross MN 197 (MP 1-7). In this location, construction of the Project could interfere with and slow highway expansions projects. Multiple construction vehicles in the area could increase traffic delays. Highway construction on MN 197/U.S. 71 is expected to occur in 2010 or 2011. Potential impacts could be reduced by coordinating construction schedules with MnDOT.

Project Route Alternative 2 and the Enbridge pipelines have the potential to affect the planned MN 197/U.S. 71 expansion because they cross MN 197 (MP 2-6). In this location, construction of the Project could interfere with and slow highway expansions projects. Multiple construction vehicles in the area could increase traffic delays. Highway construction is expected to occur in 2010 or 2011. Potential impacts could be reduced by coordinating construction schedules with MnDOT.

Although Route Alternative 3 is the longest of the Route Alternatives and could follow or parallel roadways for the longest distance, the Route Alternative is largely outside of cumulative effects projects identified, including MnDOT highway expansions, the Enbridge pipelines, the Superfund Site, and CNF projects. Thus, fewer cumulative effects to traffic and transportation would be anticipated for Route Alternative 3 than Route Alternatives 1 and 2.

4.2.19. Safety and Health

Because no direct or indirect effects are expected from magnetic fields associated with this project, no cumulative effects are expected.

Increased construction in the Study Area could result in increased spills and releases of construction-type materials (such as gasoline, diesel, and lubricating and hydraulic fluids); most result from vehicle and construction equipment fueling and maintenance in construction staging areas or along the ROW. However, the potential for spills are much greater if there is a break in a petroleum line once project operation begins. With implementation of Enbridge plans and procedures, including adherence to federal requirements, the reliability and safety of the proposed pipelines would meet or exceed industry standards. Due to these precautions, no adverse cumulative effects are expected.

4.2.20. Noise

Noise generated by construction equipment is likely to constitute the greatest temporary noise impact as a result of the cumulative projects. Earth moving machinery like bulldozers or supporting equipment like air compressors or concrete mixers will generate temporary noise above ambient background noise levels. With Project Alternative 3, the cities of Tenstrike, Blackduck, and Deer River would experience construction-related noise impacts while under Alternative 2, the cities of Cass Lake and Bena would be impacted. The impacts at nearest sensitive receptors from construction are expected to comply with the respective local noise ordinances per location as well as the applicable Minnesota noise standard and classifications under which noise generating activity is to occur. For daytime hours, the noise level would range from 60 dBa (L_{50}) for the most stringent noise area classification 1 (urban/residential) to 75 dBa (L_{50}) for noise area classification 3 (industrial/manufacturing).

In addition, the drilling rig, pumps, generators, and mobile equipment used for Enbridge horizontal directional drilling (HDD) operations produce noise that may impact nearby noise-sensitive uses. If noise from HDD operations cannot be mitigated to the required level, other measures—such as providing temporary lodging at a local motel for affected residents—could be used to avoid exposing residents to objectionable noise. Noise impacts from construction would be temporary and minor if appropriate mitigation measures are implemented.

5. Comparison of Alternatives

This section summarizes the comparative impacts of the No-Build Alternative and Route Alternatives 1, 2, and 3. Due to the differences in length and function of the various segment alternatives, the potential impacts of the proposed segments are not directly comparable and are not discussed herein. The section summarizes potential mitigation for the direct and indirect effects identified in Section 3.0 and the potential irreversible and irretrievable commitment of resources under the build alternatives. Finally, the section discusses the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity.

5.1. Comparative Impacts of Alternatives

Four main alternatives were carried forward for analysis in the environmental impact statement (EIS): Route Alternative 1; Route Alternative 2; Route Alternative 3; and the No-Build Alternatives. Route segments identified by the Applicants (Otter Tail Power et al., 2008a; Otter Tail Power et al., 2008b) were also included for analysis in the EIS. In general, potential impacts do not vary greatly between the build alternatives. Route Alternative 3 is significantly longer than Route Alternatives 1 and 2; as such, more acreage would be affected for resources located along Route Alternative 3 than Alternatives 1 and 2. The nature and extent of potential impacts to the Leech Lake Reservation (LLR) and Chippewa National Forest (CNF) lands would be similar to those for the entire lengths of Route Alternatives 1, 2, or 3. Route Alternative 3 was designed to avoid the LLR as much as possible; as such, impacts to resources within the LLR boundaries would be much less for Route Alternative 3 than for Route Alternatives 1 and 2.

Table 5-1: Comparative Impacts of Route Alternatives

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Treaty Trust Resources				
Direct impacts	Long-term loss of an important gathering area for tribal members.	Some long-term loss of gathering opportunities for tribal members.	Minimal loss of gathering opportunities for tribal members due to avoidance of the LLR.	No effect.
Aesthetics				
Direct impacts	Loss of scenic resources; loss of trees would change view; contrast to surrounding landscape. Conversion of 579 acres of forested area. Impact to spiritual and significant cultural area of the Leech Lake Band of Ojibwe; Aniishiinaabe cultural and spirituality is tied to land and the surrounding environment so any disturbance to this visual or aesthetics of Route Alterantive 1 corridor would have a direct affect to the Leech Lake People. Impacts to Ten Section management area	Loss of scenic resources; loss of trees would change view; contrast to surrounding landscape. Conversion of 439 acres of forested area. Alternative 2, which follows U.S.-2, would be visible to visitors and residents due to less forest cover to shield views and would be located near more recreational areas.	Loss of scenic resources; loss of trees would change view; contrast to surrounding landscape. Conversion of 813 acres of forested area.	No effect.
Air Quality and Climate				
Direct Impacts	Fugitive dust and vehicle emissions during construction.	Fugitive dust and vehicle emissions during construction.	Fugitive dust and vehicle emissions during construction. Alternative 3 would result in the greatest duration of construction effects due to its length.	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Indirect Impacts	Minor decrease in carbon sequestration potential due to loss of existing trees.	Minor decrease in carbon sequestration potential due to loss of existing trees.	Minor decrease in carbon sequestration potential due to loss of existing trees.	No effect.
Geology and Soils				
Topography	No effect.	No effect.	No effect.	No effect.
Geology	No effect.	No effect.	No effect.	No effect.
Soils	Soils would be disturbed during construction; erosion and compaction are possible. Temporary soil impacts from transmission line structures for entire route are 876 acres and long-term impacts are 3 acres. Temporary soil impacts to LLR from transmission line structures are 618 acres and long-term impacts are 2 acres. Temporary soil impacts to CNF from transmission line structures are 341 acres and long-term impacts is 1 acre. Long-term impacts from substation construction and expansion could range up to 7.8 acres.	Soils would be disturbed during construction; erosion and compaction are possible. Temporary soil impacts from transmission line structures for entire route are 931 acres and long-term impacts are 3 acres. Temporary soil impacts to LLR from transmission line structures are 631 acres and long-term impacts are 2 acres. Temporary soil impacts to CNF from transmission line structures are 281 acres and long-term impacts is 1 acre. Long-term impacts from substation construction and expansion are 3.5 acres.	Soils would be disturbed during construction; erosion and compaction are possible. Temporary soil impacts from transmission line structures for entire route are 1,070 acres and long-term impacts are 5 acres. Temporary soil impacts to LLR from transmission line structures are 4 acres and long-term impacts are 0 acres. Temporary soil impacts to CNF from transmission line structures are 846 acres and long-term impacts are 3 acres. Long-term impacts from substation construction and expansion are 3.5 acres.	No effect.
Water Resources				

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Surface Water	No major effect. If water bodies cannot be spanned, shore erosion, sedimentation, and changes in turbidity may occur. Crosses 4 water basins and 6 water courses along entire route. Crosses 3 water basins and 5 water courses on the LLR. Crosses 4 water basins and 5 water courses on CNF.	No major effect. If water bodies cannot be spanned, shore erosion, sedimentation, and changes in turbidity may occur. Crosses 2 water basins and 7 water courses along entire route. Crosses 2 water basins and 7 water courses on the LLR. Crosses 2 water basins and 2 water courses on CNF.	No major effect. If water bodies cannot be spanned, shore erosion, sedimentation, and changes in turbidity may occur. Crosses 9 water basins and 27 water courses along entire route. Avoids the LLR. Crosses 8 water basins and 15 water courses on CNF.	No effect.
Groundwater	No major effect.	No major effect.	No major effect.	No major effect. .
Floodplains				
Direct Effects	No major effect. If water bodies cannot be spanned, erosion or sedimentation may result in a loss of surrounding floodplains. Possible location of 8 structures in the FEMA designated areas.	No major effect. If water bodies cannot be spanned, erosion or sedimentation may result in a loss of surrounding floodplains. Possible location of 4 structures in the FEMA designated areas.	No major effect. If water bodies cannot be spanned, erosion or sedimentation may result in a loss of surrounding floodplains. Possible location of 46 structures in the FEMA designated areas with 16 in the CNF.	No effect.
Wetlands				
Direct Effects	Potential loss or conversion of wetlands.	Potential loss or conversion of wetlands.	Potential loss or conversion of wetlands. The highest amount of wetland type conversion would occur for Alternative 3.	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
	Potential effects to NWI wetlands: temporary impacts to 83 acres, wetland conversion of 209 acres, and <1 acre of long-term impacts along entire route. 113 structures are estimated in NWI wetlands.	Potential effects to NWI wetlands: temporary Impacts to 59 acres, wetland conversion of 166 acres, and <1 acre of long-term impacts along entire route. 93 structures are estimated in NWI wetlands.	Potential effects to NWI wetlands: temporary Impacts to 101 acres, wetland conversion of 269 acres, and <1 acre of long-term impacts along entire route. 120 structures are estimated in NWI wetlands.	
Indirect Effects	Conversion of wetland types may result in a change in wildlife species composition, diversity, and abundance.	Conversion of wetland types may result in a change in wildlife species composition, diversity, and abundance.	Conversion of wetland types may result in a change in wildlife species composition, diversity, and abundance.	No effect.
Biological Resources				
Direct Effects	Conversion of existing vegetation communities (1,048 acres). Disturbance of intact diverse native plant communities. Introduction or spread of noxious weeds in cleared ROWs. Short-term impacts to wildlife from conversion of forested habitat. Long-term conversion of wildlife habitat in areas that remain cleared and increased long-term fragmentation and edge effect (5.2 miles of new corridors). Would establish a long-term ROW in canopy forest.	Conversion of existing vegetation communities (1,018 acres). Disturbance of intact diverse native plant communities. Introduction or spread of noxious weeds in cleared ROWs. Short-term impacts to wildlife from conversion of forested habitat. Long-term conversion of wildlife habitat in areas that remain cleared and increased long-term fragmentation and edge effect (5.1 miles of new corridors).	Conversion of existing vegetation communities (1,759 acres). Disturbance of intact diverse native plant communities. Introduction or spread of noxious weeds in cleared ROWs. Short-term impacts to wildlife from conversion of forested habitat. Long-term conversion of wildlife habitat in areas that remain cleared and increased long-term fragmentation and edge effect (2.3 miles of new corridors).	No effect.
Species of Special Concern				

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Direct Effects	Potential for habitat conversion. Destruction of non-motile plant species, if located within ROW. Disturbance of intact diverse native plant communities. Affect to Ten Section Area by converting forested land and resulting in habitat conversion and edge effect. MnDNR and LLDRM have preliminarily determined Route Alternative 1 would jeopardize the only known one-flowered broomrape population in Northern Minnesota.	Potential for habitat conversion. Destruction of non-motile plant species, if located within ROW. Disturbance of intact diverse native plant communities Affects periphery of Ten Section Area by converting forested land and resulting in habitat conversion and edge effect.	Potential for habitat conversion. Destruction of non-motile plant species, if located within ROW. Disturbance of intact diverse native plant communities	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Cultural Resources and Values including TCPs				
Direct Effects	Potential loss or disturbance of cultural resources or sites Potential impacts on the viewshed of historical structures or landscapes. Potential to disturb unrecorded archaeological sites. Long-term loss of TCPs and locations where they are gathered. Impact to the vitality of the spiritual well-being of tribal residents who use TCPs. Presence of transmission line would alter cultural experience in areas identified as culturally significant, including Ten Section and Guthrie Till Plain areas.	Potential loss or disturbance of cultural resources or sites Potential impacts on the viewshed of historical structures or landscapes. Potential to disturb unrecorded archaeological sites. Long-term loss of TCPs and locations where they are gathered. Impact to the vitality of the spiritual well-being of tribal residents who use TCPs.	Potential loss or disturbance of cultural resources or sites Potential impacts on the viewshed of historical structures or landscapes. Potential to disturb unrecorded archaeological sites.	No effect.
Land Use				
Direct Effects	Temporary and long-term loss of land use by private owners. Temporary and long-term land impacts within ROW: 879 acres of which 579 acres of forested land will have long-term impacts. Conversion of 4 acres for new Cass Lake substation. Additional acreage may be required for possible expansion at Nary Junction.	Temporary and long-term loss of land use by private owners. Temporary and long-term land impacts within ROW: 934 acres of which 439 acres of forested land will have long-term impacts.	Temporary and long-term loss of land use by private owners. Temporary and long-term land impacts within ROW: 1391 acres of which 813 acres of forested land will have long-term impacts.	No effect.

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Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
	Total LLR temporary and long-term impacts: 620 acres; 433 acres of long-term forested land impacts. Total CNF temporary and long-term impacts: 342 acres; 294 acres of long-term forested land impacts.	Total LLR temporary and long-term impacts: 633 acres; 338 acres of long-term forested land impacts. Total CNF temporary and long-term impacts: 282 acres; 202 acres of long-term forested land impacts.	Total LLR temporary and long-term impacts: 4 acres; 1 acres of long-term forested land impacts. Total CNF temporary and long-term impacts: 840 acres; 584 acres of long-term forested land impacts.	
Indirect Effects	Potential for increased trespassing through creation of easements.	Potential for increased trespassing through creation of easements.	Potential for increased trespassing through creation of easements.	No effect.
Socioeconomics				

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Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Direct Effect	Short-term influx of income during construction and increased tax base (property taxes from the Applicant) during operation of the project. Economic benefit to businesses and surrounding communities through increased electrical capacity and reliability. Potential decrease in property values. Least potential to directly affect residences. 579 acres of forest land lost from timber harvesting. Greatest potential for impacts to subsistence uses from conversion and fragmentation of habitat and introduction of invasive species. Potentially affects up to 662 acres of total ROW within the LLR.	Short-term influx of income during construction and increased tax base (property taxes from the Applicant) during operation of the project. Economic benefit to businesses and surrounding communities through increased electrical capacity and reliability. Potential decrease in property values. 439 acres of forest land lost from timber harvesting. Moderate potential for impacts to subsistence uses from conversion and fragmentation of habitat and introduction of invasive species. Potentially affects up to 660 acres of total ROW within the LLR.	Short-term influx of income during construction and increased tax base (property taxes from the Applicant) during operation of the project. Economic benefit to businesses and surrounding communities through increased electrical capacity and reliability. Potential decrease in property values. Greatest potential to directly affect residences 638 acres of forest land lost from timber harvesting. Least potential for impacts to subsistence uses from conversion and fragmentation of habitat and introduction of invasive species. Potentially affects up to 4 acres of total ROW within the LLR.	Would not meet the area's need for reliable electric supply.
Indirect Effects	Increased timber sales in the vicinity of the project during construction, but loss of future timber resources.	Increased timber sales in the vicinity of the project during construction, but loss of future timber resources.	Increased timber sales in the vicinity of the project during construction, but loss of future timber resources.	No effect.
Environmental Justice				

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Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Direct Effects	Crosses the homeland of Minority Community. Will result in long-term loss of gathering lands and temporary disruption to hunting and gathering will occur during construction. Long-term aesthetic impacts to a Minority Community.	Crosses the homeland of Minority Community. Will result in long-term loss of gathering lands and temporary disruption to hunting and gathering will occur during construction. Long-term aesthetic impacts to a Minority Community.	Largely avoids the LLR. Will result in loss of a small amount of gathering lands and temporary disruption to hunting and gathering will occur during construction.	No effect.
Indirect Effects	Aesthetic intrusion would alter cultural experience in areas identified as culturally significant, including Ten Section and Guthrie Till Plain areas.			
Recreation and Tourism				
Direct Effects	Removal of forested land within the LLR CNF. Possible location of the ROW within the Bemidji Slough or Bemidji State Game Refuge. Potential Bemidji Slough impacts: 5 acres temporarily and 675 square feet long-term. Potential Bemidji State Game Refuge impacts: 65 acres temporarily and 0.2 acres long-term.	Removal of forested land within the LLR CNF. Possible location of the ROW within the Bemidji State Game Refuge. Potential Bemidji State Game Refuge impacts: 124 acres temporarily and 0.3 acres long-term.	Removal of forested land within the LLR CNF. Possible location of the ROW within the Bemidji Slough or Bemidji State Game Refuge. Potential Bemidji Slough impacts: 4.3 acres temporarily and 561 square feet long-term. Potential Bemidji State Game Refuge impacts: 111 acres temporarily and 0.3 acres long-term.	No effect.

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Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Indirect Effects	Changes to vegetation and land cover within easement may impact wildlife habitat and affect hunting areas. Creation of easements may increase the opportunities for OHV/snowmobile trails. Unexpected noise levels (during construction) or viewshed changes may affect non-motorized recreational activities.	Changes to vegetation and land cover within easement may impact wildlife habitat and affect hunting areas. Creation of easements may increase the opportunities for OHV/snowmobile trails. Unexpected noise levels (during construction) or viewshed changes may affect passive recreational activities.	Changes to vegetation and land cover within easement may impact wildlife habitat and affect hunting areas. Creation of easements may increase the opportunities for OHV/snowmobile trails. Unexpected noise levels (during construction) or viewshed changes may affect passive recreational activities.	No effect.
Agriculture				
Direct Effects	Loss of agricultural land (52 acres temporarily and 0.7 acres long-term) and prime farmland (1.3 acres long-term). Largest loss of agricultural and farmland on LLR. Potential interference with agricultural activities (maneuvering equipment around poles and aerial spraying).	Loss of agricultural land (31 acres temporarily and 0.3 acres long-term) and prime farmland (0.7 acres long-term). Potential interference with agricultural activities (maneuvering equipment around poles and aerial spraying).	Loss of agricultural land (119 acres temporarily and 2 acres long-term) and prime farmland (3.6 acres long-term). No affect to agricultural/farmland on LLR. Potential interference with agricultural activities (maneuvering equipment around poles and aerial spraying).	No effects.
Forestry				
Direct Effects	Long-term loss of forested land and timber resources.	Long-term loss of forested land and timber resources.	Long-term loss of forested land and timber resources.	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
	Conversion of about 579 acres of forested area to managed shrub and grasslands along entire route; 433 acres in LLR; 294 acres in CNF. 4 acres of forest land lost for new Cass Lake substation. Lost opportunity for silvicultural research in Pike Bay Experimental Forest. Affect to Ten Section Area by converting forested land and result in loss of old growth.	Conversion of about 439 acres of forested area to managed shrub and grasslands along entire route; 335 acres in LLR; 202 in CNF. Affect to Ten Section Area by converting forested land and result in loss of old growth.	Conversion of about 813 acres of forested area to managed shrub and grasslands along entire route; 1 acre in LLR; 584 acres in CNF.	
Mining				
	No major effect.	No major effect.	No major effect.	No effect.
Community Services				
	No major effect.	No major effect.	No major effect.	No effect.
Utility Systems				
Direct Effects	Potential interference with omnidirectional and unidirectional antenna, resulting in TV and radio interference. Electrical interference on underground pipelines.	Potential interference with omnidirectional and unidirectional antenna, resulting in TV and radio interference. Electrical interference on underground pipelines.	Potential interference with omnidirectional and unidirectional antenna, resulting in TV and radio interference. Electrical interference on underground pipelines.	Demand on existing transmission system would increase and brownouts (leading to blackouts) could occur.
Traffic and Transportation				
Direct Effects	Short-term road traffic and rail delays during construction. Electrical interference to railroads.	Short-term road traffic and rail delays during construction. Electrical interference to railroads.	Short-term road traffic and rail delays during construction. Electrical interference to railroads.	No effect.

Resource	Route Alternative 1 and associated Segment Alternatives	Route Alternative 2 and associated Segment Alternatives	Route Alternative 3 and associated Segment Alternatives	No-Build Alternative
Indirect Effects	Loss of living snow fences along highways, resulting in snow drift for drivers. Follows 25 miles of existing highway ROW. Potential conflicts with future roadway expansion.	Loss of living snow fences along highways, resulting in snow drift for drivers. Follows 60 miles of existing highway ROW. Potential conflicts with future roadway expansion.	Loss of living snow fences along highways, resulting in snow drift for drivers. Follows 32 miles of existing highway ROW. Potential conflicts with future roadway expansion.	No effect.
Safety and Health				
	No effect.	No effect.	No effect.	No effect.
Noise				
Direct Effects	Noise generated from operation of construction equipment.	Noise generated from operation of construction equipment.	Noise generated from operation of construction equipment.	No effect.

5.2. Mitigation of Impacts

The HVTL route permit would require certain mitigation measures to prevent or minimize both short-term and long-term impacts on resources from construction and operation of the Project. Additional mitigation measures were agreed to by the Applicants in the Application for a Route Permit (Otter Tail Power et al., 2008a), submitted in June 2008. Mitigation measures for each resource area are discussed in detail in Section 3.0 and summarized in Table 5-2.

Table 5-2: Summary of Mitigation Measures

Resource	Mitigation Measures
Aesthetics	Limits imposed in the HVTL permit for the removal of vegetation and trees.
	HVTL permit requirements for cleanup of construction waste.
	HVTL permit requirement to span water bodies when possible.
	ROW,access roads, temporary work spaces, and other private lands restoration required by the HVTL permit and as agreed upon in the vegetative management plan.
	Communication with landowners regarding specific pole placement.
	Use of uniform structure designs that blend into the natural environmental (i.e., wood poles).
	Placement of structures at the maximum possible distance from trails, water bodies, and highways.
	Limit number and placement of construction staging areas. Possible use of Enbridge cleared right of way.
	Cross water bodies in the same location as existing transmission lines.
	Double-circuit the Project with existing transmission or distribution lines to the extent possible.
	Parallel existing transmission line and pipeline easement to the extent possible.
	The height of the structures may be reduced, as feasible, to minimize impacts within areas of high scenic importance. Use of H-frame structures for the Mississippi River crossing would have a lower profile than single pole structures.
Air Quality and Climate	Use of Best Management Practices (BMPs) to control fugitive dust during construction: monitor dust generation; operate vehicles at reduced speeds; and use of water and dust abatement methods.
	Maintain construction vehicles, limit idling time, and could use 15 ULSD in all on/off road construction equipment.
	Limit burning of vegetative and construction debris for the entire project. Use alternative methods such as chipping the debris for mulching, for use as a fuel source or other uses. No burning of slash or construction piles will be allowed on or near the Leech Lake Reservation.
	No burning on or near the boundaries of the Leech Lake Reservation; in order to reduce the potential for Black Carbon and other emissions. Burning permit would be required from Leech Lake Band of Ojibwe.
	Restoration of the natural landscape would commence shortly upon cessation of construction activities, as is typically required as a condition of the HVTL permits issued by the Commission.
Soil and Geology	HVTL permit requirement to re-grade areas disturbed to construction to reflect topography existing before construction.
	Avoid disturbance of soils and excavation in steeply sloped areas.
	Implementation of Soil Erosion and Sediment Control Plan, required by the HVTL permit.
	Development of BMPs under a Storm Water Pollution Prevention Plan (SWPPP), including installation of silt fencing, straw bales or ditch blocks and/or covering bare soils with mulch, plastic sheeting, or fiber rolls to protect drainage ways and streams from sediment runoff from exposed soils.
	Restore compacted soils to their native state through tillage operations.

Resource	Mitigation Measures
	Limit setup and staging sites to previously disturbed areas.
	Identification of wet organic soils through mapping and, if necessary on-site investigations and soil borings.
	To the extent practicable, complete construction in the wet organic soils when the ground is frozen.
	Develop procedures for the proper storage and disposal of all hazardous and non-hazardous wastes generated during construction.
	Use controlled staging areas for refueling and hazardous material loading/unloading.
	Revegetate all disturbed areas once construction is complete. Seed mixes could be specified based upon site characteristics and in accordance with regulatory permits.
	In the event that previously contaminated soils are discovered during construction, the Applicants could stop work immediately, contact the appropriate state or tribal agency, and consult with the agency with respect to an acceptable plan of action.
Water Resources	HVTL permit requirement to span all water bodies to the extent possible.
	Plant or seed non-agricultural areas disturbed by transmission line structures to prevent runoff. Ensure that native seed mixes from the plants already indigenous to the immediate area of disturbance are used for the seeding.
	HVTL permit requirement to co-locate with existing transmission facilities along certain segments of a permitted route.
	Development of BMPs under a SWPPP including location of structures and disturbed areas away from water bodies; location of fueling activities and fuel and chemical storage away from water bodies; installation of sediment and erosion control; use of turbidity control methods; spread topsoil and seed in a timely manner; avoid use of fertilizer, pesticides, or herbicides near water bodies; implement procedures to minimize and control inadvertent fluid returns during horizontal direction drilling (if used).
	Compensatory mitigation if required under the Section 404 permit could include the restoration, establishment, enhancement, or preservation of wetlands or other aquatic resources to off-set Project impacts.
Floodplains	HVTL permit requirement to return floodplain contours to their pre-construction profile if disturbed during construction.
	HVTL permit requirement to span all water bodies and associated floodplains to the extent possible.
	Plant or seed non-agricultural areas disturbed by transmission line structures to prevent runoff. Use native seed mixes from the indigenous plants and plant indigenous plants located in the immediate disturbed soil area; ensure seeding and/or plantings are done in a time congruent with seeding and growth of the area, not during a time that would preclude germination or rooting.
	Use construction techniques to minimize run-off into floodplains during construction.
Wetlands	HVTL permit requirement to span wetlands to the extent possible.
	Plant or seed non-agricultural areas disturbed by transmission line structures to prevent runoff. Use native seed mixes from the indigenous plants and plant indigenous plants located in the immediate disturbed soil area; ensure seeding and/or plantings are done in a time congruent with seeding and growth of the area, not during a time that would preclude germination or rooting.

Resource	Mitigation Measures
	Development of BMPs under a SWPPP, NPDES permit, License to Cross Public Waters permit, Public Waters work permit, and Section 10 permit, including location of fueling activities and fuel and chemical storage away from water bodies; installation of sediment and erosion control; use of turbidity control methods; spread topsoil and seed in a timely manner; avoid use of fertilizer, pesticides, or herbicides near wetlands; implement procedures to minimize and control inadvertent fluid returns during horizontal direction drilling (if used).
	Schedule construction during frozen ground conditions.
	Access wetlands through the shortest route resulting in the least amount of physical impact to the wetland during construction.
	Assemble structures on upland areas before transporting into wetlands.
	Use of construction mats and specially designed all terrain vehicles to minimize impacts within wetlands when construction during winter (frozen) months is not possible.
	Restore wetlands as required by the USACE St. Paul District to replace wetland functions and values lost due to regulated activities pursuant to Section 404 of the Clean Water Act and St. Paul District Policy for Wetland Compensatory Mitigation in Minnesota, and in concert with other district policies and guidance.
Biological Resources	Reseed disturbed areas following construction with a LLDRM/CNF approved native species seed mix to restore native vegetation cover. Seed mix will be developed in conjunction with appropriate resource agencies taking into consideration culturally important species.
	Develop a noxious weed management program, including a noxious weed and vegetation management plan.
	Conduct a field review of ROW and construction staging sites prior to construction to identify areas that contain noxious weeds and should be avoided.
	Power-wash or manually remove material from construction vehicles prior to the start of construction and if equipment has traveled from an area contaminated by noxious weeds to an uncontaminated area.
	Siting the Project within or adjacent to existing ROWs to minimize impacts to wildlife habitat.
	Limit clearing and maintenance of the ROW within previously forested areas to the extent practicable.
	Install marked transmission line shield wires to the extent practicable within major flyways.
	Develop an Avian Protection Plan (APP).
Species of Special Concern	Placement of the ROW within the 1,000-foot-wide route to avoid known species of special concern, active nesting locations, and active breeding locations.
	Conduct ROW clearing outside of the breeding season.
	Notify appropriate agencies if previously unknown nesting/breeding sites are identified during construction.
	An *Orabanche uniflora* Mitigation Plan will be developed if the Project Route is placed in close proximity of the known population(s).
Cultural Resources	Avoid identified archaeological and historic resources through adjustment of the ROW within the selected 1,000-foot-wide route.
	Vegetative restoration of the ROW and construction areas using local native ecotype species. Seed mix will be developed in conjunction with appropriate resource agencies taking into consideration culturally important species.

Resource	Mitigation Measures
	Implement BMPs for water resources (see above) to minimize potential effects to wild rice.
	Use of single pole structures within the city of Cass Lake to minimize visual and aesthetic impacts to the viewshed of historical properties.
Land Use	Co-locating the Project along existing ROWs, including highways, railways, existing transmission lines, and pipelines.
	Communicate with MnDNR LLDRM, and CNF to identify and avoid sensitive forested areas.
	Reseed state and federal forested land with a seed mix recommended by the appropriate agency's management. Seed mix will be developed in conjunction with appropriate resource agencies taking into consideration culturally important species.
	Limit construction staging and lay-down areas to previously disturbed areas.
	Use the minimum necessary width and length for transmission line access roads.
	Communicate with private land owners regarding exact placement of structures and disturbed areas.
	Adjust conductor spans to avoid sensitive land use areas.
	Limit construction activities to the ROW, unless access permission is obtained from adjacent landowners.
	Repair or replace fences, gates, and similar improvements that are removed or damaged during Project construction.
Socioeconomics	Communicate with landowners regarding exact placement of structures and disturbed areas.
	Use the minimum necessary width and length for transmission line access roads.
	Limit construction activities to the ROW, unless access permission is obtained from adjacent landowners.
	Easement payments to landowners are required to compensate landowners for loss of use of the utility easement on their property.
	Co-locating the Project along existing ROWs, including highways, railways, existing transmission lines, and pipelines, to avoid crossing additional, undisturbed properties and affecting property values.
Environmental Justice	Communicate with private landowners regarding exact placement of structures and disturbed areas.
	To prevent long-term disruption to hunting and gathering resources, the HVTL permit would require restoration of the rights-of-way, temporary work spaces, access roads, and other lands affected by constructions. The HVTL permit would require the Applicants to work with the MnDNR, LLDRM, CNF, landowners, and local wildlife management programs to restore and maintain the rights-of-way to provide a useful and functional habitat for plants, nesting birds, small animals, and migrating animals to minimize habitat fragmentation. The Applicants could work with the LLDRM to allow them to collect and transplant (in whole or in part) traditionally important plants from the entire ROW. Opportunities could be provided to the LLDRM Plant Resource Department in order to conduct long-term management of portions of or the entire ROW through the LLR to reduce the occurrence of non-native invasive species and support traditionally important plants.

Resource	Mitigation Measures
	Span water bodies, wetlands, and floodplains to the extent possible, to minimize effects on wild rice resources.
Recreation and Tourism	Co-locating the Project along existing ROWs, including highways, railways, existing transmission lines, and pipelines, to avoid previously undisturbed recreation areas and wildlife habitat.
	Communicate with private landowners and resource management agencies regarding exact placement of structures and disturbed areas.
	Placement of barriers and signs at or near road crossings to limit unauthorized off-highway vehicle (OHV) or other vehicle traffic on ROWs.
	Conduct construction at water access points during winter months when use of such areas for recreation tourism is minimal.
	Align the Project ROW perpendicular rather than parallel to existing trails to the extent practicable to minimize impacts to recreation trails.
	Post signs during construction to provide residents and visitors with advance notice of what recreational activities may be affected during construction.
Agriculture	HVTL permit required Agricultural Mitigation Plan.
	Communicate with private landowners regarding placement of structures and disturbed areas to minimize effects on farming operations.
	Co-locating the Project along existing ROWs, including highways, railways, existing transmission lines, and pipelines, to avoid previously undisturbed agricultural land.
	Use of a single pole structure for placement on agricultural land.
	Compensate landowners for crop damage and soil compaction that occurs during Project construction.
	HVTL permit requirement to restore ROW and disturbed areas, including restoration of compacted soils through tillage operations.
Forestry	Limits imposed in the HVTL permit for the removal of vegetation and trees.
	Limits imposed in the HVTL permit for the creation of temporary easements for access roads and construction/staging areas. The HVTL permit could require that these areas be selected to minimize tree removal.
	Restoration of previously forested land with native shrubs and grasses as identified in the vegetation management plan. Plant seedlings in temporary work areas.
	Conduct construction activities on CNF lands in accordance with the Forest-Wide Management Directions, as provided in the 2004 Final Forest Plan.
	Offer timber harvested from the Project to the local community for use as firewood.
Mining	No mitigation measures identified.
Community Services	No mitigation measures identified.
Utility Systems	Proper maintenance, preventative maintenance, and selection of hardware for the transmission line.
	HVTL permit condition requiring the correction of interference to communication systems that the transmission line causes or creates.
	Modifying receiving antennae to correct radio interference.
	Detuning of transmission line structures if receiving antennae modifications do not eliminate interference with radio frequencies.
	Communicate with local radio broadcasting stations to confirm that blocking interference does not occur due to structure placement.

Resource	Mitigation Measures
	Modification or replacement of antenna or amplifier for residents that experience TV signal interference.
	Reduction of AC interference on pipelines through reducing the impedance of the transmission structure grounds, grounding the pipeline in conjunction with de-couplers, burying gradient control wires along the pipeline or ground mats under aboveground facilities (such as at valves), and the use of dead fronts at test stations.
	Conduct computer modeling of AC interference to ensure that property mitigation is designed and installed prior to energizing the transmission line.
	Schedule planned service disruptions that are necessary during construction activities with the affected owners of existing transmission lines. Provide advance notice of service disruption to electric customers.
	Ensure that utility repair crews are present or on-call during construction activities to respond to unplanned incidents that may result in an interruption to electric service.
Traffic and Transportation	Construct transmission line in accordance with National Electric Safety Code (NESC) guidelines for the required clearances between transmission lines and transportation structures.
	HVTL permit requirement to comply with MnDOT and all applicable road authorities' management standard and policies, including written notice of construction to MnDOT and applicable road authorities.
	HVTL permit requirement to restore the ROW, temporary work spaces, access roads, abandoned ROW, and other lands affected during construction, including living snow fences.
	File a "Notice of Proposed Construction of Alteration" with the FAA and provide an opportunity for the FAA to comment about compatibility of the Project with airport operations.
	Obtain MnDOT and county permits as applicable for transmission line crossings of roadways. Use of ROW along the National Highway System requires approval of the Federal Highway Administration.
	Implement traffic control measures during construction, which could include flag persons, barriers, and flashing lights.
	Install temporary wood pole "guard structures" to safeguard the public and construction workers during removal of existing conductors or stringing of new overhead conductors over highways.
	Grounding tracks and communication cables on existing rail lines to prevent interference.
	Use of taller structures where the Project crosses the railroad to increase clearance between passing trains and conductors.
	Consolidate the Project with existing transmission line to reduce the number of railroad crossings.
Safety and Health	Use BMPs to minimize the potential for spills or leaks from equipment during construction, including frequent inspections of equipment; requiring portable spill containment kits for construction equipment; ensuring that equipment operations are present at the nozzle at all times when fueling is in progress; and prohibiting the refueling of equipment in wetlands.
	Use of protective devices (e.g., breakers and relays) that would de-energize the transmission line in the event of an emergency.
	Use of fences at substations to prevent access.

Resource	Mitigation Measures
	Construct the Project in accordance with NESC standards regarding clearance, grounding, utility crossing, strength of materials, and ROW widths.
	Ground metal buildings, fences, and other large, permanent conductive objects in close proximity or parallel to the line to prevent electric field discharge.
	Minimize the length of the transmission line that parallels or is co-located with distribution of local service conductors to minimize the potential for stray voltage.
	Educating local livestock operations about techniques to reduce the potential for insulated electric fences to pick up an induced charge from the transmission line.
Noise	HVTL permit requirement for the Project to meet Minnesota noise standards.
	Limit construction to daytime work hours.
	Equip heavy equipment with sound attenuation devices, such as mufflers.
	Minimize noise impacts from substation through design, including setbacks from sensitive noise receptors, layout and landscaping choices, and use of low noise transformers.

5.3. Irreversible and Irretrievable Commitment of Resources

Irreversible commitment of resources refers to the loss of future options for resource development or management, especially of nonrenewable resources such as cultural resources.

The construction of the Project would require the irretrievable commitment of non-recyclable building materials and fuel consumed by construction equipment. Under certain Route Alternatives and Route Segments, as identified in applicable sections of the DEIS, the Project would require the irreversible or irretrievable commitment of old growth forest, including the Ten Section area and Pike Bay Experimental Forest. In addition, Route Alternative 1 could result in the loss of the Orabanche uniflora species, for which an incidental take permit from the USFWS may be required.

5.4. Relationship between Short-term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity

Construction of the Project would have short-term impacts on environmental resources, primarily associated with installation of poles and conductors, clearing of the right-of-way (ROW), and use of construction lay-down areas. Temporary impacts from construction activities are discussed in Section 3.0 and Table 5-1 above. The HVTL permit would require the Applicants to restore the ROW, temporary work spaces, access roads, abandoned ROW, and other lands affected by construction of the Project. During the restoration process, the Applicants would be required by the HVTL to work with landowners, the Minnesota Department of Natural Resources (MnDNR), and local wildlife management programs to ensure that the restored ROW would provide useful and functional habitat for vegetation and wildlife.

The short-term use of environmental resources would result in increased electrical reliability for the region in which the Project would be located. The Project and associated facilities (e.g., substations, breaker stations) would remain operational for over 50 years (Otter Tail Power et al., 2008a). Within that time, environmental resources would return to their long-term productivity, with the exception of those resources for which long-term impacts beyond a 50-year time period would occur. Estimate long-term impacts to resources within the 125-foot ROW are show in Table 5-3.

Table 5-3: Estimated Long-Term Impacts (acres) to Resources within a 125-foot Feasible Right-of-Way

Resource	Route Alternative 1	Route Alternative 2	Route Alternative 3
Forested lands	579	439	813
Soils	3	3	5
Wetland type conversion	209	166	269
Wetlands	<1	<1	<1
Shrub land	<1	<1	Up to 1.4
Cropland/Grassland	<1	<1	Up to 2.4
Agricultural land use	<1	<1	2.03
Prime farmland	1.3	<1	3.6

Construction and operation of the project would result in long-term impacts to soils, forested land, wetlands, shrub land, cropland/grassland, agricultural land, and prime farmlands. These resources would not return to productivity until the transmission line and associated facilities are removed. In the case of wetland conversion, impacts could be mitigated through reclamation, restoration, or permanently protecting other wetlands for an offset of wetland losses. For all other resource areas identified in the EIS, long-term impacts beyond the Project lifetime of 50 years are either not anticipated or expected to be avoided through mitigation measures.

6. Regulatory and Permit Requirements

Construction of the Project would require a High Voltage Transmission Line (HVTL) permit from the Minnesota Public Utilities Commission (Commission) (Minn. Stat. 216E.03, subd. 2). Additional potentially required permits and approvals are listed in Table 6-1 below. The table also includes applicable Executive Orders and departmental policies on land use management, which may guide regulating federal agencies in the permit or approval process.

Table 6-1: Potentially Required Permits and Approvals

Regulation/Policy	Citation	Description – As Relevant to Project
Federal Regulations and Permits		
American Indian Religious Freedom Act of 1978	42 U.S.C. 1996	The Act ensures the protection of sacred locations and access of Native Americans to those sacred locations and traditional resources that are integral to the practice of their religions.
Archaeological Resources Protection Act	16 U.S.C. 470	The Act requires a permit for the excavation or removal of archaeological resources from publicly held or Native American lands. Permitted excavations must further archaeological knowledge and the resources removed are to remain the property of the United States. Tribal consent must be issued if the resource is found on land owned by a Native American tribe.
Clean Air Act	42 U.S.C. 7401	The Act establishes NAAQS for certain pervasive pollutants. The Act establishes limitations on SO_2 and NO_x emissions and sets permitting requirements. Authority for implementation of the permitting program is delegated to the MPCA.
Clean Water Act, as amended in 1972	32 U.S.C. 1251	The Act contains standards to address the causes of pollution and poor water quality, including municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction. Specific sections of the Act relevant to the Project include: Section 402 — National Pollutant Discharge Elimination System (NPDES) Permit. Requires sources to obtain permits to discharge effluents and stormwaters to surface waters. The NPDES permit would be issued by the state of Minnesota; and Section 404 — Permits for Dredged or Fill Material. Regulates the discharge of dredged or fill material in the jurisdictional wetlands and waters of the United States. Permits are issued by the USACE.
Determination of No Hazard to Air Navigation	40 CFR 77.19	The FAA must confirm that construction of the Project does not constitute a hazard to air navigation.
Emergency Planning and Community Right-to-Know Act of 1986	42 U.S.C. 11001 et seq.	The Act requires that the Applicant maintain an inventory of specific chemicals used or stored on-site

		and annually report quantities present or used over applicable threshold.
Endangered Species Act of 1973 and Amendments of 1982	16 U.S.C. 1531 et seq.	The Act requires any federal agency authorizing, funding, or carrying out any action to ensure that the action is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species. If the Project is determined to be an activity that might incidentally harm (or "take") endangered or threatened species, the Applicants would be required to obtain an incidental take permit from the USFWS. In addition to obtaining the permit, the Applicants would be required to develop a Habitat Conservation Plan.
Farmland Protection Policy Act	7 U.S.C. 4201 et seq.	The Act requires federal agencies to identify and quantify adverse impacts of federal programs on farmlands to minimize the number of federal programs that contribute to the unnecessary and irreversible conversion of agricultural land to non-agricultural uses.
Fish and Wildlife Conservation Act of 1980	16 U.S.C. 2901 et seq.	The Act encourages federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats.
Fish and Wildlife Coordination Act	16 U.S.C. 661 et seq.	The Act requires federal agencies to consult with the USFWS and the state agency responsible for fish and wildlife resources if the Project affects water resources.
Highly Erodible Land & Wetland Conservation	7 CFR Part 12	The regulation sets forth the terms and conditions under which a person who produces an agricultural commodity on highly erodible land or designates such land for conservation use, plants an agricultural commodity on a converted wetland, or converts a wetland shall be determined to be ineligible for certain benefits provided by the USDA and agencies and instrumentalities of USDA.
Migratory Bird Treaty Act	16 U.S.C. 703 et seq.	The Act protects birds that have common migration patterns between the United States and Canada.
National Environmental Policy Act of 1969	42 U.S.C. 4321-4347	The Act requires agencies of the federal government to study the possible environmental impacts of major federal actions significantly affecting the quality of the human environment.
National Forest Management Act	16 U.S.C. 1600-1614	The National Forest Management Act reorganized, expanded and otherwise amended the Forest and Rangeland Renewable Resources Planning Act of 1974. The National Forest Management Act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of national forests.
National Historic Preservation Act	16 U.S.C. 470 et seq.	Under Section 106 of the Act, prior to the approval of the expenditure of any federal funds on the Project or prior to the issuance of any license, the federal agency must take into account the effect of the Project on any district, site, building, structure, or object that is included

		in or eligible for inclusion in the National Register. The federal agency shall afford the Advisory Council on Historic Preservation established under Title II of the Act a reasonable opportunity to comment with regard to such undertaking.
National Trails System Act	16 U.S.C. 1241-1251	The Act allows easements and ROWs upon, over, under, across, or along the national trails system to be granted by the Secretary of the Interior or Secretary of Agriculture, in accordance with the laws applicable to the national parts system and national forest system.
Native American Graves & Repatriation Act	25 U.S.C. 3001	The Act requires the Secretary of the Interior to guide the repatriation of federal archaeological collections and collections that are culturally affiliated with Native American tribes and held by museums that receive federal funding.
Noise Control Act	42 U.S.C. 4901-4918	The Act directs federal agencies to carry out programs in their jurisdictions “to the fullest extent within their authority” and in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health and welfare.
Notice to the Federal Aviation Administration	14 CFR Part 77	The regulation requires that the FAA be notified if structures are to be over 200 feet high to determine if the structures would be an obstruction to air navigation.
Occupational Safety and Health Act of 1970	29 U.S.C. 651 et seq.	The Act established regulations for the protection of worker health and safety. The Applicants would be subject to OSHA general industry standards and OSHA construction standards.
Pollution Prevention Act of 1990	42 U.S.C. 13101 et seq.	The Act establishes a national policy for waste management and pollution control.
Rivers and Harbor Act of 1899	33 CFR Part 322	The Act requires a Section 10 permit from the USACE if the Project requires structures or work in or affecting navigable waters.
Resource Conservation & Recovery Act	42 U.S.C. 6901	The Act regulates the treatment, storage, and disposal of hazardous wastes. The Applicants would be required to manage hazardous wastes generated during construction or operation of the Project in accordance with RCRA.
Safe Drinking Water Act	42 U.S.C. 300	The Act authorizes the USEPA to regulate public drinking water supplies by establishing drinking water standards, delegating authority for enforcement of drinking water standards to the states, and protecting aquifers from hazards such as injection of wastes and other materials into wells. The Act is enforced in the state by the Minnesota Department of Health, who manages applicable permits and registrations.
USDA’s Enhancement, Protection, & Management of the Cultural Environment	7 CFR Part 3100	This regulation establishes USDA policy regarding the enhancement, protection, and management of the cultural environment. The regulation establishes procedures for implementing Executive Order 11593, and regulations promulgated by the Advisory Council on Historic Preservation (ACHP) “Protection of Historical and Cultural Properties” in 36 CFR part 800 as required by §800.10 of those regulations. Direction is provided to the agencies of USDA for protection of the cultural environment.

Wild and Scenic Rivers Act	16 U.S.C 1271	The Act prohibits federal support of actions that would harm the free-flowing conditions, water quality, or resource values of waters designated as wild and scenic rivers.
Wilderness Act	16 U.S.C 1131	The Act prohibits the construction of commercial enterprise or permanent roads within any wilderness area designated by the Act, except as necessary to meet minimum requirements for the administration of the area. There can be no temporary roads or structures installed within designated areas.
Leech Lake Reservation Regulations and Permits		
Reservation Resolution		Permits the Project to cross the Leech Lake Reservation.
Executive Orders		
E.O. 11988, Floodplain Management	E.O. 11988	The executive order directs federal agencies to establish procedures to ensure that they consider potential effects of flood hazards and floodplain management for any action undertaken. Agencies are to avoid impacts to floodplains to the extent practical.
E.O. 11990, Protection of Wetlands	E.O. 11990	The executive order directs federal agencies to avoid short- and long-term impacts to wetlands if a practical alternative exists.
E.O. 12898, Environmental Justice	E.O. 12898	The executive order directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.
E.O. 13007, Indian Sacred Sites	E.O. 13007	The executive order directs federal agencies, to the extent permitted by law and consistent with agency missions, to avoid adverse effects to sacred sites and to provide access to those sites to Native Americans for religious practices.
E.O. 13112, Invasive Species	E.O. 13112	The executive order directs federal agencies to prevent the introduction or to monitor and control invasive non-native species and provide for restoration of native species.
E.O. 13175, Consultation and Coordination with Indian Tribal Governments	E.O. 13175	The executive order directs federal agencies to establish meaningful consultation and collaboration with tribal governments to strengthen United States government to government relationships with Indian tries.
E.O. 13186, Responsibilities of Federal Agencies to Protect Migratory Birds	E.O. 13186	The executive order directs federal agencies to avoid or minimize the negative impacts of their actions on migratory birds, and to take active steps to protect birds and their habitats.
State Regulations and Permits		
Aboveground Storage Tank Registration	Minn. R. ch. 7001 and 7151	The rule requires that aboveground storage tanks larger than 110 gallons of oil or petroleum products must be registered with the state.
Access Permit	Minn. R. 8810.0050	The rule requires the Applicants to obtain an access permit from MnDOT when access is needed from established MnDOT ROWs.
Certificate of Need	Minn. R. ch. 7829, 7849,	The rule requires the Applicants to submit a description of the proposed energy facility and its probable location,

	7851, 7853, and 7855	an indication of forecast information upon which the alleged need is based, a discussion of possible alternatives and why they were rejected, and environmental information related to construction and operation of the proposed facility to the PUC.
Cultural Resources Review	36 CFR Part 800	The federal regulation requires state review under the National Historic Preservation Act.
Drainage Permit	Minn. R. 8810.3200-8810.3600	The rule requires a permit for the repair of utility or rebuilding of structures already in place (e.g., manholes, catch basins).
Easement Across State-Owned Land Managed by the Minnesota Department of Natural Resources	Minn. Stat. 84.63 and 84.631	The statute requires that MnDNR issue an easement to cross state-owned lands for the purposes of construction.
Electrical Inspection	Minn. R. ch. 3800	The rule requires the Project to conform to all applicable electrical codes, enforced by the state.
Environmental Laboratory Certification	Minn. R. 4740.2010-4740.2120	The rule states that if sampling is required under state or federal permits (e.g., NPDES), environmental laboratory certification would be required.
Hazardous Waste Generator License	Minn. R. 7045.0225	The rule requires that if the Project generates greater than 10 gallons of hazardous waste in a calendar year, the Applicants must obtain a license.
License to Cross Public Lands and Waters	Minn. R. ch. 6135	The rule requires a license if utility services are to cross public waters or lands administered by the MnDNR.
Minnesota Endangered Species Law and Permit	Minn. R. ch. 6134 and Minn. Stat. 84.0895	The statute requires MnDNR to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern. The resulting list of Endangered, Threatened, and Special Concern Species is codified as Minn. R. ch. 6134. If the Project is determined to be an activity that including picking, digging, or destroying a threatened or endangered plant species, the Applicants would be required to obtain a permit from the MnDNR.
NPDES General Construction Stormwater Permit	40 CFR 122.26; Minn. R. 7001.1035	The federal regulation authorizes the state environmental agency to regulate NPDES general stormwater permits. Coverage under the state general permit is required for construction projects disturbing greater than 1 acre of land.
NPDES/SDS Permit	Minn. R. 7001.0020	The rule requires a permit if wastewater generated from the Project is to be discharged to waters of the U.S.
Public Waters Work Permit (Protected Waters Permit)	Minn. R. 6115.0160-6115.0280	The rule requires a permit for work activities that would change or diminish the course, current, or cross section of public waters within the state.
Utility Permit on Trunk Highway ROW	Minn. R. 8810.3100-8810.3600	The rule requires a permit to install or move existing utilities on existing highway ROWs.
Water Appropriation Permit	Minn. R. 6115.0600-6115.0810; 6115.0010	The rule requires a general notification to the MnDNR if groundwater is withdrawn for construction dewatering, landscaping, or hydrostatic testing. A Water Appropriations Permit would be required if groundwater is withdrawn at a rate greater than 10,000 gallons per day or one million gallons per year.
Departmental Policies		
Land and Resource Management Plan –		The Land and Resource Management Plan (Forest

Chippewa National Forest - 2004		Plan) establishes direction for natural resource management on the Chippewa National Forest.
USDA Departmental Regulation, Land Use Policy	DR 9500-3	The policy directs departments within the USDA to discourage unwarranted conversion to other uses of prime and unique farmlands, farmlands or statewide or local importance, and prime rangelands. The policy directs the agency to advocate for the retention of important farmlands, rangelands, forest land, and wetlands, and to reduce the risk of flood loss and soil erosion.
USDA Departmental Regulation, Fish & Wildlife Policy	DR 9500-4	The policy directs departments within the USDA that manage lands (e.g., Nation Forest System) to give consideration to fish and wildlife in developing programs for the lands.
USDA Departmental Regulation, Policy on Range	DR 9500-5	The policy directs departments within the USDA to undertake activities and implement programs to protect, enhance, and use range ecosystems.

Notes: EO = Executive Order
Sources: Otter Tower Power et al., 2009; U.S. Department of Energy, 2007

In addition to the permits and approvals described above, county and city construction and building permits would be required. Design and construction of enclosures associated with the new substation and substation modification would be subject to municipal and county requirements.

As lead federal agency, RUS is responsible for ensuring that the Project complies with Treaties of the United States with the Leech Lake Band of Ojibwe, including:

- Treaty with Chippewa July 29th, 1837;
- Treaty with Chippewa October 4th, 1842;
- Treaty with Chippewa, Pillager August 21st, 1847;
- Treaty with Chippewa September 30th, 1854;
- Treaty with Chippewa February 22nd, 1855;
- Treaty with Chippewa, Mississippi, Pillager, Lake Winnibigoshish May 7th, 1863; and
- Treaty with Chippewa, Mississippi, Pillager, Lake Winnibigoshish May 7th, 1864.

7. Agencies and Tribes Contacted

Consultation with tribes, federal and state agencies has been ongoing. Various federal and state interagency meetings were conducted to share Project information and determine the scope of the EIS and throughout the development of the EIS.

7.1. Cooperating Agencies

The Minnesota Department of Commerce, Office of Energy Security (OES) (co-lead)
United States Department of Agriculture Rural Development (RUS)) (co-lead)

U.S. Forest Service (USFS) Chippewa National Forest (CNF), U.S. Army Corps of Engineers (USACE), and the Division of Resource Management, Leech Lake Band of Ojibwe Indians (LLDRM) agreed to assist RUS as cooperating agencies in preparing this EIS.

7.2. Federal Agencies Contacted

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Bureau of Indian Affairs
U.S. Department of Agriculture, Natural Resources Conservation Service

7.3. Minnesota Agencies Contacted

Minnesota Department of Natural Resources
Minnesota Department of Transportation
Minnesota Public Utilities Commission
Minnesota State Historic Preservation Office

7.4. Tribes Contacted

Leech Lake Band of Ojibwe
Assiniboine and Sioux Tribes of Fort Peck
Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation
Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe
Flandreau Santee Sioux Tribe of North Dakota
Fond du Lac Band of the Minnesota Chippewa Tribe
Grand Portage Band of the Minnesota Chippewa Tribe

Keweenaw Bay Indian Community
Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
Lac Vieux Desert Band of Lake Superior Chippewa Indians
Lower Sioux Community Council
Mille Lacs Band of the Minnesota Chippewa Tribe
Prairie Island Indian Community
Red Cliff Band of Lake Superior Indians of Wisconsin
Red Lake Band of Minnesota Chippewa Tribe
Santee Sioux Nation, Nebraska
Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
Sokaogon Chippewa Community
Spirit Lake Nation
St. Croix Chippewa Indians of Wisconsin
Upper Sioux Community of Minnesota
White Earth Band of Minnesota Chippewa Tribe

8. Distribution List

The DEIS was distributed to the agencies, organizations, persons, and locations listed below:

8.1. Federal Agencies

Advisory Council on Historic Preservation
Chippewa National Forest
NOAA Office of Policy and Strategic Planning
U.S. Army Corps of Engineers, Bemidji Regulatory Office
U.S. Army Corps of Engineers, Mississippi Valley Division
U.S. Department of Agriculture National Agricultural Library
U.S. Department of Agriculture APHIS PPD/EAD
U.S. Department of Agriculture Natural Resources Conservation Service
U.S. Department of Agriculture Office of Civil Rights
U.S. Department of Interior, Office of Environmental Policy and Compliance
U.S. Department of Interior, Bureau of Indian Affairs, Midwest Office
U.S. Environmental Protection Agency, Region 5
U.S. Fish and Wildlife Service

8.2. Tribal Entities

Leech Lake Band of Ojibwe
Leech Lake Band of Ojibwe, Division of Resource Management

8.3. Minnesota State Agencies

Minnesota Board of Water and Soil Resources
Minnesota Department of Natural Resources
Minnesota Department of Agriculture
Minnesota Department of Health
Minnesota Department of Transportation
Minnesota Indian Affairs Council
Minnesota Office of Attorney General
Minnesota Pollution Control Agency
Minnesota State Historic Preservation Office

8.4. Local Units of Government

Beltrami County
Cass County
Hubbard County
Itasca County
Bemidji

Bena
Cass Lake
Deer River
Zemple
Cohasset
Blackduck

8.5. Local Libraries

Bemidji Public Library
Blackduck Public Library
Bovey Public Library
Cass Lake Public Library
Coleraine Public Library
Grand Rapids Public Library
Margaret Welch Memorial Library
Walker Public Library

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